

Psychometric properties of the DASS-Depression scale among a Brazilian population with chronic pain

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Abstract

Background: Depression is a common contributor to suffering and disability in people with chronic pain. However, the assessment of depression in this population has been hampered by the presence of a number of somatic symptoms that are shared between chronic pain, treatment side-effects and traditional concepts of depression. As a result, the use of depression measures that do not contain somatic items has been encouraged. **Objective:** This study examined the psychometric properties of the Depression sub-scale of the Depression Anxiety and Stress Scales (DASS) in a Brazilian chronic pain

patient population. **Method:** Data on a number of measures were collected from 348 participants attending pain facilities. **Results:** Principal components and exploratory factor analyses indicated the presence of only one factor. Item analyses indicated adequate item-scale correlations. The Cronbach α was .96, which suggests an excellent internal consistency. **Conclusion:** The DASS-Depression scale has adequate psychometric properties and its further use with Brazilian chronic pain populations can now be supported.

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Introduction

Among affective factors associated with chronic pain, depression appears to be the most common. However, its prevalence varies among different chronic pain samples, with reports ranging from 1.5% to 57% [1,2]. The variance in depression prevalence may be due to different diagnostic criteria, measures and settings, but regardless, depression is widely agreed to be a common contributor to suffering and disability in people with chronic pain.

Worz [1] reported that depression reduces the likelihood of responding to pain treatments and worsens the effect of chronic pain on physical and psychological functioning.

Haythornthwaite et al. [3] found that depression in chronic pain patients is associated with greater pain intensity and pain interference, and more pain behaviors. Banks and Kerns [4] found that depression may mediate the relationship between chronic pain and disability. Keefe et al. [5] and Pincus and Williams [6] suggest that depression may also be a risk factor for pain onset and development, as well as disability.

Altogether, these findings provide evidence that depression may mediate the perception of noxious stimuli, as well as responses to chronic pain, which in turn may increase disability and maladjustment to chronic pain.

However, debate has emerged over the actual nature of depression in chronic pain populations, especially in relation to symptoms that may be shared between chronic illnesses, pain, side-effects of treatment and depression (e.g., Pincus and Williams [6]). A number of researchers (e.g., Refs. [6–9]) have explored cognitive models of depression, in contrast to the more traditional *DSM-IV* [10] which describes depression

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in terms of somatic, affective and cognitive symptoms. These different models of depression have implications for the assessment of depression, especially when assessment is based on older psychometric scales (e.g., Beck et al. [11], Zung and Durham [12] and Hamilton [13]). These older scales are derived from the traditional DSM approach and, accordingly, include somatic symptoms, such as insomnia, appetite changes, weight loss, loss of libido and motor retardation [11–15]. There is concern that, in addition to questions about the models of depression on which these older scales are based, the assessment of depression in medical populations using scales that contain somatic items of depression may lead to bias in their findings.

Pincus et al. [16] found that chronic pain patients tend to endorse the somatic items of depression more often than depressed people without chronic pain. In this population, it seems that somatic items may be relatively poor markers of depression; chronic pain patients may experience somatic symptoms for other reasons than depression; and that the presence of somatic items may inflate test scores in this population [16,17].

To overcome the problem of bias caused by somatic items in the assessment of depression, especially in medical populations, a number of alternative depression measures have been developed. These include the Hospital Anxiety and Depression Scale (HADS) [18]; the Depression Anxiety Stress Scale (DASS) [19]; and the Depression, Anxiety and Positive Outcome Scale [16]. The psychometric properties of each of these measures have been well supported [16,20,21], as has their use in chronic pain populations [16,17]. Of these scales, only the HADS has been validated in a Brazilian (nonpain) population [22], but none has been validated in a Brazilian chronic pain patient population. The DASS has been used by our group in chronic pain samples in Australia [17,23], and in this paper we sought to evaluate the psychometric properties of the DASS-Depression scale in a Brazilian chronic pain sample. The 14 items in the DASS-Depression [7] scale ask respondents to indicate how well the items applied to them over the past week. The items include statements about low mood, low self-worth, feeling slowed down, pessimistic outlook, loss of interest, lack of meaning and lack of initiative.

Material and methods

Participants

Over a period of 4 months (from March to June 2005), data were collected from 348 participants with chronic pain attending pain clinics or similar facilities in public and private institutions in Brazil. The participants should be considered to represent a convenience sample, selected on the basis of specified criteria, from people seeking treatment for their persistent pain.

Inclusion criteria

- Pain clinic patients having persisting pain for a period of more than 3 months, on most days, and willing to participate in the study;
- Age superior to 18 and inferior to 85 years;
- Having 4 or more years of formal education;
- Being able to read Portuguese.

Exclusion criteria

- Having cancer pain¹;
- Having a diagnosis of a major psychiatric disorder (i.e., psychoses or dementia);
- Questionnaires with more than 10% of missing items.

Procedure

The research procedure consisted of two parts: (i) translation and adaptation of the depression scale of DASS from English into Portuguese and adaptation of measures and (ii) data collection.

The translation of the measures was performed by the first author based on a back-translation method [24]. The back translation was done by three psychologists who are fluent in both English and Portuguese. The translation method consisted of reviewing, translating and adapting the measures from English to Portuguese (and back to English again).

A preliminary cross-cultural adaptation was necessary because some of the words used to express feelings or situations would not make sense or lose their meaning if they were translated literally to Portuguese (e.g., "I couldn't seem to experience any positive feelings at all", was translated and adapted to Portuguese for "I didn't have positive feelings"). Apart from a few minor changes, the DASS-Depression scale Brazilian version was very similar to the original version without compromising its comprehension and being adequate to the Portuguese language. The last back translation was then compared with the first translation done by the researcher and a high concordance between them was found.

Once an acceptable version of the Brazilian version of the depression scale was developed, it was included in a battery of questionnaires and administered to chronic patients attending nine pain clinics in different parts of Brazil. The participants were referred to the researcher by their treating physician according to the set inclusion and exclusion criteria. All necessary information, a written consent form and the psychological measures to be completed were given to the participants by the researcher who explained the purpose of the study and answered any questions they might have. The questionnaires took approx-

¹ In comparison to those with chronic noncancer pain, there are often other issues involved with cancer pain (e.g., survival, aversive treatments) which may influence the assessment of variables like depression. To avoid these issues, these patients were excluded from the studied sample.

imately 40 min to complete. The completed measures were checked by the researcher to ensure there were no obvious problems in their completion. Medical/clinical data were then collected from the patients' medical file.

Approval for the study was obtained from the ethics committee at each institution. All the ethical procedures were observed, including information about the purpose of the research and patients' rights. A code number identified the patients to keep data confidential. No change in treatment occurred.

Measures

Several measures were used in this study. However, for the purpose of the present study, information obtained from socio-demographic and clinical questionnaire as well as DASS-Depression [7] and the PRSS-Catastrophising [25] scales was reported here.

The socio-demographic and clinical questionnaire

Participants completed a questionnaire with information regarding age, gender, marital status, level of education, socio-economic level, profession, working status, major health problem, pain site, clinical diagnosis, pain intensity (assessed by a numerical and verbal rating scale) and pain duration, medication usage, type of intervention and other major health problems.

The Depression Anxiety Stress Scale [7]

The DASS was developed aiming to provide a more specific measure of depression and anxiety with a low inter-correlation between these factors. The DASS has three scales (depression, anxiety and stress) and 42 items, ranging from 0 to 3, the total scores of each scale consist of the sum of the items, and is scored separately. The depression scale has 14 items; none of them reflects somatic symptoms of depression.

It has been reported that the DASS has sound psychometric properties and high to moderate correlation with other similar measures (e.g., BDI [11]) [7,17]. The DASS-depression scale has a moderately high correlation (0.74) with the BDI [7]. Although the BDI has a number of somatic symptoms of depression among its 21 items, 13 reflect cognitive symptoms of depression; thus a moderate-high rather than a high correlation between these two measures is to be expected.

An adequate alpha coefficient for the depression scale has also been reported in two studies (0.96 [17] and 0.91 [7]). Studies conducted with the DASS-Depression scale have reported the existence of one factor for this scale, a minimal construct overlap between the other DASS scales, and also adequate criterion validity [7,17,21].

The Pain-Related Self-Statements Scale [25]

The Pain-Related Self-Statement (PRSS) was developed based on the concepts of cognitive schemata and automatic thoughts. PRSS is composed of two subscales (coping and catastrophising). PRSS-Catastrophising items

derived from a clinical setting and were factors analysed with adequate results.

The catastrophising scale has nine items, rated on a six-point Likert scale (0 to 5); the total score is the sum of the items divided by 9 or the number of items scored.

Flor et al. [25] reported an internal consistency of 0.92, and a test-retest correlation coefficient of 0.87 (over a 2-week interval). Significant differences in mean scores were found between healthy controls and pain patients, supporting the discriminant validity for this measure.

Analyses

A number of statistical procedures were conducted to examine the psychometric properties of the Brazilian version of the DASS-Depression scale. These included descriptive statistics (means, standard deviations, range); reliability assessed through split-half reliability and internal consistency; and validity assessed by analyzing construct, convergent, discriminant and criterion validity [26]. Construct validity was examined using principal component and exploratory factor analyses. Convergent validity was tested through item-scale correlation [27]. Convergent validity was also evaluated by comparing the correlation between the DASS-depression scale and the PRSS-Catastrophising scale [26]. Criterion validity was assessed comparing differences in mean scores between groups on working status and a number of other variables. These analyses were conducted using the SPSS 12.0 for Windows package (SPSS Inc., Chicago, IL, USA).

Questionnaires with less than 10% of missing items were included in the analyses and the missing items were substituted by the respective measure mean score.

Results

Participants

Of the 348 participants who agreed to participate, 37 (11%) were excluded from the sample after applying inclusion and exclusion criteria and statistical analysis criteria. The final sample consisted of 311 participants. No significant differences were found between the initial and the final sample for age, sex and level of education.

Descriptive statistics

The sample's mean age was 48.9 (S.D.=14.06) years, with a majority being women (74%) and most were married (64.3%). Education level was evenly distributed, 32.5% of the subjects had 4 to 8 years of education, 28.6% had 9 to 12 years of education and 38.9% had tertiary education. Pain chronicity varied, with 12.2% of the participants having pain from 3 months to 1 year, 19.3% having pain between 1 and 2 years, 28% having pain between 3 and 5 years, 12.5% having pain from 6 to 9 years and 28% having pain for more than

10 years. Median pain intensity was 6 out of 10 (lower quartile was 5 and upper quartile was 8). Pain in two or more major pain sites (45%) was the major complaint, and most of the participants were taking medications (82.4%). Unemployment due to pain was reported by 41.1% (125) of the sample.

Mean score for the DASS-Depression scale in this population was 14.03 (S.D.=12.02), ranging from 0 to 42. Floor and ceiling percentages were respectively 7.7% and 1.6%, suggesting a higher percentage of lower scores than higher scores. Skewness and kurtosis values were 0.79 and -0.56, which suggest data are normally distributed and without outliers [28,29]. However, the histogram chart reveals that data are skewed slightly to the left, indicating a higher concentration of low scores. Kaiser–Meyer–Olkin measure of sampling adequacy (0.96) also supported that the data were adequate to conduct PCA.

Mean score for the Brazilian version of the DASS-Depression scale ($n=311$) did not differ significantly ($t=1.23$, $df=707$, $P=.05$) from those reported in an Australian chronic pain sample ($n=398$, $\bar{X}=15.15$, S.D.=12.22) [17], but they are substantially different ($t=11.96$, $df=800$, $P=.05$) from the mean of a nonclinical (Australian) sample ($n=491$, $\bar{X}=5.06$, S.D.=7.57) [17].

Reliability

Reliability was determined by examining internal consistency (Cronbach α) and split-half correlation coefficient (Pearson).

The Depression scale had an internal correlation coefficient (Cronbach α) of 0.96, which is very high and suggests an excellent internal consistency [26,30]. These findings are similar to those reported with a chronic pain sample in Australia [17] (0.96), and with a study conducted with a general (Australian) population sample [7] (0.91), and broadly consistent with results reported with a short version of the DASS in a general population sample in the United Kingdom [21] (0.82).

In order to examine the consistency of the split-half forms and to compare them with the abbreviated DASS-Depression scale [21], the two halves of the scale were divided according to the items selected on the short form. The first half was composed of item numbers (1, 3, 6, 9, 10, 13, 14), which is consistent with the DASS-Depression scale short form [21]. The correlation (Pearson coefficient) between the split-halves was 0.93 indicating a high consistency between forms, which is similar to previous findings (i.e., 0.82) [21]. The Cronbach α values for the first and second half were 0.90 and 0.93, respectively, which suggest that both forms are equally internally reliable.

Validity

Validity of the Brazilian version of the DASS-Depression scale was examined using principal components analysis, item-scale correlations, correlation between the Brazilian

version of the DASS-Depression and a measure of catastrophising, and comparing differences in mean scores between groups.

Results of a principal components analysis suggest the existence of only one factor for the depression scale (using an eigenvalue greater than one criterion, confirmed by the inspection of the Scree plot). This accounted for 65% of total variance. High loadings (range 0.73–0.87) were found for all items, except for Item 1 (0.64) ("I couldn't seem to experience any positive feelings at all"), and high communality among items suggests the existence of only one factor on the DASS-Depression scale.

Exploratory factor analysis using initial factor method of principal factors (PFA) and the maximum likelihood (ML) method with oblique rotation (Promax) was also used to examine the number of factors. Both methods and the Scree plot indicated only one factor should be retained. This factor explained 94% of the common variance, while a second factor accounted for just under 6% of the common variance. If the decision to retain a factor that accounts for at least 5% of the common variance is used, then it could be argued that the first two factors could be retained. However, based on the results of the PFA, ML and Scree plot, the fact that the rotated pattern structure matrix did not demonstrate simple structure suggested that the additional factor was not necessary. Therefore, the results of the PCA suggesting the existence of one main component should be maintained.

These results are consistent with other findings on the DASS [17,21] and support the construct validity of DASS-Depression scale (Table 1).

The item-scale correlations (Pearson) range from 0.65 to 0.87 and these are all above the minimum value recommended (0.40), suggesting that all items are adequately related to the total score and confirming the convergent validity of this scale. This result confirms the PCA findings for the existence of a one-factor solution for the Brazilian version of the DASS-Depression scale, which is also consistent with previous studies [7,17,21].

The correlation between the Brazilian version of the DASS-Depression scale and the Brazilian version of the catastrophising scale of the PRSS was examined to test the convergent validity of the depression scale [26]. A moderate correlation coefficient (0.59) indicates that, while related, the constructs measured are distinct. As expected, individuals who catastrophize about their pain more frequently also show higher levels of depression [26].

Criterion validity was assessed comparing differences between groups on working status, using ANOVA test. Significant differences in mean scores in the DASS-Depression were observed between groups ($F=11.91$, $df=309$, $P=.001$). A post hoc analysis (using Scheffe) revealed significant differences only between the working group ($\bar{X}=10.84$, S.D.=12.22) and the not working due to pain group ($\bar{X}=17.58$, S.D.=12.07) ($P=.05$). Participants not working due to pain had higher depression scores than those in the working group. There were no significant differences in

Table 1

Principal component analysis of the Depression scale with factor loading and communalities for a one-factor solution

Item number and description	F1	h^2
5. I felt that I had lost interest in just about everything.	.87	.76
7. I felt that life wasn't worthwhile.	.87	.75
12. I could see nothing in the future to be hopeful about.	.85	.72
11. I felt I was pretty worthless.	.84	.70
10. I was unable to become enthusiastic about anything.	.83	.69
6. I felt I wasn't worth much as a person.	.82	.68
9. I felt down hearted and blue.	.82	.67
3. I felt that I had nothing to look forward.	.81	.66
13. I felt that life was meaningless.	.80	.64
4. I felt sad and depressed.	.80	.64
8. I couldn't seem to get any enjoyment out of things I did.	.79	.62
2. I just couldn't seem to get going.	.77	.59
14. I found it difficult to work up the initiative to do things.	.73	.53
1. I couldn't seem to experience any positive feelings at all.	.64	.40
Eigenvalue	9.10	
Percentage variance	65.1	

depression scores between the working and partially working group, and between the partially working and not working due to pain group ($P < .05$). These results support the ability of the DASS-Depression (Brazilian version) to predict distinct functional outcomes (i.e., working status).

Possible differences on depression scores according to pain site, pain intensity, age and gender were examined using *t* test and ANOVA (depending on the type of variable), but no significant differences in mean scores were found ($P \geq .05$).

Discussion

The results of this study indicate the Portuguese-language (Brazilian) version of the DASS-Depression scale has good psychometric properties when used in a Brazilian chronic pain patient sample. Different measures of reliability and validity were examined and all yielded reasonable results. The vast majority of participants also completed the instrument without difficulty. This indicates that it is acceptable for use with pain patients in Brazil.

The results of this study support previous findings that indicate the DASS-Depression scale has high internal consistency, as well as a one-factor solution and high item-scale correlations [7,17,21].

As expected, the Brazilian version of the DASS-Depression scale correlated moderately ($r=0.59$) with the catastrophising measure (PRSS). Consistent with theories of the relationship between depression and catastrophizing, this suggests the two constructs are related but distinct, suggesting the DASS-Depression scale possesses adequate convergent validity. This finding confirms previous reports of a relationship between these two constructs [31,32].

That the Brazilian version of the DASS-Depression scale was sensitive to differences between patient groups accord-

ing to work status (as a reflection of disability) provides evidence of its criterion validity. This finding is consistent with those reported by other researchers who have found that depression in chronic pain patients is associated with greater disability and pain interference (e.g., Haythornthwaite et al. [3]; Pincus and Williams [6]; Keefe et al. [5]; Worz [1]). Similar findings have also been reported with the DASS-depression scale which showed differences between chronic pain patients and members of the general (nonclinical) population [17].

Despite these promising findings, it is recognized that the stability of this measure over time with Brazilian chronic pain patients has yet to be established. Although previous findings with this instrument in other countries suggest the stability (test-retest reliability) should be acceptable.

It is important to emphasize that although the DASS-Depression scale appears to be a strong measure for the assessment of cognitive/affective symptoms of depression, it is not intended to assess depression from a DSM perspective [10]. Cognitive models of depression expressly exclude somatic symptoms as necessary for the diagnosis of depression [7–9,16]. This has been argued as of particular relevance in medical populations where somatic symptoms can be poor discriminators of depression [6,7,9], but examination of models of depression is beyond the focus of this paper (for further discussion of this issue, see Refs. [6,7,9]).

To date, relatively few psychological measures have been validated and tested for reliability in the Brazilian chronic pain population. The availability of a sound measure that assesses depression without using somatic items should provide a useful tool to both clinicians and researchers dealing with chronic pain patients in Brazil.

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Appendix A. Escala de Depressão (Lovibond and Lovibond, DASS - Depression, anxiety and Stress Scale, 1995)

Por favor, leia cada frase e circule um número (0, 1, 2 ou 3) que indica o quanto esta frase se aplica a você nesta última semana. Não existem respostas certas ou erradas. Por favor não gaste muito tempo em cada frase.

Please read each sentence and circle the number (0, 1, 2 or 3) that indicates how much each sentence applies to you in the last week. There is no right or wrong answer. Please do not spend too much time on each sentence.

	Não se aplica a mim (0)	Se aplica a mim as vezes (1)	Se aplica a mim geralmente (2)	Se aplica a mim sempre ou na maior parte do tempo (3)
Did not apply to me at all	Applied to me to some degree, or at some time	Applied to me to a considerable degree, or a good part of the time	Applied to me very much, or most of the time	
Não tive sentimentos positivos.				
1. I haven't had positive feelings.	0	1	2	3
Parece que não conseguirei continuar.				
2. It seems I won't be able to go on.	0	1	2	3
Me senti sem esperanças no futuro.				
3. I have been feeling hopeless about the future.	0	1	2	3
Me senti triste e deprimido.				
4. I have been sad and depressed.	0	1	2	3
Sinto que perdi o interesse em quase tudo.				
5. I feel that I have lost interest in almost everything.	0	1	2	3
Me sinto desvalorizado.				
6. I feel unappreciated.	0	1	2	3
Tenho sentido que a vida não tem valor.				
7. I have felt that life is worthless.	0	1	2	3
Não tive prazer nas coisas que fiz.				
8. I haven't had pleasure in the things I do.	0	1	2	3
Me senti triste e desanimado.				
9. I have been feeling sad and unenthusiastic.	0	1	2	3
Não tive entusiasmo para nada.				
10. I haven't been enthusiastic about anything.	0	1	2	3
Tenho me sentido sem valor.				
11. I have been feeling worthless.	0	1	2	3
Não vejo nada para ter esperanças no futuro.				
12. I don't see anything to be hopeful about in the future.	0	1	2	3
Sinto que a vida não tem sentido.				
13. I feel that life is meaningless.	0	1	2	3
Tive dificuldade em ter iniciativa para começar a fazer as coisas.				
14. I have had trouble finding initiative to begin doing things.	0	1	2	3