Validations and psychological properties of a simplified Chinese version of pain anxiety symptoms scale (SC-PASS)

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Abstract

The Pain Anxiety Symptoms Scale (PASS) has been developed to evaluate pain anxiety, which leads to avoidance of daily activities and normal movements. However, a simplified Chinese version of PASS is still not available. Physicians are not aware of which patients are prone to anxiety, and what the risk factors are.

To cross-culturally adapt the PASS into a simplified Chinese version and test the reliability and validity. Factors affecting pain anxiety were also explored.

The PASS was first translated into a simplified Chinese version according to a forward-backward method. Then, validations were tested including content validity, construct validity, and reliability. Content validity was analyzed by response trend. Construct validity was analyzed by confirmatory factor analysis (CFA), exploratory factor analysis, and priori hypotheses testing. Reliability was analyzed by internal consistency and test–retest reliability. Risk factors of catastrophizing were analyzed by performing multivariate liner regression.

A total of 219 patients were included in the study. The scores of items were well distributed. Both CFA and exploratory factor analysis suggested a 2nd-order, 4-factor model, accounting for 65.42% of the total variance according to principle component analysis. SC-PASS obtained good reliability with a Cronbach $\alpha = 0.92$ and ICC $= 0.90$. College education, long pain duration, and both married and divorced status were risk factors. Factors reduced pain-related anxiety were no medication assumption, female sex, widowed status, non-Han ethnicity, and having no religious belief.

The SC-PASS was applicable in Chinese patients and it was suitable for the clinical uses in mainland China.

Abbreviations: CFA = confirmatory factor analysis, BPI = The Brief Pain Inventory, CMIN/DF = Satorra–Bentler scaled chi-square (S-Bχ^2)/degrees of freedom ratio, GFI = Goodness-of-fit index, HADS = The Hospital Anxiety and Depression Scale, ICC = intraclass correlation coefficient, NNFI = nonnormed fit index, PASS = Pain Anxiety Symptoms Scale, PCA = principal component analysis, RMSEA = root square error of approximation, CFI = comparative fit index, SC-PASS = simplified Chinese version of Pain Anxiety Symptoms Scale, SF-12 = The Short Form Health Survey-12.

Keywords: anxiety, chronic pain, reliability, risk factors, validity

1. Introduction

Chronic pain, commonly defined as sensation of pain lasting over 3 months or longer,[1] is a debilitating condition which troubles a lot of people globally. Chronic pain, with incremental incidence

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rate as well as limited medical treatment, is becoming the growing concern all over the world. Previous studies have demonstrated that the prevalence of chronic pain is estimated 30.7% in USA[2] and 30% in Europe.[3] As for China, the high prevalence of chronic pain is consistent with the Western countries. A total of 38.9% of Beijing population,[4] 25.8% of Chongqing population,[5] and 32.8% of Shanghai population[6] are reported to suffer from chronic pain.

Pain-related fear is an important conception in chronic disabling, which is usually based more on anticipation of pain rather than the real sensation of pain experience.[7,8] The fear of pain can result in the avoidance of daily activities or normal movements.[9] If not treated effectively, the patients would experience long duration of pain anxiety and psychological problems. Furthermore, feeling anxiety would decrease the quality of life and reduce work efficiency.[10] In addition, the cost of drug therapy was over $17.8 billion annually in USA.[11] Globally, pain-related fear has caused countless economic losses. Therefore, it is quite significant to search for an effective way to assess their pain anxiety and adapt clinical intervention. Despite the growing concern, the effective clinical strategy to treat pain anxiety is still limited. However, some researchers have found that psychological factors and mood situation are strongly correlated with the experience of pain, thus psychological treatments can be one way out of the current condition.[12]

Pain anxiety is defined as the cognitive (distraction/worry), emotional (fear), behavioral (escape/avoidance), and physiological

reactions (nauseous) to the experience/anticipation of pain.[8] Since a shortened 20-item version of Pain Anxiety Symptoms Scale (PASS) was established in 2002,[8] the PASS has been reported to have convincing reliability and construct validity in Canada, America, Dutch German, Korea, and Hong Kong.[13–17] However, a simplified Chinese version of PASS (SC-PASS) has not been available yet, resulting in physicians in China unable to assess pain-related anxiety of patients with chronic pain. Moreover, physicians in China are not fully aware of what kind of patients are more likely to suffer from pain anxiety, what the risks are and how to deal with the symptoms effectively.

The purpose of this study is 3-fold: To cross-culturally adapt the PASS into a SC-PASS version; To test the reliability and validity of the simplified Chinese version; and To define the factors affecting anxiety in a clinical setting.

2. Methods

Overview of the study design:

(a) Translating and adapting an SC-PASS.
(b) Testing the content validity, construct validity and reliability of the SC-PASS.
(c) Exploring factors affecting anxiety in a clinical setting.

2.1. Translation and adaption of the Chinese version of SC-PASS

The translation was based on the guideline of cross-cultural adaptation.[18] To translate the PASS into a Chinese version accurately, the author (ZXY) first wrote a SC-PASS (T1) and invited another professor of English who was blind to this research to finish his translation (T2). Without any major disagreements, the 2 SC-PASSs (T1&T2) were successfully synthesized into a written 20-item questionnaire (T-12). To translate the T-12 back into English, 2 English speakers whose 2nd language is Chinese respectively created one back translation (BT1&BT2). An expert committee consists of 1 physician working in a pain clinic, 1 physician major in rehabilitation, 1 English professor, and 1 statistician was established to review the written report and finally reached consensus on the prefinal version of the SC-PASS. Then it was performed in a cohort of 30 patients in a pain clinic to pretest its acceptability in patients. The patients were asked if they had any difficulties when finishing the questionnaire or whether there was any ambiguity in the items. The committee collected the feedback and then created a final version of SC-PASS (see Supplement file, http://links.lww.com/MD/B520).

2.2. Participants

A total of 219 patients seeking for treatments in the pain clinic of Changhai hospital were recruited in the study. This study was approved by the Changhai hospital affiliated to Second Military Medical University Institutional Review Board. A written informed consent was obtained from the participants at the time for admission, with all data used for scientific purpose. As described by Terwee et al,[19] at least 100 patients were supposed to be enrolled for internal consistency analysis in the study and 50 another patients to analyze floor effects, validity, and reliability. The inclusion criteria were patients diagnosed with chronic pain disease, having an over-6-week pain history, age over 18, and having the ability to read and write Chinese. Patients with

malignant tumor, severe systemic rheumatologic disease, and those who could not cooperate with the research were excluded out of the study. The average age of the patients was 58.4 years old (SD = 13.4) and two third of them were women (66.7%). The median pain duration was 6 months (range from 1.5 to 142 months) and the mean months of pain duration was 19.9 (SD = 30.2). Among all the patients, 122 (55.7%) of them were retired and 116 (53%) of them obtained low level of income. In addition, 120 (54.8%) of the patients were taking medication to relieve the sensation of pain. (Details shown in Table 1).

2.3. Instruments

All participants were asked to finish the following instruments:

PASS is a 20-item self-report measure to assess pain-related anxiety. Each item is a 6-point scale anchored from 0 (never) to 5 (always). Total score is ranged from 0 (representing no pain anxiety) to 100 (representing severe pain anxiety). It was reported that PASS scores ranging from 0 to 34 indicated mild pain anxiety; 35 to 67 indicated moderate pain anxiety; and 68 to 100 indicated severe pain anxiety.[20] Previous studies have shown good internal consistency and construct validity in clinical and community samples.[13–17]

The hospital anxiety and depression scale (HADS) is a 14-item self-report instrument to evaluate depression and anxiety. The items are divided into 2 subscales, 7 of which are used to assess anxiety (HADS-A), and the other 7 to assess depression (HADS-D). Each item is rated on a 3-point scale ranging from 0 to 3 with a total 21 points in each subscale.[21] Higher scores indicate worse symptoms. A Chinese version of HADS was used in this study because of its dependable reliability.[22]

The short form health survey-12 (SF-12) includes a subset of 12 items from SF-36 to measure the quality of life. SF-12 consists of 8 domains: physical function; role-physical; bodily pain; general health; vitality; social functioning; role-emotional; and mental health, with a higher score indicating a better quality of life.[23] A Chinese version of SF-12 with good reliability and validity was performed in the study.[24]

The brief pain inventory (BPI) is a 9-item, self-administered questionnaire to measure pain and pain-related interference. The items are ranging from 0 (with no pain/interference) to 10 (with most serious pain/worst interference). A Chinese version of BPI was successfully established in 1996.[25]

2.4. Statistical analysis

Psychometric properties were analyzed according to COSMIN checklist.[26,27] Statistical Package for the Social Sciences (SPSS) version 18.0 (IBM, Armonk, NY) was used to analyze the data. Statistical Analysis System (SAS) release 9.3 (SAS Institute Inc., Cary, NC) was used to perform multivariate linear regression. AMOS 18.0 (Chicago, IL) was used to analyze confirmatory factor analysis (CFA) and P values <0.05 were considered with statistically significant.

2.5. Content validity

Content validity was analyzed to test whether the items of SC-PASS exactly measure the same property as the original version. Any item with a Z-skewness value >1.96 indicated that it was deviated from a normal distribution pattern and an item-total correlation coefficient <0.30 indicated that the items did not measure the same properties.[28]

Table 1

Demographic characteristics of patients.

General characteristics	N, % or mean (SD)
Sex	
Male	73 (33.3%)
Female	146 (66.6%)
Age, year	58.4 (13.4)
Ethnicity	
Han	215 (98.2%)
Others	4 (1.8%)
Occupation	
Labor	46 (21.0%)
Peasant	16 (7.3%)
White collar	9 (4.1%)
Soldier	8 (3.7%)
Free lancer	18 (8.2%)
Retired	122 (55.7%)
Unemployed	0 (0%)
Marital status	
Unmarried	89 (40.6%)
Married	114 (52.1%)
Divorced	4 (1.8%)
Widowed	12 (5.5%)
Education	
Primary school	18 (8.2%)
Middle school	84 (38.4%)
High school	73 (33.3%)
College	44 (20.1%)
Religious belief	
Yes	44 (20.1%)
No	175 (79.9%)
Pain duration	19.9 (30.2)
Income (RMB)	
Low (<3000)	116 (53%)
Medium (3000–6000)	72 (32.9%)
High (6000–10,000)	19 (8.7%)
Very high (>10,000)	12 (5.5%)
SC-PASS	37.02 (18.56)
HADS	
Anxiety	8.42 (5.20)
Depression	8.46 (5.32)
SF-12	
Physical function	56.39 (32.20)
Role-physical	55.25 (39.00)
Bodily pain	46.35 (28.90)
General health	52.74 (34.43)
Vitality	40.91 (28.59)
Social functioning	66.89 (33.69)
Role-emotional	57.76 (29.27)
Mental health	51.37 (15.35)
BPI	
Pain intensity	18.58 (7.70)
Pain interference	31.06 (23.34)

BPI = brief pain inventory, HADS = hospital anxiety and depression scale, N = number, SC-PASS = simplified Chinese version of pain anxiety symptoms scale, SD = standard deviation, SF-12 = the short form of health survey-12.

2.6. Construct validity

According to COSMIN checklist, construct validity refers to the degree to which the scores of the instrument are consistent with hypotheses. It is composed of 3 aspects: structural validity, hypotheses testing, and cross-cultural validity.[26]

2.7. Structural validity

Structural validity is defined as the degree to which the scores reflect the dimensionality of the construct.[29] The 2nd-order,

4-factor correlated model presumed that each single item was loaded on one 1st-order factor (cognitive, emotional, behavioral, and physiological reactions), with factors allowed to correlate.[7] To test whether this model was reproduced in the SC-PASS, CFA was performed to compare a 2nd-order, 3-factor model derived from another study by AMOS 18.0 as introduced before.[15] The fittest model should meet the following requirements according to Bentler standard in 1990[30]:

(1) Satorra–Bentler scaled chi-square $(S\text{-}B\chi^2)$/degrees of freedom ratio (CMIN/DF) ≤ 3.0;
(2) Nonnormed fit index (NNFI) ≥ 0.85;
(3) Robust-comparative fit index (CFI) ≥ 0.90;
(4) Goodness-of-fit index (GFI) ≥ 0.90;
(5) Root square error of approximation (RMSEA) ≤ 0.08.

2.8. Priori hypotheses

According to previous studies, HADS was applied to screen for anxiety and depression in patients with bodily disease. And anxiety and depression often co-occur with pain.[31] Thus, the SC-PASS was considered to correlate moderately with the HADS-A and HADS-D. In addition, many patients with anxiety and depression were more likely to report physical symptoms.[32] Thus, the SC-PASS was considered to moderately correlate with pain intensity, pain interference, general health, vitality, and bodily pain. Patients with pain-related anxiety would gradually form psychological obstacle and avoid most of the social activities which might cause pain.[9,33] Thus, the SC-PASS should correlate negatively with social functioning.[34]

In conclusion, the authors predicted the following assumption: (1–2) the SC-PASS should correlate moderately with the HADS-A and HADS-D; (3) pain intensity; (4) pain interference in BPI; (5–8) general health, vitality, and bodily pain in SF-12 and it should correlate negatively with social functioning.

Criteria: low $(0.00 \leq r \leq 0.30)$; moderate $(0.31 \leq r \leq 0.60)$; high $(r \geq 0.60)$.[35] P-values < 0.05 were considered as statistic significance.

2.9. Internal consistency and test–retest reliability

Internal consistency was assessed by Cronbach α and was regarded as excellent internal consistency when Cronbach α was between 0.80 and 0.95.

Test–retest reliability was assessed by Bland–Altman plot and intraclass correlation coefficient (ICC). Good reliability can be confirmed if the ICC value is over 0.70.[19]

2.10. Exploration of factors affecting pain-related anxiety

Comprehensive analysis was performed for each patient in the study, including sex, age, ethnicity, occupation, marital status, income, education, religious beliefs, pain duration, and the use of medication. A multivariate linear regression was used in the study to find out the factors leading to pain-related anxiety. Besides, a step-in regression was performed to screen out statistically significant variables. The inclusion alpha was 0.10 and the exclusion alpha was 0.15.

3. Results

3.1. Translation and adaption of SC-PASS

The translation of PASS from English version to simplified Chinese version was successfully performed under the committee's effort. And only a few alterations were made for more

accurate expression as follows: Item11 "decrease" was translated into 缓解 instead of 降低, Item18 "dizzy or faint" was translated into 眩晕 instead of 眩晕或虚弱, and Item20 "calm my body down" was translated into 身体不适 instead of 让身体冷静下来. All the patients were ability to finish the questionnaire without any difficulties, which indicated that the SC-PASS was well cross-cultural inherited and easy to be understood.

3.2. Missing items

All the items were received with feedback and there was no missing item in the whole procedure.

3.3. Mean SC-PASS score

The mean SC-PASS score for each patient assessed by SC-PASS was 37.02 ± 13.56, with 9.74 ± 6.75 (cognitive), 10.71 ± 5.58 (escape/avoidance), 9.28 ± 5.58 (fear), and 7.39 ± 4.85 (physiological reaction) for each subscale, respectively. (Details shown in Table 2).

3.4. Content validity

The scores of the items were well distributed, with Z-skewness ranging from 0.01 (item10) to 1.02 (item16), and all the item-total correlation coefficient was ≥ 0.4. Thus, there was no item excluded out of the final version of the questionnaire. (Details shown in Table 3).

3.5. Construct validity
3.5.1. Structural validity. The Kaiser–Meye–Olkin (KMO) test's result was 0.89, and Bartlett significance <0.01, indicating that the SC-PASS could be performed by factor analyze for further analysis.

Compared with the 2nd order, 3-factor model (CMIN/DF = 4.51, NNFI = 0.72, CFI = 0.76, GFI = 0.71, and RMSEA = 0.13), the 2nd order, 4-factor model was more suitable for the data (see Fig. 1), with NNFI (0.85), CFI (0.90), and RMSEA (0.08) meeting the minimum acceptable fit criteria. The CMIN/DF and GFI were 2.48 and 0.86, respectively. (Details shown in Table 4).

In addition, principal component analysis (PCA) was performed by SPSS. The result also suggested a 4-factor model, accounting for 65.42% of the total variance (18.43%, 17.04%, 16.78%, and 13.17%, respectively). The result was in accordance with the original one: the 1st factor (cognitive anxiety) included item 1 to 5; the 2nd factor (escape/avoidance) included item 6 to 10; the 3rd factor (fear) included item 11 to 15, and the 4th factor (physiological reaction) included item 16 to 20. Thus both the CFA and PCA indicated the 4-factor model. (Details shown in Table 5).

Subscale	Mean	SD
Cognitive anxiety	9.74	6.75
Escape/avoidance	10.71	5.85
Fear	9.18	5.58
Physiological relation	7.39	4.85
Total	37.02	18.56

SC-PASS = simplified Chinese version of pain anxiety symptoms scale, SD = standard deviation.

Table 3

Corrected item-total correlation and response trend for each item of simplified Chinese version of pain anxiety symptoms scale (SC-PASS).

Item	Z-skewedness	Item-total correlation
Item1	0.66	0.67
Item2	0.31	0.61
Item3	0.22	0.56
Item4	0.31	0.70
Item5	0.05	0.63
Item6	0.43	0.64
Item7	0.31	0.58
Item8	0.83	0.55
Item9	0.22	0.69
Item10	0.00	0.59
Item11	0.51	0.65
Item12	0.51	0.64
Item13	0.41	0.65
Item14	0.34	0.74
Item15	0.70	0.54
Item16	1.02	0.45
Item17	0.70	0.49
Item18	0.76	0.36
Item19	0.64	0.44
Item20	0.12	0.45

3.5.2. Priori hypotheses. The SC-PASS showed a moderate correlation with the HADS (both anxiety and depression), pain intensity, and especially high with pain interference. Besides, the result also revealed moderate correlations between SC-PASS and general health and vitality. Negatively correlation between SC-PASS and social functioning was observed as expected (all P value
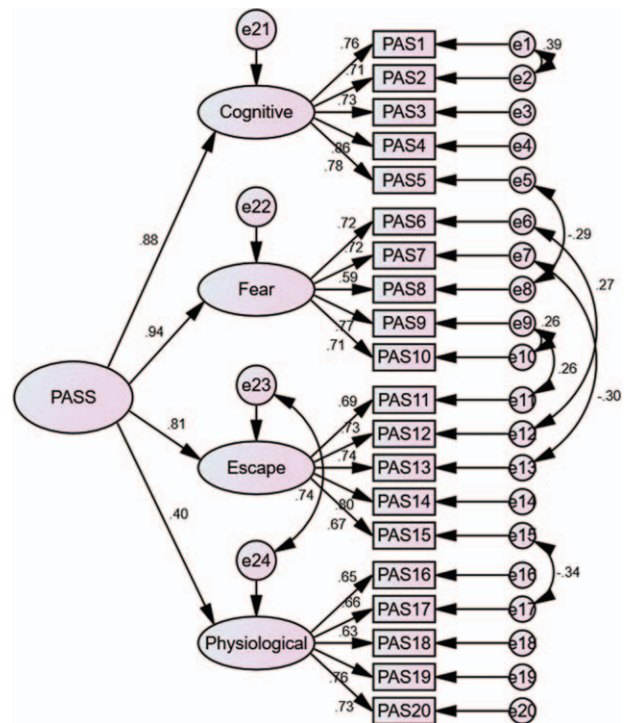

Figure 1. Second order, 4-factor model of the simplified Chinese version of pain anxiety symptoms scale (SC-PASS) with standardized parameter estimates.

Table 4

Goodness of Fit for the CFA.

Model	CMIN/DF	NNFI	CFI	GFI	RMSEA
Second order, 4-factor	2.48	0.85	0.90	0.86	0.08
Second order, 3-factor	4.51	0.72	0.76	0.71	0.13

CFA = confirmatory factor analysis, CFI = comparative fit index, CMIN/DF = Satorra–Bentler scaled chi-square $(S\text{-}Bχ^2)$/degrees of freedom ratio, GFI = Goodness-of-fit index, NNFI = nonnormed fit index, RMSEA = root square error of approximation.

<0.05). However, no statistically correlations and statistical significance between SC-PASS and bodily pain and mental health were found in the table. Thus, 7/9 of the priori hypotheses were confirmed. (Details shown in Table 6).

3.5.3. Internal consistency and test–retest reliability. The SC-PASS showed extremely good internal consistency, with the Cronbach α values were 0.92, 0.89, 0.84, 0.85, and 0.81 for SC-PASS, cognitive, escape/avoidance, fear, and physiological reactions, respectively. The ICC also indicated good reliability of the SC-PASS, with the values were 0.90 (95%CI 0.85–0.94), 0.92 (95%CI 0.87–0.95), 0.92 (95%CI 0.87–0.95), 0.83 (95% CI 0.73–0.89), and 0.75 (95%CI 0.61–0.84) for SC-PASS, cognitive, escape/avoidance, fear, and physiological reactions, respectively. In addition, the Bland–Altman plot also indicated that the 2 tests had no significant differences. (See Fig. 2).

3.5.4. Factors predicting pain-related anxieties. The multivariate linear regression was performed to analyze factors predicting pain-related anxieties. The result showed that 7 factors (sex, ethnicity, marital status, education, religious belief, pain duration, and taking medication) might have influence on the phenomenon. The F value was 30.9 and the R^2 and adjusted R^2 were 0.64 and 0.40, respectively. Details of the results are showed in Table 7. Factors predicted pain-related anxiety were college education (standard β = 0.38), pain duration (standard β = 0.35),

Table 5

Principle component analysis for the simplified Chinese version of pain anxiety symptoms scale (SC-PASS).

	Factor			
Item	**Cognitive anxiety**	**Escape/ avoidance**	**Fear**	**Physiological reaction**
PAS1	0.803	0.173	0.190	0.196
PAS2	0.848	0.199	0.091	0.120
PAS3	0.621	0.012	0.458	0.034
PAS4	0.725	0.062	0.467	0.137
PAS5	0.689	−0.085	0.269	0.427
PAS6	0.149	0.212	0.718	0.276
PAS7	0.176	0.045	0.766	0.218
PAS8	0.184	0.410	0.595	−0.011
PAS9	0.429	0.066	0.653	0.262
PAS10	0.432	0.001	0.647	0.114
PAS11	0.352	0.080	0.305	0.673
PAS12	0.073	0.391	0.317	0.680
PAS13	0.376	0.438	0.143	0.483
PAS14	0.355	0.362	0.394	0.471
PAS15	0.162	0.295	0.076	0.736
PAS16	−0.066	0.612	0.250	0.279
PAS17	0.196	0.723	0.257	−0.060
PAS18	0.084	0.749	−0.006	0.073
PAS19	0.070	0.744	−0.046	0.315
PAS20	0.022	0.727	0.075	0.278

Table 6

Correlations between SC-PASS and pain anxiety related measures.

	PAS	**Cognitive**	**Escape/avoidance**	**Fear**
HADS				
Anxiety	0.476[**]	0.573[**]	0.459[**]	0.405[**]
Depression	0.448[**]	0.591[**]	0.436[**]	0.345[**]
SF-12				
GH	0.317[**]	0.400[**]	0.273[**]	0.252[**]
PF	0.016	0.128	−0.035	−0.020
RP	−0.078	−0.021	−0.114	−0.097
RE	−0.045	−0.042	−0.018	−0.052
BP	0.262[**]	0.169[*]	0.254[**]	0.295[**]
MH	0.132	0.107	0.107	0.015
VT	0.376[**]	0.222[**]	0.269[**]	0.438[**]
SF	−0.322[***]	−0.169[*]	−0.310[**]	−0.355[**]
BPI				
Pain intensity	0.385[**]	0.256[**]	0.358[**]	0.334[**]
Pain interference	0.625[**]	0.421[**]	0.590[**]	0.592[**]

BP = bodily pain, BPI = brief pain inventory, GH = general health perception, HADS = hospital anxiety and depression scale, MH = mental health, PF = physical functioning, RE = role limitations due to emotional problems, RP = role limitations due to physical health, SC-PASS = simplified Chinese version of pain anxiety symptoms scale, SF = social functioning, VT = vitality.

middle school and high school education (standard β = 0.15 and 0.10), and married/divorced status (both standard β = 0.04). Factors reduced pain-related anxiety were no regular medication use (standard β = −0.19), female sex (standard β = −0.18), widowed status (standard β = −0.18), non-Han ethnicity (standard β = −0.16), and having no religious belief (standard β = −0.12).

4. Discussion

In this study, PASS was successfully cross-culturally adapted into simplified Chinese and validated with good measurement properties. Predictions on pain-related anxiety were analyzed for all patients in pain clinic. It was worth mentioning that the participants fully responded to the questionnaire. And all the items were answered with a normal distribution and good item-total correlation. The mean score for each patient assessed by SC-PASS was 37.02 ± 13.56, revealing that the patients in pain clinic were suffering from moderate pain anxiety. Compared to some Western and Asian countries,[7,8,13–16,36] the patients in mainland China obtained a lower total mean score of SC-PASS, indicating that patients with chronic pain in mainland China tended to present less physiological symptoms. Although the mean score of other subscales was lower, the one of physiological reaction subscale (7.39) was relatively higher, indicating that clinical strategies focusing on physiological phenomenon of Chinese chronic pain patients might be effective.

In our study, both CFA and PCA were performed to verify the construct validity. The result suggested the 4-factor model with satisfactory goodness fit index and low RMSEA, which was consistent with the Canadian, Dutch, American, Germany, and Hong Kong versions.[7,13,14,16,17] In addition, a children's version of PASS in Canada also indicated a 4-factor model.[8] However, the Korean version of PASS did not fit for the 4-factor structure,[15] revealing that the 4-factor structure was not the optimal latent structure in all of the cultures. To further assess whether the 4-factor model was best fit for Chinese culture, PCA was applied in our study. The result also suggested a 4-factor structure. Therefore, the 4-factor model was best fit for mainland China.
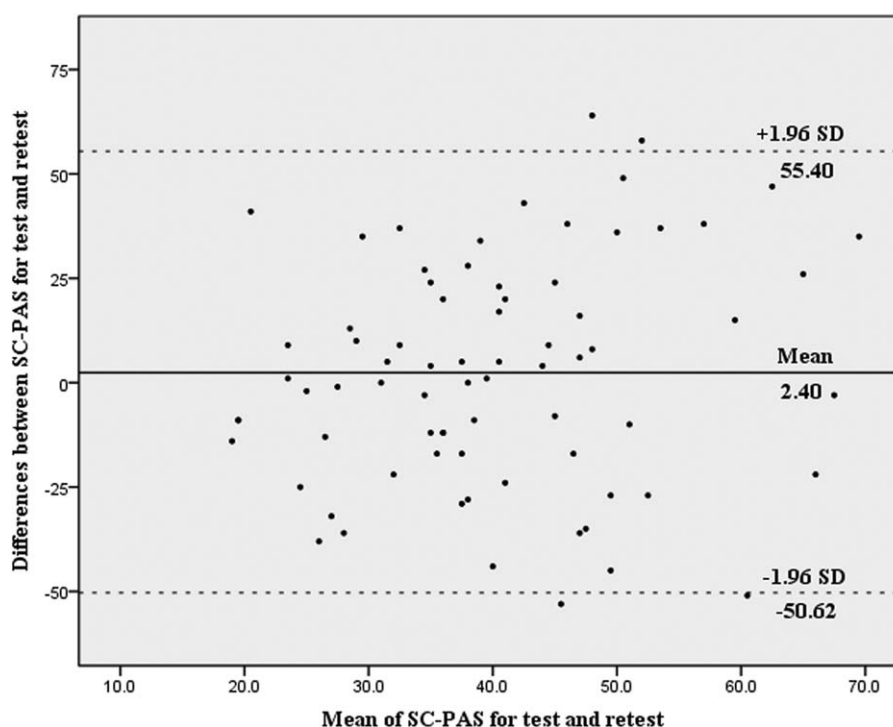
Figure 2. Bland–Altman plot for test–retest reliability of simplified Chinese version of pain anxiety symptoms scale (SC-PASS). The line indicates the 95% (±1.96 standard deviation) limits of agreement. The differences from 2 tests were plotted against the mean of the 2 session total scores.

Table 7

Predictors for pain anxiety in patients from pain clinic by multivariate liner regression.

	Beta	SD	T	P	Standardized beta
Sex					
Male	0.00				
Female	−7.22	1.91	−3.77	0.00	−0.18
People					
Han	0.00				
Other	−21.46	6.59	−3.26	0.00	−0.16
Marital status					
Unmarried	0.00				
Married	1.33	1.82	0.73	0.47	0.04
Divorced	5.19	6.07	0.86	0.39	0.04
Widowed	−14.35	3.82	−3.76	0.00	−0.18
Education					
Primary school					
Middle school	5.90	3.12	1.89	0.06	0.15
High school	3.87	3.17	1.22	0.22	0.10
College	17.54	3.36	5.22	<0.0001	0.38
Religious belief					
Yes					
No	−5.43	2.40	−2.26	0.03	−0.12
Pain Duration	0.21	0.03	6.99	<0.0001	0.35
Pain medication					
Yes	0.00				
No	−6.99	1.90	−3.68	0.00	−0.19
Pain interference	0.44	0.04	12.00	<0.0001	0.55
Multivariate regression analysis ($R^2 = 0.64$)					**Adjusted 0.40**
F value		Pr > F			
30.9		<0.0001			

Priori hypotheses were made based on the conception and 7/9 of the hypotheses were verified after analyzing the Pearson correlation between SC-PASS and other related measurements, suggesting a good construct validity as 75% of the hypotheses were confirmed. According to previous studies, pain-related anxiety was supposed to correlate with depression, pain severity, pain interference, and disability.[37] In our study, the PASS correlated moderately with HADS-A, indicating that SC-PASS was conceptually related with anxiety. Besides, moderate correlations were also found between SC-PASS and HADS-D, pain intensity, vitality and pain interference, and negatively with social function. In this scenario, associations between pain-related fear and anxiety did occur in Chinese patients and this phenomenon was also seen in Western countries.[38] With regard to depression, the results confirmed that cognitive anxiety was more highly correlated with HADS-D than fear, escape/avoidance, and physiological reaction as expected, which was in line with previous study between PASS and HADS.[16] In addition, some investigations also found that PASS was a predicator of pain interference.[33,39] In our study, anxiety was found to potentially cause daily interference to a large of extent. And both the fear and escape/avoidance subscale showed a strong correlation with pain interference, indicating that items in fear and interference might be a predictor for pain interference. Melzack reported that disability was best predicted by the PASS escape/avoidance score.[40] However, in the present study, the result showed mild to moderate correlations between SF-12 and escape/avoidance subscale of SC-PASS. Instead, vitality, social function, and general health were more highly correlated with fear and cognitive anxiety subscale. The reason might be that patients' disability happened because of a cognitive-affective factor rather than a behavior factor. Except the cognitive anxiety subscale, the fear, escape/avoidance, and physiological subscale all moderately correlated with pain intensity, indicating that the sensation of pain might not in a cognitive-affective level. Most of the findings of the SC-PASS were in accordance with the previous studies, such as the Canadian, American, Germany, Korean, Dutch, and Hong Kong version.[13–17] In general, the SC-PASS demonstrated a good construct validity in assessing pain clinic patients.

The internal consistency of SC-PASS was extremely good, verifying that all the measured items were pain-related anxiety. Since the Cronbach α of SC-PASS was higher than any of its 4 subscale, the total score of SC-PASS had better predictive power than any subscale scores. In addition, the Bland–Altman plot showed good test–retest reliability. Combining with the studies in Canada (α = 0.90), America (α = 0.94), German (0.90), Korea (0.95), and Hong Kong (0.90), the authors found that the PASS and all other different versions had a good internal consistency, indicating that PASS was a stable tool to measure pain-related fear.

The authors found 7 factors that might affect pain-related anxiety, which might explain 40% of the variance of pain-related anxiety. An interesting phenomenon was found that higher education might lead to more pain-related anxiety. A possible explanation was that a well-educated person might concern more on his/her personal health and tend to consider more than other people. Females were found to have less pain-related anxiety than males in the present study. Robert Edwards MA also found stronger linear relationships between pain and anxiety among male patients relative to female.[41] This was partly because anxiety enhanced one's attentional focus on pain, and vice versa. The different effects of attentional focus varied as a function of gender. However, other researches such as those in Hong Kong[16] and Dutch[13] found no significant gender differences.

Besides, the authors found that pain medication assumption was associated with worse pain-related anxiety. The result was in accordance with Arteta's research that depression and anxiety might lead to pain catastrophizing and opioid misuse. In short, a college-educated male with a long period of pain duration who often uses pain medications may suffer the worst experience of pain-related anxiety.

There were still some limitations during the process of establishing the SC-PASS. The assessment of SC-PASS was performed in the pain clinic of Changhai hospital. It was a single-center study, and its results might not be as convincing as those of a multicenter study. In addition, criterion validity was not performed in the study.

5. Conclusion

The English version of PASS was successfully translated in to simplified Chinese version and cross-culturally adapted with good construct validity, excellent internal consistency, and test–retest reliability. Sex, ethnicity, marital status, education, religious belief, pain duration, and medication assumption were predictive factors that might have influence on pain-related anxiety. The authors concluded that the SC-PASS was applicable in Chinese patients and suitable for the clinical uses in mainland China.

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