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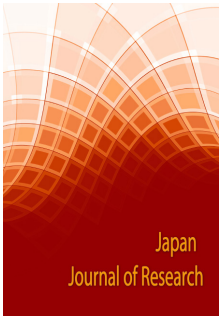

Pain-Induced Anxiety in Older Adults: Validation of The Pass-20p (Pain Anxiety Symptoms Scale-20) For Use in Brazil And Development of A Shortened Version

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Abstract

Introduction: *Chronic pain is associated with biological and behavioral responses that are often linked to neuropsychiatric disorders such as anxiety. In pain-related conditions, anxiety may be assessed using the Pain Anxiety Symptoms Scale (PASS- 20P), an instrument already translated and cross-culturally adapted for use in Brazil. This study aimed to evaluate the psychometric properties of the Brazilian version of the PASS-20P in older adults with chronic pain.* ***Methods:*** *This was a methodological study focused on instrument validation, involving older adults experiencing chronic pain. Sociodemographic and pain-related data (nature, etiology, intensity) were collected. The Hospital Anxiety and Depression Scale (HADS) and the PASS-20P were administered—the latter on three separate occasions: first, by two different researchers independently, and then, 7 to 14 days later, by only one of them. Statistical analyses included Cronbach's alpha, intraclass correlation coefficient (ICC), and Pearson's correlation coefficient.* ***Results:*** *The sample consisted of 60 participants with a mean age of 78.4 years. Most were women (91.7%), white (63.3%), widowed (48.7%), and presented pain of primarily osteodegenerative etiology (51.7%). The PASS-20P demonstrated excellent internal consistency (Cronbach's alpha = 0.899) and satisfactory intra- and inter-rater reproducibility (ICC = 0.938 and 0.948, respectively; $p < 0.001$). Convergent construct validity was adequate (Pearson's correlation coefficient = 0.586). A shortened version of the instrument, the PASS-6P, was developed. ROC curve analysis indicated that scores of 9.5 or higher suggest the presence of pain-induced anxiety.* ***Conclusion:*** *The PASS-20P demonstrated adequate psychometric properties for assessing pain-induced anxiety in older adults. Its shortened version may facilitate assessment and contribute to improved management of chronic pain in this population.*

Introduction

Chronic pain is highly prevalent worldwide and is frequently associated with neuropsychiatric conditions. Approximately 52.3% of individuals with chronic pain may present with comorbid anxiety symptoms, which should be jointly addressed and treated [1].

Pain-induced anxiety appears to be more strongly correlated with pain sensitivity itself than with generalized anxiety [2]. When anxiety is associated with painful conditions, there is an increased risk of pain chronification, pain catastrophizing, fear of pain or movement-induced pain, and hypervigilance. These factors may lead to devastating consequences for quality of life, poor clinical prognosis, low therapeutic response rates, and a vicious cycle of activity limitations and functional disability [3].

Although studies on chronic pain and its associated factors have significantly increased in recent years, the scientific evidence on the co-occurrence of pain and anxiety remains limited [4]. This comorbidity could be efficiently addressed using the Pain Anxiety Symptoms Scale (PASS-20), a tool developed to assess and measure the intensity of anxiety symptoms in individuals with chronic pain [5,6].

Within the biopsychosocial model of chronic pain, anxiety is recognized as a significant psychological factor in the subjective pain experience, exerting synergistic effects [7]. The PASS-20 evaluates anxiety symptoms in individuals with pain and also assesses their severity. Previous studies have shown that reductions in PASS-20 scores predict improvements in pain outcomes [2,5].

To date, no studies have been identified that screen for pain-induced anxiety specifically in the older adult population. Recently, the PASS-20 was translated and culturally adapted into Brazilian Portuguese, in a process that

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involved older adults. However, the psychometric properties of this version have not yet been evaluated (6).

There is a recognized need for multinational studies employing standardized assessment tools that allow for data comparability. The PASS-20 has already had its psychometric properties evaluated not only in its countries of origin but also in other countries such as China, South Korea, Germany, Spain, and Saudi Arabia [8-12]. No such scientific data have been found from Latin America. Therefore, this study aimed to investigate the psychometric properties of the PASS-20 in a Brazilian population of older adults with chronic pain, focusing on its reliability and construct validity.

Methods

Study Design

This was a methodological, descriptive study with a quantitative approach, focused on the validation of a measurement instrument.

Study Setting

Data were collected at the outpatient unit of the Division of Geriatrics and Gerontology at the Federal University of São Paulo (Universidade Federal de São Paulo – UNIFESP).

Sampling

A non-probabilistic, convenience sample was used, composed of community- dwelling older adults. The inclusion criteria were: age 60 years or older, both sexes, presence of chronic pain (lasting three months or more) with a minimum intensity of 3 on the Numeric Verbal Pain Scale (NVPS), regardless of etiology. Participants with mild cognitive impairment or dementia (defined as a score below the expected cutoff for educational level on the Mini-Mental State Examination) were excluded, as were those with communication impairments.

Procedures

Data were collected between January and November 2023. Variables included sociodemographic characteristics (sex, age, race, marital status) and pain-related information (location, pathophysiology, etiology, and intensity—the latter measured using the NVPS, ranging from 0 [no pain] to 10 [worst possible pain]).

The Hospital Anxiety and Depression Scale (HADS) was administered. HADS has been validated in Brazilian samples with chronic pain and has demonstrated high sensitivity in screening for anxiety and depression [13]. It consists of 14 items divided into two subscales (7 items each) designed to assess anxiety and depression. Each item is scored based on frequency. Subscale scores range from 0 to 21, with higher scores indicating greater levels of anxiety or depression. Anxiety is classified as follows: 0–7 = unlikely, 8–11 = possible, and 12– 21 = probable. Only anxiety scores were considered for analysis.

The PASS-20P instrument was also applied. It is divided into four domains— cognitive symptoms, somatic symptoms, avoidance behaviors, and fear sensations— all related to pain. Items are scored based on frequency (0 = never to 5 = always), totaling 20 items, with higher scores indicating greater severity of pain-induced anxiety. The tool was administered independently by two physicians experienced in caring for older adults with pain (the principal investigator and a second trained professional) on the same day. A reapplication was conducted 7 to 14 days later by the principal investigator, ensuring that no analgesic intervention occurred during that interval.

Ethical Considerations

The study was approved by the Research Ethics Committee of the Federal University of São Paulo (CEP – 60429722.3.0000.5505), and all participants signed a written informed consent form.

Statistical Analysis

Data were analyzed using SPSS v26 (2019), MiniTAB 21.2 (2022), and Microsoft Excel Office 2010. The distribution of qualitative variables was analyzed using relative frequencies (percentages or prevalence), and the Z-test for two proportions. Internal consistency was assessed using Cronbach's alpha (values >0.7 considered ideal; 0.6–0.7 satisfactory). Intra- and inter-rater reproducibility were evaluated using the intraclass correlation coefficient (ICC) and the paired Student's t- test (ICC <0.5 = poor; 0.5–0.75 = moderate; 0.75–0.9 = good; >0.9 = excellent). Convergent construct validity was assessed by comparing mean PASS-20P and HADS scores using Pearson's linear correlation coefficient (0.1–0.4 = weak; 0.4–0.6 = moderate; >0.6 = strong).

Item factor analysis was performed using the orthogonal Varimax rotation method, with Kaiser normalization and Principal Component Analysis. The clustering of items with common meanings enabled the development of a short version of the instrument (based on the highest factor loadings), which also underwent convergent validity testing using Pearson's correlation coefficient. Sensitivity and specificity were assessed through the construction of a Receiver Operating Characteristic (ROC) curve. A significance level of $p < 0.05$ was adopted.

Results

The sample consisted of 60 participants, aged between 60 and 94 years (mean 78.4 ± 1.9 years). The majority were female (91.7%), White (63.3%), and widowed (48.7%) (Table 1).

Nociceptive pain was the most frequently reported (65%), followed by mixed pain (18.3%), nociplastic pain (10%), and neuropathic pain (6.7%). The leading etiology was osteodegenerative disease, with osteoarthritis accounting for 51.7% of cases. The most commonly affected anatomical sites were: lumbar spine (25%), knees (21.7%), hips (16.7%), shoulders (15%), legs (5%), bladder (3.3%), thorax (3.3%), ankles (3.3%), head (1.7%), hands (1.7%), feet (1.7%), and calves (1.7%) (Table 1).

Moderate pain intensity was the most prevalent. Anxiety symptoms (classified as possible or probable) according to the HADS were highly frequent, occurring in 40% of participants (Table 1).

The application time for the PASS-20P was considered brief, taking approximately 5 minutes.

The reliability of the PASS-20P, in terms of internal consistency, was considered excellent, with a high Cronbach's alpha coefficient (0.899). Reliability was also deemed adequate in both intra- and inter-rater reproducibility analyses, with significant and high intraclass correlation coefficients (ICC = 0.938 and 0.948, respectively; $p < 0.001$) (Table 2).

Convergent construct validity was also satisfactory, as evidenced by a Pearson correlation coefficient of 0.586 ($p < 0.001$).

A short version of the PASS-20P was developed based on factor loadings of its items. Five factors (item groupings) were identified, accounting for 65% of the variance—a value

Table 1. *Sample Characterization*

		N	%	p-valor
Age	Mean: 78.4 years			
	Min-Max: 60-94 years			
Sex	Female	55	91,7%	<0,001
	Male	5	8,3%	
Race	White	38	63,3%	
	Mixed	12	20,0%	<0,001
	Black	10	16,7%	<0,001
Marital status	Widowed	28	46,7%	
	Married	20	33,3%	0,136
	Single	9	15,0%	<0,001
	Divorced	2	3,3%	<0,001
	Stable union	1	1,7%	<0,001
Pain Physiopathology	Nociceptive	39	65,0%	
	Mixed	11	18,3%	<0,001
	Nociplastic	6	10,0%	<0,001
	Neuropathic	4	6,7%	<0,001
Pain Location	Lumbar	15	25,0%	
	Knee	13	21,7%	0,666
	Hip	10	16,7%	0,261
	Shoulder	9	15,0%	0,171
	Legs	3	5,0%	0,002
	Bladder	2	3,3%	<0,001
	Thoracic	2	3,3%	<0,001
	Ankle	2	3,3%	<0,001
	Head	1	1,7%	<0,001
	Head	1	1,7%	<0,001
	Calf	1	1,7%	<0,001
	Feet	1	1,7%	<0,001
Pain Etiology	Osteodegenerative	31	51,7%	
	Traumatic/Muscular	13	21,7%	<0,001
	Fibromyalgia	8	13,3%	<0,001
	Mechanical overload	3	5,0%	<0,001
	Ischemic	2	3,3%	<0,001
	Other	3	5,0%	<0,001
HADS	Unlikely anxiety	36	60%	
	Possible anxiety	13	21,7%	<0,001
	Probable anxiety	11	18,3%	<0,001

considered good (Table 3). This short version, titled PASS-6P, consists of six items (2, 10, 11, 12, 16, and 19) and demonstrated a strong correlation with the original scale ($r = 0.948$; $p < 0.001$) (see Box 1).

A ROC curve was constructed for the PASS-6P, identifying a cutoff score of 9.5 or higher as indicative of pain-induced anxiety in older adults. The area under the ROC curve was 0.732. At this threshold, the short version demonstrated a sensitivity of 79.2% and specificity of 55.6% ($p < 0.001$). Positive and negative predictive values, as well as the overall accuracy of both the PASS-20P and PASS-6P, are presented in Table 4.

Table 2. *PASS-20P Reliability Indices*

	ICC	P-value
Intra-rater	0,938	<0,001
Inter-rater	0,948	<0,001

Table 3. *Factor Loadings of Items for Each Factor*

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Q12	0,760				
Q11	0,757				
Q13	0,704				
Q3	0,702				
Q5	0,608				
Q14	0,564				
Q16		0,803			
Q19		0,776			
Q17		0,682			
Q20		0,649			
Q18		0,630			
Q15		0,460			
Q2			0,753		
Q4			0,743		
Q1			0,650		
Q10				0,859	
Q9				0,721	
Q8					0,715
Q6					0,459
Q7					0,431

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization; Rotation converged in 6 iterations

Table 4. *Predictive Measures According to HADS for PASS-20P and PASS-6P*

	PASS-20P	PASS-6P
Accuracy	73,3%	65,0%
Sensitivity	62,5%	79,2%
Specificity	80,6%	55,6%
Positive Predictive Value	68,2%	54,3%
Negative Predictive Value	76,3%	80,0%

Discussion

Addressing anxiety symptoms associated with pain is of great importance in pain management, contributing to improved treatment strategies and health outcomes—particularly among older adults, who experience high prevalence of pain

(1). Moreover, this population represents a vulnerable group due to the frequent presence of comorbidities and reduced physical and psychological resilience [14]. Having access to a simple, reliable, and valid instrument, such as the newly developed PASS-6P, may support healthcare professionals in

Box 1: *PASS-6P (Pain Anxiety Symptoms Scale – 6 items)*

Itens avaliados:	**Nunca**					**Sempre**
1. Durante os episódios de dor, é difícil pensar em algo além da dor.	0	1	2	3	4	5
2. Eu tento evitar atividades que causam dor.	0	1	2	3	4	5
3. Eu creio que, se minha dor ficar muito intensa, nunca vai melhorar.	0	1	2	3	4	5
4. Quanto eu sinto dor, fico com medo que algo terrível vá acontecer.	0	1	2	3	4	5
5. Eu começo a tremer quando estou numa atividade que aumenta a dor.	0	1	2	3	4	5
6. A dor me deixa com vontade de vomitar.	0	1	2	3	4	5

their clinical assessments.

The study sample consisted predominantly of women (91.7%), reflecting the feminization of aging (414-Texto do artigo-1181-1208-10-20140103, [n.d.]).

Participants were elderly individuals across a broad age range (60 to 94 years, mean age 78.4), which is noteworthy, as the instrument was not limited to evaluation in either the younger or the oldest-old segments of the elderly population. Severe pain was the most prevalent, with a mean intensity score of 7.63 (± 1.92) on the Numeric Verbal Scale (NVS), and approximately 40% of participants exhibited anxiety symptoms as assessed by the HADS—indicating a high presence of anxiety disorders in the sample.

Reliability and validity are critical to ensuring that measurement instruments collect consistent and accurate data. In this study, the psychometric properties of the PASS-20P were evaluated specifically in an older adult population, and the results were satisfactory. Internal consistency reliability was excellent, with a Cronbach's alpha of 0.899.

The PASS-20 has been consistently validated as a reliable tool for screening pain-related anxiety, with strong psychometric evidence across various cultural and demographic contexts. In the original study, the PASS-20 demonstrated a high Cronbach's alpha (0.940) [15]. Similar findings were reported in validation studies conducted in China ($\alpha = 0.92$), the Arab world ($\alpha = 0.88$), Germany ($\alpha = 0.90$), South Korea ($\alpha = 0.95$), and Spain ($\alpha = 0.93$) [8-12].

Regarding inter- and intra-rater reliability, the PASS-20P also showed strong results in this study, with ICC values of 0.938 and 0.948, respectively ($p < 0.001$). The Arabic version likewise demonstrated excellent reliability, with ICC values above 0.90 for total scores and subscales, suggesting strong test-retest stability [11]. Similar outcomes were observed in the Chinese, German, and Korean versions, all reporting ICC values above 0.85 [8,9], reinforcing the cross-cultural robustness of the PASS-20's reproducibility [12].

Convergent construct validity of the PASS-20P, assessed via Pearson's correlation coefficient, was moderate yet satisfactory ($r = 0.586$), comparable to the findings in the Korean version ($r = 0.62$) [8], and consistent with the Spanish version as well [10].

This is the first study to propose a shortened version of the PASS-20, offering increased clinical practicality for assessing anxiety disorders in older adults with chronic pain. A ROC curve was generated to establish cutoff scores for identifying pain-related anxiety, with scores ≥9.5 on the PASS-6P indicating a positive screening.

Among the limitations of this study is the fact that the sample was drawn from a single institution. However, it included a diverse elderly population across a wide age range. Another limitation relates to the sample's composition, which was predominantly female.

Further studies are now needed to evaluate the psychometric properties of the PASS-6P in different populations, thereby strengthening the evidence base for its clinical utility.

Conclusion

The PASS-20P demonstrated adequate psychometric properties—such as reliability and validity—for use in older adults in Brazil. The shortened version, PASS- 6P, consisting of only six items, offers a practical tool for assessing pain-related anxiety disorders. This can support healthcare professionals in managing older adults with pain and may also contribute to research exploring the comorbidity of anxiety disorders and pain.

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