

HEALTH SERVICES RESEARCH

Reliability and Validity of the Pain Anxiety Symptom Scale in Persian Speaking Chronic Low Back Pain Patients

Sanaz Shanbehzadeh, PhD,* Mahyar Salavati, PT, PhD,* Mahnaz Tavahomi,†
Ali Khatibi, PhD,‡ Saeed Talebian, PhD,§ and Khosro Khademi-Kalantari, PhD§

Study Design. Psychometric testing of the Persian version of Pain Anxiety Symptom Scale 20.

Objective. The aim of this study was to assess the reliability and construct validity of the PASS-20 in nonspecific chronic low back pain (LBP) patients.

Summary of Background Data. The PASS-20 is a self-report questionnaire that assesses pain-related anxiety. The Psychometric properties of this instrument have not been assessed in Persian-speaking chronic LBP patients.

Methods. One hundred and sixty participants with chronic LBP completed the Persian version of PASS-20, Tampa Scale of Kinesiophobia (TSK), Fear-Avoidance Beliefs Questionnaire (FABQ), Pain Catastrophizing Scale (PCS), trait form of the State-Trait Anxiety (STAI-T), Oswestry Low Back Pain Disability Index (ODI), Beck Depression Inventory (BDI-II), and Visual Analogue Scale (VAS). To evaluate test-retest reliability, 60 patients filled out the PASS-20, 6 to 8 days after the first visit. Test-retest reliability (intraclass correlation coefficient [ICC], standard error of measurement [SEM], and minimal detectable change [MDC]), internal consistency, dimensionality, and construct validity were examined.

Results. The ICCs of the PASS-20 subscales and total score ranged from 0.71 to 0.8. The SEMs for PASS-20 total score was

7.29 and for the subscales ranged from 2.43 to 2.98. The MDC for the total score was 20.14 and for the subscales ranged from 6.71 to 8.23. The Cronbach alpha values for the subscales and total score ranged from 0.70 to 0.91. Significant positive correlations were found between the PASS-20 total score and PCS, TSK, FABQ, ODI, BDI, STAI-T, and pain intensity.

Conclusion. The Persian version of the PASS-20 showed acceptable psychometric properties for the assessment of pain-related anxiety in Persian-speaking patients with chronic LBP.

Key words: chronic, low back pain, pain-related anxiety, persian version, reliability, validity.

Level of Evidence: 3

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Chronic low back pain (LBP) is among 10 top conditions accounting for highest disability-adjusted life years worldwide.¹ The lifetime prevalence of LBP is higher in industrialized societies (up to 60%) and is known as the leading cause of work absence, activity limitation, and other social and familial restrictions. LBP imposes a high affective and at the same time economic burden on individuals, families, and the society.²

Various pain-related psychological factors, such as pain catastrophizing, fear of pain, and pain-related anxiety are suggested to be linked to the development, aggravation, and prolongation of the pain.^{3,4} Vowels *et al*⁵ suggested that psychological variables are important in the prediction of the problematic aspects of chronic LBP. The fear-anxiety-avoidance model of chronic pain highlights the role of pain-related anxiety in mediating the relationship between pain-related fear and avoidance from pain-arousing situations and activities.^{3,6,7} Moreover, it contributes substantially to disability, depression, and maladjustments to pain.^{8,9} To understand the complex nature of chronic LBP paying attention to anxiety and fear of pain is of great importance.⁵

The theoretical and empirical work in the field of pain has supported the development of instruments measuring different aspects of pain-related cognitions among chronic pain patients. Accordingly, the Pain Anxiety Symptom Scale

From the *Department of Physiotherapy, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran; †Department of Physical Therapy, School of Rehabilitation, Iran University of Medical Sciences, Tehran, Iran; ‡Psychology Department, 2-Interdisciplinary Program in Neuroscience, Bilkent University, Ankara, Turkey; and §Department of Physiotherapy, School of Rehabilitation, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

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Address correspondence and reprint requests to Mahyar Salavati, PT, PhD, Department of Physiotherapy, University of Social Welfare and Rehabilitation Sciences, Evin, Koodakyar Ave, Tehran 1985713831, Iran; E-mail: mahyarsalavati@gmail.com

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(PASS) was developed to measure pain-related anxiety. Four aspects of anxiety including fear of pain, cognitive anxiety, escape-avoidance behaviors, and physiological symptoms of anxiety are assessed by the instrument.⁹

The original version of PASS is a 40-item scale with acceptable psychometric properties and proved to be a valid measure of pain-related anxiety (internal consistency: $\alpha = 0.74-0.94$; test-retest reliability: $r = 0.74-0.87$).⁹ Later, a short form 20-item PASS was developed, which showed adequate psychometric properties and was proven to be a useful instrument for the assessment of pain-related anxiety and fear among chronic pain patients.¹⁰ The translated versions of the PASS-20 have been validated in different languages and cultures including Dutch,¹¹ German,¹² Chinese,¹³ and Korean,¹⁴ which had good psychometric properties. The Persian version of the PASS-20 has been used in previous studies¹⁵; however, no study has systematically investigated the psychometric properties of the Persian PASS-20 in an independent sample of chronic pain patients. Therefore, the purpose of the present study was to examine the reliability (internal consistency and test-retest) of the Persian PASS-20 and its construct validity by exploring correlations with other psychological and pain-related fear measures in a population of Persian-speaking individuals with chronic LBP.

METHODS

Participants

From January to May 2015, a consecutive sample of convenience consisting of 160 native Persian speakers with chronic LBP participated in a test session and 60 of them participated on a retest session. They had a history of at least 3 months of persistent pain between the 12th rib and the gluteal fold without any specific diagnosed pathology. They were not diagnosed to have infections, tumors, osteoporosis, fractures, structural deformities, inflammatory disorders, radiculopathy, or cauda equina syndrome. Participants' age was between 18 and 50 years (mean age 32, SD = 12.3), and their mean (SD) of pain intensity and duration of pain was 3 (2.4) and 68.6 (60) months, respectively. Table 1 shows the sociodemographic profile of the participants. All patients signed an informed consent form approved by the Ethics Committee at University of Social Welfare and Rehabilitation Science, before participation.

Instruments

PASS-20

The PASS-20 is a 20-item self-report measure to assess pain-related anxiety. The scale contains four subscales: cognitive anxiety, escape/avoidance behaviors, fear of pain, and physiological symptoms of anxiety. Each item is rated on a six-point scale ranging from 0 (never) to 5 (always). Total score ranges from 0 to 100, higher scores represent greater pain-related anxiety. Evidence indicates good reliability, validity, and internal consistency for PASS-20.^{10,11,16}

TABLE 1. Sociodemographic Profile of the LBP participants (n = 160)

Characteristics	%
Sex	
Male	28
Female	72
Marital status	
Never married	45
Married	50
Divorced	5
Education level	
Completed high school	5
College	22
Graduate school	48
Post graduate	25
Employment status	
Employed	66.5
Unemployed	33.5

LBP indicates low back pain.

Tampa Scale of Kinesiophobia

The Tampa scale of Kinesiophobia (TSK) is a 17-item questionnaire (TSK), measuring fear of movement and (re)injury. Each item is answered on a four-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). Total score ranges from 17 to 68. Higher scores indicate greater levels of fear of movement and (re)injury. The Persian version of TSK has been reported to have acceptable psychometric properties in individuals with chronic LBP.¹⁷

Fear-avoidance Beliefs Questionnaire

The Fear-avoidance Beliefs Questionnaire (FABQ) is a 16-item questionnaire designed to study patients' beliefs about the potential harmful effects of work and physical activity.¹⁸ The FABQ contains two subscales (work and physical activity). Each item is scored on a seven-point Likert scale ranging from 0 (strongly disagree) to 6 (strongly agree). The total score of the FABQ/physical activity ranges from 0 to 24. The total score for the FABQ/work subscale ranges between 0 and 42. Higher scores indicate increased levels of fear-avoidance beliefs. The Persian version of FABQ has been reported to have good reliability and validity among chronic LBP patients.¹⁹

Pain Catastrophizing Scale

The Pain Catastrophizing Scale (PCS) is a 13-item scale designed to assess the patient's catastrophizing thoughts and behaviors during pain intervals or in anticipation of pain. Items are scored on a five-point scale ranging from 0 (totally disagree) to 4 (totally agree). The total score ranges from 0 to 52, with higher scores indicating more severe pain-related catastrophizing. The Persian version of the PCS has been reported to be valid and reliable in chronic pain patients.²⁰

State-trait Anxiety Inventory)

The trait form of State-Trait Anxiety Inventory (STAI) (STAI-T) is a 20-item questionnaire that assesses the general tendency of the respondent to perceive situations as threatening. The instrument targets “how respondents generally feel.” The items are rated on a four-point Likert scale, ranging from 1 (almost never) to 4 (almost always). The reliable and valid Persian version of this instrument was used in the present study.²¹

Oswestry Low Back Pain Disability Index

The Oswestry Low Back Pain Disability Index (ODI) is a 10-item measure designed to assess patient’s perceived disability as a consequence of LBP. Each item is scored on a six-point scale (0–5), with 0 representing no limitation and 5 representing maximal limitation. Total score ranges from 0 to 100 percent. Higher scores indicate greater perceived disability by the patient. The Persian version of ODI used in the present study has been shown to have acceptable reliability and validity in LBP patients.²²

Beck Depression Inventory

The Beck Depression Inventory (BDI-II) is a widely used instrument to assess the severity of depressive symptoms. BDI contains 21 questions with answers graded on a four-point scale ranging from 0 (absent or mild) to 3 (severe). The total score ranges from 0 to 63 with higher scores indicating more severe depressive symptoms. Its psychometric properties have demonstrated good reliability and validity across a variety of populations,^{23,24} as well as the Persian version.²⁵

Visual Analogue Scale

The Beck Depression Inventory (VAS) is a 100-mm ungraded line with 2 anchors. Its left and right anchors represented minimum and maximum intensities of pain, respectively. The participants were asked to report their current pain intensity on the VAS.²⁶

Procedure

An assessment package, comprising the measures described above in a random order, was administered to participants. To assess test-retest reliability, 60 patients filled out the Persian PASS-20 on a separate session 6 to 8 days apart.

Statistical Analysis

Test-retest Reliability

The intraclass correlation coefficient (ICC), two-way random-effects model with 95% confidence interval, was used to assess test-retest reliability.²⁷ An ICC ≥ 0.70 was considered acceptable for test-retest reliability.^{27,28}

Absolute reliability or measurement precision associated with repeated measurements was determined by standard error of measurement (SEM).^{27,29} Also the minimal detectable change (MDC) ($1.96 \times \sqrt{2} \times \text{SEM}$), which can be considered as a real change in score, was calculate from SEM.^{27,30}

Cronbach alpha coefficient was used to assess the internal consistency. Internal consistency measures the extent of which the items in a subscale are correlated and may contain the same construct. A Cronbach alpha coefficient ≥ 0.70 was considered to be acceptable.²⁷

Floor/Ceiling Effect

The floor and ceiling effects were considered to exist if a high proportion of patients achieved the minimum and maximum score on PASS-20 questionnaire, respectively.²⁷ The maximum cutoff for floor or ceiling effects should be no $>15\%$.²⁷ High floor and ceiling effects indicate insensitivity of the questionnaire for detecting changes and discriminating subjects among the end of the scale.²⁷

Dimensionality

Spearman correlation coefficients (r_s) between the score of each item and its relevant subscale were used for the assessment of dimensionality.³¹ For this purpose, the score of each item was subtracted from the score of its relevant subscale (item–subscale correlation after correction for overlap). Correlation coefficients ≥ 0.40 were considered acceptable.³¹ It was hypothesized that the correlation of each item with its relevant subscale would be higher than those with the other subscales.

Construct Validity

Validity is the extent to which an instrument measures what it is intended to measure.²⁷ Construct validity was measured by calculating Spearman rank correlations between Persian PASS-20 subscales and total score with VAS, TSK, FABQ, STAI-T, BDI, and ODI. Correlation coefficients <0.30 , 0.30 to 0.60 , and >0.60 indicated as weak, moderate, and strong correlations, respectively.³² To assess the correlations between the FABQ/work subscale and PASS-20, the non-working group of patients was excluded from data analysis.

RESULTS

Reliability

The ICC values for all subscales and the total score were >0.70 , ranging from 0.71 to 0.80. Also, the Cronbach alpha coefficients were >0.70 for all subscales and the total score ranges from 0.70 to 0.91. Table 2 demonstrates the ICCs, Cronbach alpha coefficients, SEMs, and MDCs for Persian PASS-20 total and subscales scores.

Floor and Ceiling Effects

No ceiling or floor effect was observed for the Persian PASS-20 total and the subscale scores (Table 3). Less than 15% of participants had the lowest or highest possible scores for the total score of PASS-20 as well as the scores of the PASS-20 subscales.

Dimensionality

Spearman correlation coefficients between Persian PASS-20 items and its hypothesized relevant subscales exceeded 0.95

TABLE 2. Descriptive Statistics and Reliability Measures for the Persian Version of PASS-20 Total Score and its Subscales

	Mean ± SD	Range	Cronbach's Alpha (N = 160)	ICC (N = 60)	95% CI		SEM	MDC
	Test				Lower Bound	Upper Bound		
Total PASS	35.51 ± 18.34	1–82	0.91	0.8	0.68	0.88	7.29	20.14
Cognitive Anxiety	11.14 ± 6.36	0–25	0.87	0.75	0.6	0.84	2.98	8.23
Escape/Avoidance	10.56 ± 5.37	0–25	0.72	0.71	0.55	0.82	2.52	6.96
Fear	7.96 ± 5.47	0–22	0.78	0.79	0.67	0.87	2.48	6.85
Physiologic Anxiety	5.85 ± 4.64	0–17	0.70	0.73	0.57	0.83	2.43	6.71

CI indicates confidence interval; ICC, intraclass correlation coefficient; SD, standard deviation; SEM, standard error of measurement; MDC, minimal detectable change; PASS, Pain Anxiety Symptom Scale.

for all items (Table 4). By comparison with those of relevant subscales, correlations between each item with other subscales were lower (ranging from 0.24 to 0.65).

Construct Validity

Table 5 shows the Spearman correlations between the total and subscale scores of PASS-20 with the TSK, FABQ, STAI-T, BDI, ODI, and pain intensity. The total score, Cognitive Anxiety and Fear subscales of Persian PASS-20 showed strong positive correlations with PCS (ranging from 0.678 to 0.704) and moderate correlation with ODI (ranging from 0.377 to 0.423). The subscales and total score of Persian PASS-20, except Escape/Avoidance subscale, showed significant and moderate correlations in the positive direction with BDI score (ranging from 0.427 to 0.462), TSK score (ranging from 0.365 to 0.462) and the STAI-T score (ranging from 0.3 to 0.36). The subscales and total score of Persian PASS-20 showed positive moderate to weak correlations with FABQ/activity (ranging from 0.218 to 0.45) and work (ranging from 0.18 to 0.366) and weak positive correlations with pain intensity, ranging from 0.169 to 0.258.

DISCUSSION

The present study examined the psychometric properties of the Persian version of PASS-20. The results demonstrated

high test-retest reliability ($ICC > 0.70$) and acceptable internal consistency ($\alpha > 0.70$) for the total score and all subscales of the Persian PASS-20 in chronic LBP patients. This was consistent with the findings of other versions of PASS-20 in which they have shown a range of Cronbach α level from 0.66 to 0.92.^{10–14,33,34} The MDC values of Persian PASS-20 total score and subscales indicated that the pain-related anxiety of the patient would be considered to really decrease or increase, as the changes in scores exceed 20.14 points for total score, 6.76 for Cognitive Anxiety, 6.85 for Fear, 6.96 for Escape/Avoidance, and 6.71 for Physiologic Anxiety subscales. These MDCs may assist clinicians and researchers to determine whether the changes in the scores of PASS-20 in chronic LBP patients are actual and reliable change of pain-related anxiety.²⁹ The Persian PASS-20 showed no floor or ceiling effect in chronic LBP participants. Researchers have used ceiling and floor effects to measure content validity, which indicates that an instrument uses the full range of scores.^{35–37}

The results of the dimensionality showed higher correlations of Persian PASS-20 items with their relevant subscales as compared to other subscales. This indicates a suitable structure of PASS-20 in which each dimension contains relevant items to the purposed construct. Therefore, all items could be considered as strong measures of their hypothesized dimensions.

TABLE 3. Ceiling and Floor Effects of Total and Subscales Scores of Persian Version PASS-20 (n = 160)

	Floor Effect (%)		Ceiling Effect (%)	
Total	1.3%	N = 2	0%	N = 0
Cognitive Anxiety	1.8%	N = 3	1.3%	N = 2
Fear	5%	N = 8	0%	N = 0
Escape/Avoidance	0.6%	N = 1	0.6%	N = 1
Physiologic Anxiety	15%	N = 24	0%	N = 0

PASS indicates Pain Anxiety Symptom Scale.

TABLE 4. Correlation of PASS-20 Item Scores With Its Relevant Subscale (Corrected for Overlap) and the Other Subscales.

Subscale	Item	Cognitive Anxiety	Escape/Avoidance	Fear	Physiologic Anxiety
Cognitive Anxiety	5	0.982*	0.510*	0.425*	0.633*
	10	0.986*	0.539*	0.548*	0.527*
	14	0.986*	0.527*	0.609*	0.475*
	17	0.986*	0.432*	0.497*	0.581*
	19	0.981*	0.491*	0.698*	0.496*
Escape/Avoidance	3	0.325*	0.959*	0.253*	0.347*
	6	0.453*	0.973*	0.329*	0.454*
	8	0.312*	0.956*	0.355*	0.494*
	11	0.546*	0.964*	0.465*	0.434*
	20	0.470*	0.965*	0.240*	0.257*
Fear	1	0.332*	0.341*	0.968*	0.353*
	2	0.448*	0.258*	0.960*	0.352*
	9	0.481*	0.318*	0.967*	0.422*
	13	0.643*	0.446*	0.979*	0.534*
	16	0.485*	0.317*	0.979*	0.452*
Physiologic Anxiety	4	0.272*	0.294*	0.263*	0.980*
	7	0.351*	0.424*	0.396*	0.974*
	12	0.576*	0.474*	0.466*	0.968*
	15	0.395*	0.300*	0.395*	0.963*
	18	0.598*	0.461*	0.537*	0.967*

PASS indicates Pain Anxiety Symptom Scale.

*All correlation coefficients are significant at $P < 0.01$. Correlation between each item and its hypothesized subscale after correction for overlap is in bold.

Construct validity of the Persian PASS-20 was supported by significant positive correlations between PASS-20 and PCS, TSK, FABQ, ODI, BDI, STAI-T, and pain intensity. Comparable with the findings of Raelofs *et al*, Crombez *et al*, and McCracken *et al*,^{9,11,38} the Persian PASS-20 had the strongest correlation with PCS. This means that chronic LBP patients with higher

catastrophizing thoughts may have greater pain-related anxiety. Moreover, Cognitive Anxiety and Fear subscales of Persian PASS-20 showed higher correlations with PCS as compared to the other two subscales. Vancleef *et al*³⁹ reported that the Cognitive Anxiety and Fear subscale of PASS-20 and PCS are conceptually related to catastrophizing cognitions.

TABLE 5. Spearman Rank Correlations of the Total Score and Subscales of PASS-20 With PCS, Pain Intensity, TSK, FABQ, STAI-T, BDI, and ODI

	Pain Intensity	STAI-T	ODI	PCS	BDI	TSK	FABQ/Activity	FABQ/Work
PASS total score	0.224**	0.353**	0.417**	0.704**	0.465**	0.462**	0.412**	0.319**
Cognitive Anxiety	0.169*	0.30**	0.423**	0.689**	0.427**	0.441**	0.450**	0.366**
Escape/Avoidance	0.176*	0.103	0.205*	0.284**	0.088	0.240**	0.360**	0.085
Fear	0.258**	0.367**	0.377**	0.678**	0.467**	0.365**	0.293**	0.307**
Physiologic Anxiety	0.175*	0.30**	0.281**	0.475**	0.425**	0.368**	0.218*	0.18*

*Correlation coefficients significant at $P < 0.05$.

**Correlation coefficients significant at $P < 0.01$.

BDI indicates Beck Depression Inventory; FABQ, Fear Avoidance Belief Questionnaire; ODI, Oswestry Disability Index; PASS-20, Pain Anxiety Symptom scale; PCS, Pain Catastrophizing Scale; STAI-T, State Trait Anxiety Inventory-Trait; TSK, Tampa Scale of Kinesiophobia.

Consistent with the findings of the German, Chinese, and Dutch version, moderate positive correlations between the total score of Persian PASS-20 and TSK were observed.^{11,12,38,40} Additionally, moderate positive correlation was also observed between the PASS-20 and FABQ/Activity. The correlation between Persian PASS-20 and FABQ has been assessed only in the Spanish version, which reported a low relationship between these two constructs.³³ The TSK and FABQ have been shown to be associated with behavioral performance,³⁸ whereas, the PASS-20 measures more general fear and anxiety aspects of pain.^{12,38} In this regard, Crombez *et al*³⁸ found that the pain-related anxiety was more strongly related to pain catastrophizing than avoidance behavior performance.

Surprisingly, the Escape/Avoidance subscale of Persian PASS-20 showed weak correlation with TSK. This finding was in conflict with the findings of the Chinese, Korean, and the German versions, which found moderate correlations.^{12–14} The TSK is related to the beliefs that movement causes (re)injury and should be avoided,⁴¹ whereas the PASS-20 Escape/Avoidance subscale assesses anxious avoidance responses to pain.¹³ The variations observed in our findings and those previous studies could be a result of several factors, which impact the association between health beliefs and behavior responses, such as culture, financial constraints, and health system provider barriers.⁴²

In addition, the Escape/Avoidance subscale of Persian PASS-20 and the FABQ/Activity had weak positive correlation. FABQ items refer to the avoidance beliefs about how work and activity affects pain,³⁹ not the avoidance responses to pain. The German version showed higher correlations between the Escape/Avoidance subscale of PASS-20 and avoidance responses to physical activity measured by the Avoidance-Endurance Questionnaire (AEQ). These instruments both assess avoidance responses to pain.¹² Therefore, this may explain the higher relationship found in the German version compared to the present study. In support of our findings, Hasenberg *et al*⁴³ reported weak correlation between the FABQ/Activity and Avoidance responses to physical activity of AEQ.

In accordance with our findings, the Chinese, German, and Spanish versions found moderate correlations between the Persian PASS-20 and disability.^{12,13,33} Wong *et al*¹³ suggested that, in addition to pain-related anxiety, several factors are involved in determining disability. Furthermore, low correlations were observed between pain intensity and Persian PASS-20, which was consistent with the findings of other versions.^{9,10,12,33,38} McCracken *et al* reported that pain-related anxiety is a stronger predictor of disability than pain intensity.⁹

Finally, the Persian PASS-20 total score showed positive moderate correlations with the level of anxiety and depression. This has been observed in other populations as well.^{10,12–14} The prevalence of chronic pain has been found to be substantially higher in patients with anxiety or depressive disorders.⁴⁴ Also, the onset of anxiety and depression has been observed with the onset of chronic

pain.⁴⁵ Concerning this, researchers have suggested a bidirectional relationship between pain with anxiety and depression, through which one could precede the other.⁴⁶

CONCLUSION

In conclusion, the Persian version of PASS-20 had good psychometric properties and could be suitable for use in clinical practice. The findings of the present study indicate that the Persian PASS-20 has high internal consistency and test-retest reliability. In addition, it showed acceptable construct validity by correlating with pain intensity, disability, depression, anxiety, catastrophizing cognitions, fear of movement, and avoidance beliefs.

➤ Key Points

- ❑ The Persian version of PASS-20 has acceptable reliability and internal consistency in chronic LBP patients.
- ❑ Pain-related anxiety is highly correlated with catastrophizing cognition rather than pain intensity.
- ❑ The construct validity of Persian version of PASS-20 was supported by its correlation with catastrophizing cognitions, fear of movement, fear avoidance beliefs, degree of anxiety, and depression.

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