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ORIGINAL ARTICLE

Validation of the Pain-Related Catastrophizing Thoughts Scale

Validação da Escala de Pensamentos Catastróficos sobre Dor

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ABSTRACT

This study aims at assessing the reliability and validity of the Catastrophizing Thoughts sub-scale of the Pain Related Self-Statement Scale in a Brazilian population with chronic pain. Method: Data were collected from a convenience sample of 311 patients with chronic pain. The psychometric properties of the Catastrophizing Thoughts sub-scale were assessed by analyzing the reliability and validity of this tool. Results: The Catastrophizing Thoughts Scale mean score for this population was 2.38 (SD = 1.8). Cronbach alpha coefficient was 0.89, and the split-half correlation (Pearson) was 0.74, indicating adequate internal consistency and correlation between halves. The main component analysis indicated the existence of 2 components (hopelessness and rumination). Discriminant and criterion validity were also adequate. Significant correlations were found between the Catastrophizing scale and disability, pain intensity and pain site. Among the studied variables, catastrophizing was the strongest predictor of disability, even higher than pain intensity. Conclusion: Altogether, these results showed that the Catastrophizing sub-scale has good psychometric properties when used in a Brazilian chronic pain patient sample and the contribution of catastrophizing to physical disability. The results of this study were consistent with those previously published in the literature.

KEYWORDS

pain, psychological tests, psychometrics, Pain Catastrophising Scale

RESUMO

Este estudo objetivou examinar a validade e a fidedignidade da sub-escala de Pensamentos Catastróficos da Escala Pain Related Self-Statement numa população brasileira com dor crônica. Estudo de corte transversal realizado com uma amostra de conveniência de 311 pacientes. As propriedades psicométricas da Escala de Pensamentos Catastróficos foram examinadas analisando a fidedignidade e validade deste instrumento. O escore médio da Escala de Pensamentos Catastróficos foi 2,38 (DP= 1,38). O coeficiente de correlação Cronbach foi 0,89 e o coeficiente de correlação Pearson entre as metades foi de 0,74, indicando adequada consistência interna e correlação entre suas metades. A análise de componentes principais indicou a presença de dois componentes (desesperança e ruminação). Indicadores de validade de critério e discriminante também foram adequados. Houveram correlações significativas entre a Escala de Pensamentos Catastróficos e incapacidade, intensidade e local da dor. Dentre as variáveis estudadas, catastrofização foi o maior preditor de incapacidade, superando intensidade da dor. Os resultados deste estudo confirmaram a adequação das propriedades psicométricas da Escala de Pensamentos Catastróficos para pacientes brasileiros e a contribuição de pensamentos catastróficos para a incapacidade física. Os resultados deste estudo foram consistentes com os publicados na literatura.

PALAVRAS-CHAVE

dor, testes psicológicos, psicometria, Escala de Pensamentos Catastróficos

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INTRODUCTION

Several diseases can result in chronic pain (pain that occurs for a period longer than three months in most of the days). Recent studies carried out in Europe and Israel[1] and in Australia[2] suggest that the prevalence of chronic pain in the population is around 20% and causes a high social and economic impact.

Although chronic pains are usually the result of complex physiopathologies, it is well known that psychosocial factors influence the intensity with which the pain is experienced, the responses to pain and the degree of interference in the daily living caused by the pain.[3-6] Several studies have shown that, among the different psychosocial factors, catastrophizing thoughts seem to be one of the most important predictors of physical disability[7], stress[8], pain intensity and inadequate responses to treatment.[9,10] Catastrophizing thoughts can be defined as mental processes directed at an exaggeratedly negative response to a harmful stimulus.[11]

Some authors have described that, regardless of the medical diagnosis or the extension of the physical damage, evaluative factors, such as catastrophizing thoughts, influence the capacity to deal with pain and determine how incapacitated the person becomes or remains incapacitated, as they mediate the perception of pain and the responses to the picture of pain.[8,12]

Considering the importance of the contribution of catastrophizing thoughts for the disability and stress caused by chronic pain, several measurement tools have been developed to evaluate this construct. The most frequently used tools are the Catastrophizing Scale of the Coping Strategies Questionnaire (CSQ)10, the Pain Catastrophizing Scale (PCS)[11] and the Catastrophizing Scale of the Pain-Related Self-Statements Scale (PRSS).[13] Several studies have confirmed the psychometric properties and the clinical usefulness of the measurement tools; however, to date, no tools to assess catastrophizing thoughts in patients with chronic pains have been validated for the Brazilian Portuguese language.

The present study assesses the reliability and validity of the Catastrophizing Scale of the Pain-Related Self-Statements Scale (PRSS)[13] in a Brazilian population of patients with chronic pain.

MATERIAL AND METHODS

Participants

The data were collected from a sample that consisted of 348 patients with chronic pain, treated at 9 institutions in the South and Southeast regions of Brazila, from March to June 2005. The participants represent a convenience sample selected based on some specific criteria.

Inclusion criteria

- To have persistent pain for a period longer than 3 months, present in most days;
- To be 18-80 years;
- To speak Portuguese and have more than 4 years of formal education;
- To be available to participate in the study.

Exclusion criteria

- To have oncologic pains;
- To have a psychopathology (for instance: psychosis or dementia)
- To present > 10% of unanswered items at any of the used questionnaires.

PROCEDURE

The research procedure consisted of 2 phases: (I) translation and adaptation of the Catastrophizing Thoughts Scale from the English language into the Brazilian Portuguese language and (II) Data collection through the use of a set of tests and inventories.

The translation of the scale into the Brazilian Portuguese language was carried out by the main researcher. The re-translation into the English was carried out by three health area professionals fluent in English and Portuguese, based on the back-translation method and cultural adaptation directives[14]. The translation method consisted in translating, adapting terms when necessary and evaluating the versions in both languages.

A cultural adaptation of some terms was necessary, considering that some words used to express feelings or situations did not make sense or lost their meaning when translated literally into Portuguese. There was high translation concordance regarding the original and final versions of the scale between the back translation translators.

When an adequate version of the scale was developed, it was included in a set of tests applied to the patients. The patients were referred to the main researcher by their physicians, following the established criteria.

The informed consent form and the inventories were given to the participants by the researcher or research assistants that explained the aim of the study and answered any raised questions.

The filling out of the questionnaires lasted around 40 minutes. After they were completed, the researcher checked the questionnaires to prevent problems with their completion. When the questionnaires were completed, the clinical data of the patients were obtained from their files, following ethical criteria.

The present study was approved by the Ethics Committee of all the institutions where it was carried out and all ethical procedures were followed.

MEASUREMENTS

Sociodemographic and Clinical Inventory

It consisted of information regarding the age, gender, civil status, level of school education, profession/occupation, professional situation, pain site and intensity (described through a numerical and verbal 0-10 scale), duration of symptoms, clinical diagnosis, types of medication and interventions to which the patient had

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b) Pacientes que apresentavam estes transtornos já diagnosticados pelo médico que os encaminhou.

been submitted.

Catastrophizing Scale of the Pain-Related Self-Statements Scale (PRSS)

The Pain-Related Self-Statements Scale (PRSS) consists of two scales (coping strategies and catastrophizing). These scales were developed based on the concepts of the cognitive system and automatic thoughts[13]; their items are samples of cognition presented by people when they have severe pain.

The development of these scales was based on the presupposed idea that other instruments (for instance, the Coping Strategies Questionnaire) did not adequately assess this construct, mainly regarding the catastrophizing thoughts. Therefore, we chose to validate only the Catastrophizing Thoughts Scale.

The Pain Catastrophizing Scale consists of 9 items scored as a Likert scale, which varies from 0 to 5 points associated to the words "almost never" and "almost always" at the extremities. The total score is the sum of all items divided by the number of answered items and the minimum score can be zero (0) and the maximum 5. At the initial validity study, the mean score was 2.03 (SD: 1.22).[13] There are no cutoffs. Higher scores indicate the presence of catastrophizing thoughts.

The Catastrophizing Thoughts Scale has adequate construct and validity discriminant, and the internal consistency coefficient (Cronbach alpha = 0.92) and the correlation coefficient at the test-retest (0.87) also suggest adequate reliability.[13] Research and clinical activities have confirmed the properties of the scale.[15]

The Roland-Morris Disability Questionnaire - RMDQ

The Roland-Morris Disability Questionnaire was initially developed to measure physical disability (based on self-reports) in patients with back pain.16 The version used in this study is an adapted version for chronic pains of any nature,[17] which consists in the substitution of the word "back" for the word "pain".

The RMDQ has 24 items and each item can be scored as 0 or 1. The total score can vary from 0 (indicating absence of physical disability) to 24 (indicating severe disability). The original and adapted versions of the RNDQ are largely employed and have excellent psychometric properties.[18,19] The Brazilian version for lumbar pain also presents adequate validity and reliability (Cronbach alpha = 0.90, Pearson's coefficient of correlation between two halves = 0.82).[20]

Statistical Analysis

A series of statistical analyses were carried out to assess the psychometric properties of the Catastrophizing Thoughts Scale: descriptive statistics (means and standard deviations), reliability (evaluated through Cronbach Alpha and Pearson) and validity estimate (principal components analysis – PCA, correlation between variables and multiple regression).

Questionnaires with less than 10% of omitted items were included in the analysis and the omitted items were substituted by the mean score. Questionnaires with more than 10% of omitted items were excluded from the final sample. All the statistical analysis were carried out using the SPSS-14.0 program.

RESULTS

The final sample consisted of 311 participants; 37 (11%) were excluded after the inclusion and exclusion criteria were applied. The participants reported no difficulty to complete the Catastrophizing Thoughts Scale – CTS. There were no significant differences (t=1.96, p=0.05) between the participants excluded from the sample and the final sample regarding the demographic and clinical variables. That is, the patients that were excluded from the final sample (11%) did not differ from those in the sample regarding degree of schooling, sex or age; factors that can interfere with the answers. They were excluded from the final sample only due to the statistical parameters, as the tests with > 10% of omitted items prevent their statistical analysis.

The mean age of the participants was 48.9 years (SD=14.06); most of them were females (74%) and married (64.3%). Regarding the level of schooling, the sample was quite heterogeneous (approximately 32% had between 4 and 8 years of schooling; 29% had between 9 and 12 years and 39% had College or University education).

The mean duration of pain was 4 years and the mean intensity of pain was 6/10 (SD=2.4). A large number of participants had pain in two or more sites (45%) and 41% of them were not working due to the painful condition. Around 82% of the participants were using some type of medication.

No significant difference was observed in the mean score of CTS among patients with different pathologies (for instance, rheumatoid arthritis, F=1.96; p=0.05).

The mean score of the CTS for this population was 2.38 (SD=1.38). Coefficients of skewness (0.14) and kurtosis (-0.95) indicated that the data were normally distributed and that there were no deviant scores.[21] The Kaiser-Meyer-Olkin coefficient of sampling adequacy (0.96) also showed to be adequate for the PCA analysis.

RELIABILITY

The internal coefficient of correlation (Cronbach α) was 0.89, which suggests that the internal consistency of this scale is adequate.[22] The correlation between the two halves (Pearson's coefficient of correlation) was 0.74, which indicated equivalence between the two forms and the scale precision.

VALIDITY

The analysis of the main components using orthogonal rotation revealed the existence of two components or factors for the Catastrophizing Thoughts Scale (called rumination and hopelessness).

The solution with two factors (variance explained "eigenvalue" > 1) contributed with 67.4% of the total variance, with most of the load values (F) varying between .68 and .98, except for item 3 (F=0.38 and h =.25). Considering these values a solution with

2 components seems to adequately contemplate the concept of catastrophizing proposed by this scale.

A correlation between these items (> 0.40) and a Pearson's coefficient of correlation of 0.62 between the factors 1 and 2 also confirms the validity of the scale. The item-scale coefficients of correlation varying between 0.71 and 0.81 are above the minimum adequate values (0.40)22, which suggests that all the items are adequately related to the total score.

Table 1
Analysis of the validity through the analysis of the main components of the Catastrophizing Thoughts Scale

Factors and item content	F 1	F 2	h²
Factor 1 Rumination			
(8) I cannot go on any more.	.98	-.09	.86
(9) This pain is driving me crazy.	.88	-.02	.76
(1) I cannot stand this pain any longer.	.86	-.03	.72
(7) This pain is killing me.	.76	.14	.73
(3) I need painkilling medication.	.38	.17	.25
Factor 2 Hopelessness			
(4) This will never end.	-.08	.91	.74
(5) I am a hopeless case.	.00	.86	.75
(2) Whatever you do, my pains will not change.	.03	.78	.65
(6) When will I get worse again?	.15	.68	.61
Eigenvalue	4.91	1.17	
Percentage of variance	54.5	12.9	

F1 and F2: factorial load of each item in each factor or component. h²: communalities

The correlations between the Catastrophizing Thoughts Scale and its components, the Roland and Morris Disability Questionnaire (RMDQ) and clinical and demographic variables were analyzed to test the discriminatory properties of this scale.

As correlações obtidas entre as variáveis acima descritas foram sigThe correlations obtained among the variables described above were significant in some cases (p≤0.001). Although significant, small correlations occurred between the Catastrophizing Thoughts Scale and its components (rumination and hopelessness) with the RMD questionnaire (0.34; 0.29; 0.32, respectively), and between the pain intensity and the RMD questionnaire and the Catastrophizing Thoughts Scale and its factors (0.31; 0.28; 0.31; 0.19, respectively).

Table 2
Correlation between the demographic and clinical variables, RMDQ, Catastrophizing Thoughts Scale and its components

	1	2	3	4	5	6	7	8
1. Age	_							
2. Duration of pain	-.01	_						
3. Intensity of pain	-.09	-.01	_					
4. Pain site	.07	.17*	.05	_				
5. RMDQ total score	.06	.08	.31*	.27*	_			
6. Catastrophizing scale	-.16*	.22*	.28*	.07	.34*	_		
7. Rumination factor	-.22*	.17*	.31*	.05	.29*	.92*	_	
8. Hopelessness factor	-.06	.24*	.19*	.08	.32*	.88*	.62*	_

* Level of significance: p = 0.01

The weak correlation observed between the scores of the Catastrophizing Thoughts Scale and its components and the Roland Morris Disability Questionnaire suggest that these tools assess different constructs, confirming the discriminative validity of this tool.

The weak correlation observed between the scores of the Catastrophizing Thoughts Scale and pain intensity and the scores of the RMDQ also suggest that, although these variables are related, to have catastrophizing thoughts does not occur only because of the pain intensity and levels of disability.

Aiming at evaluating the predictive capacity of the Catastrophizing Thoughts Scale and its criterion validity, the correlation between this construct measured through the Catastrophizing Thoughts Scale and between clinical variables and disability was assessed.

Pain site was codified as 1 for pain in one site and 2 for pain in two or more sites. The values of total r indicate the contribution of this group of variables to disability and the Beta value, the individual contribution of each variable.

In the first equation of the regression analysis (Table III), pain intensity, pain site and catastrophizing were predictors of physical disability (RMDQ), contributing with 22% of variance. The contribution of catastrophizing thoughts (R =0.11, Beta=0.26) to disability was slightly higher than the contribution of pain intensity and site.

When the contribution of the factors of the Catastrophizing Thoughts Scale were assessed, only the hopelessness component reached significant levels (beta = 0.26), also reaching values that were higher than pain intensity and site.

These results confirm the criterion validity of the Catastrophizing Thoughts Scale, as it showed to be capable of predicting

Table 3
Analysis of the contribution of the studied variables for disability through the multiple regression analysis.

Phases and predictors	R² total	R² Change	Beta	t	P
Criterion variable:					
Disability	.22				
Equation 1					
Pain site		.06	.24	4.7	0.001
Pain intensity		.05	.22	4.2	0.001
Catastrophizing Scales		.11	.26	4.9	0.001
Equation 2	.22				
Pain site		.06	.23	4.6	0.001
Pain intensity		.05	.24	4.8	0.001
Hopelessness factor		.10	.26	5.0	0.001
Rumination factor		.01	.07	1.1	0.26

Location of pain was coded 1 for a place in pain and 2 for pain in two or more locations. The values of r indicate the total contribution of this block of variables for disability and Beta value of the contribution of each variable

behaviors such as disability.

DISCUSSION

The mean score of the Brazilian version of the Catastrophizing Thoughts Scale was 2.38 (SD=1.38); higher than the one described in the original version13 (2.03; SD= 1.22; t=3.18; p=0.05). It is not clear the reason for this difference; however, it is a small difference and possibly, not clinically relevant.

More important than that is the fact that the scale had its validity and reliability confirmed, which is consistent with the results reported in the literature,[13,15] and that it was well-accepted by all the patients that filled it out with no difficulty.

The existence of two components called rumination and hopelessness found in this study is consistent with the findings described in the literature[24,25], which indicate that the catastrophizing construct has affective and cognitive components. Although several studies[7,11,26] have reported the existence of three factors (rumination, hopelessness and magnification), the magnification factor has had the lowest inter-items correlation among these factors (0.22 to 0.47) and the least factorial load, which indicates that the value of this factor can be questioned.

Additionally, the rumination component, which can be defined as the incapacity to suppress or deviate one's attention from pain-related thoughts[11] clearly presents an overlap of contents or a conceptual closeness with magnification; increase or exacerbation of values attributed to an object or situation11. Given the small number of items of this scale (9), of the number of items in the rumination component and the little significance of the magnification construct when compared to the other two dimensions, it is possible that the content of this dimension was not contemplated by the CTS.

On the other hand, most evidence produced on catastrophizing has used the catastrophizing thoughts scale[11], which, among its 13 items presents 6 items with hopelessness content (defined as the negative affective course when dealing with a harmful stimulus) and suggest that this component of the construct may be the most important predictor of disability and pain intensity among the dimensions of the catastrophizing construct. This finding was also confirmed by the present study.

The contribution of the catastrophizing thoughts to disability observed in this study, with values that are higher than pain intensity and site, has been described in the literature[24,25,26], which confirms the importance of the evaluation of this variable in patients with chronic pain and reinforces the validity of the CTS. The fact that the hopelessness component contributed more than the rumination component to predict the physical disability is also consistent with prior results.[24,25]

Some authors[27,28] have suggested that the correlation between pain intensity, physical disability and catastrophizing can occur due to the fact that the patients that harbor catastrophizing thoughts present a course directed at the most unpleasant aspects of the painful experience, thus making it even more disagreeable, which can cause less involvement in physical activities, increasing physical unfitness and collaborating to the onset of disability. Additionally, there is evidence23,25,26 of the contribution of catastrophizing thoughts to depression and indication that the correlation between these two variables can indirectly contribute to physical disability.

CONCLUSION

The present study confirms the psychometric properties of the Brazilian version of the Catastrophizing Thoughts Scale in a population of Brazilian patients with chronic pain and provides an important tool for this population. Additionally, the results of the present study reproduce the findings described in the international literature, regarding the contribution of catastrophizing thoughts to physical disability, even when demographic and clinical aspects are considered.

The stability of this tool throughout time in the studied population must be evaluated, although previous studies have suggested that it is adequate.

The incapacity to work and to perform the daily living activities is a great burden to the individual, the family of the person with a chronic pain, the society and the health system. To identify the elements that contribute to the disability and offer instruments for its measurement allows the professionals to test and offer interventions that minimize such pictures.

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APPENDIX 1

EPain-Related Catastrophizing Thoughts Scale – PRCTSt

Most of the time, we tell ourselves things. For instance: we encourage ourselves to do things, but we also blame ourselves when we make mistakes or reward ourselves when we do something successfully. When we are in pain, we frequently say things that are different from the things we say when we are feeling well. Below there is a list typical thoughts of people who are in pain. Please, read each one of the phrases and verify how frequently you have these thoughts when your pain is strong. Please check the box (•) that corresponds to the number that best describes your situation using this scale: 0= almost never to 5=almost always.

	Almost never 0	1	2	3	4	Almost always 5
1. I cannot stand this pain any longer.						
2. Whatever you do, my pains will not change.						
3. I need painkilling medication.						
4. This will never end.						
5. I am a hopeless case.						
6. When will I get worse again?						
7. This pain is killing me.						
8. I cannot go on any more.						
9. This pain is driving me crazy.						