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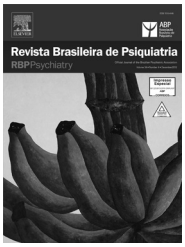

ORIGINAL ARTICLE

Validation of the Brazilian Portuguese version of the Beck Depression Inventory-II in a community sample

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DESCRIPTORS:
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Abstract
Background: The Beck Depression Inventory (BDI) is used worldwide for detecting depressive symptoms. This questionnaire has been revised (1996) to match the DSM-IV criteria for a major depressive episode. We assessed the reliability and the validity of the Brazilian Portuguese version of the BDI-II for non-clinical adults. *Methods*: The questionnaire was applied to 60 college students on two occasions. Afterwards, 182 community-dwelling adults completed the BDI-II, the Self-Report Questionnaire, and the K10 Scale. Trained psychiatrists performed face-to-face interviews with the respondents using the Structured Clinical Interview (SCID-I), the Montgomery-Åsberg Depression Scale, and the Hamilton Anxiety Scale. Descriptive analysis, signal detection analysis (Receiver Operating Characteristics), correlation analysis, and discriminant function analysis were performed to investigate the psychometric properties of the BDI-II. *Results*: The intraclass correlation coefficient of the BDI-II was 0.89, and the Cronbach's alpha coefficient of internal consistency was 0.93. Taking the SCID as the gold standard, the cut-off point of 10/11 was the best threshold for detecting depression, yielding a sensitivity of 70% and a specificity of 87%. The concurrent validity (a correlation of 0.63-0.93 with scales applied simultaneously) and the predictive ability of the severity level (over 65% correct classification) were acceptable. *Conclusion*: The BDI-II is reliable and valid for measuring depressive symptomatology among Portuguese-speaking Brazilian non-clinical populations.

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DESCRITORES:
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Validação da versão brasileira em português do Inventário de Depressão de Beck-II numa amostra da comunidade

Resumo
Objetivos: O Inventário de Depressão de Beck (IDB) é utilizado mundialmente para detectar sintomas depressivos. Este questionário foi revisado (1996) para se adequar aos critérios do DSM-IV para episódio depressivo maior. Avaliamos a confiabilidade e validade da versão I em português-brasileiro do IDB-I em uma amostra não clínica de adultos. *Métodos*: O questionário foi aplicado em duas ocasiões para 60 estudantes universitários. Em seguida, 182 adultos residentes na comunidade preencheram IDB-II, Questionário de Auto-Resposta e escala K10. Psiquiatras treinados entrevistaram pessoalmente os respondentes através da Entrevista Clínica Estruturada (SCID-I), a escala de depressão de Montgomery-Åsberg e de ansiedade de Hamilton. Análise descritiva, detecção de sinal (Receiver Operating Characteristics), correlação e função discriminante foram realizadas para investigar as propriedades psicométricas do IBD-II. *Resultados*: O coeficiente de correlação intraclasse do IDB-II foi de 0,89 e o coeficiente alfa de consistência interna foi de 0,93. Adotando a SCID como padrão-ouro, o ponto de corte de 10/11 foi o melhor limiar para detectar depressão, alcançando sensibilidade de 70% e especificidade de 87%. A validade concorrente (correlação de 0,63-0,93 com escalas aplicadas simultaneamente) e a capacidade preditiva de gravidade (mais de 65% de classificação correta de indivíduos deprimidos) foram aceitáveis. *Conclusão*: O IDB-II é fidedigno e válido para mensurar sintomatologia depressiva na população brasileira não clínica falante do português.

Introduction

The Beck Depression Inventory (BDI) is a self-rating instrument that is extensively used worldwide. Originally proposed by Beck and colleagues, the scale was revised in 1996 to include the DSM-IV criteria for a major depressive episode (MDE).[1] The BDI-II[2] has been translated from English into several other languages and features sound psychometric properties regarding its applicability and validity. Given the high prevalence of depressive disorders, the validation process comprises an essential step to extend its use to a wide range of populations.

Aim of the study

Considering the need to validate a version of the instrument in a new language, the objective of this study is to examine the psychometric properties of the Brazilian Portuguese version of the BDI-II[3] in terms of reliability, criteria, and concurrent validity. We report evidence supporting the validity of the BDI-II in detecting MDEs and overlaps with anxiety and psychological distress, considering the SCID-I as the gold standard.

Methods

The English version of the BDI-II was translated into Brazilian Portuguese by two bilingual researchers (Y.P.W. and C.G.) from the University of São Paulo and back-translated by a native-speaker. Semantic equivalence was discussed with two bilingual clinical psychiatrists. Subsequently, this version was compared with an independent Brazilian translation that was developed by a clinical psychologist at another university. The conciliated version was submitted to an expert panel discussion composed of one clinical psychiatrist, two clinical psychologists, and one psychopharmacologist, all of whom were qualified professionals regarding psychometric instruments and had clinical experience in depressive conditions. This version was submitted to a new back-translation. Before applying the instrument to the target samples, the BDI-II was pilot-tested with 20 medical students for cognitive debriefing purposes. Therefore, the current version differs slightly from the previous Portuguese version of the BDI-II that was proposed in Portugal.[4]

Participants

Two independent samples were drawn to document different psychometric properties of the BDI-II: a student sample, for retest reliability, and a community sample to establish the best cutoff point for and the validity of the BDI-II with external criteria.

Sample 1

The BDI-II was administered to 60 medical students of the Universidade de São Paulo (mean age = 24.6 years, SD = 1.2, range = 22-26, with 51% women). The students completed the BDI-II,[3] the Self-Report Questionnaire (SRQ-20),[5] and the K10 scale[6] in their classroom on two occasions, with an average interval length of 15 days.

Sample 2

Subsequently, a convenience sample of 182 adult participants drawn from a population-based household survey of the metropolitan area of São Paulo[7] completed the BDI-II,[3] the SRQ-20,[5] and the K10[6] at the Institute of Psychiatry. Regardless of their mental health or physical condition, the participants were living in their household at the time of the assessment. The mean age of this community-dwelling sample was 41 yo. (SD = 10.8, range = 20-60), the mean number of years of education was 9.4 (SD = 3.9, range = 2-19), and 102 participants were female (56%). All participants underwent face-to-face interviews that used the Structured Clinical Interview (SCID-I)[8] anchored with the Clinical Global Impression (CGI),[9] the Montgomery-Åsberg Depression Rating Scale (MADRS),[10] and the Hamilton Anxiety Scale (HAM-A).[11]

Measures

The BDI-II[2,3] consists of 21 sets of statements about depressive symptoms in the last 15 days that are rated on a 0-to-3 ordinal scale, yielding total scores ranging from 0 to 63. The suggested thresholds[1] for levels of severity were as follows: 0-13, minimal/no depression; 14-19, mild depression; 20-28, moderate depression; and 29-63, severe depression.

The following comparison instruments were applied consecutively to further assess the criterion-based validity of the BDI-II:

1) Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I)[8] and the Clinical Global Impression Scale (CGI)[9]
2) Montgomery-Åsberg Depression Rating Scale (MADRS)[10]
3) Hamilton Anxiety Scale (HAM-A)[11]
4) Kessler's psychological distress scale (K10)[5]
5) Self-Report Questionnaire (SRQ-20)[6]

This study was approved by the Ethics Committee of the University Hospital Board and written informed consent was obtained from the participants before they entered the study.

Data analysis strategy

Descriptive analyses, the intraclass correlation (ICC) of the student sample, and the internal consistency coefficient (Cronbach's alpha) of the BDI-II of the community sample were computed. Subsequently, signal detection analyses against the diagnoses of the SCID-I/MDE were conducted for all possible BDI-II scores by building the Receiver Operating Characteristics (ROC) curve. Positive predictive value (PPV), negative predictive value (NPV), and the percentage of misclassification were calculated. After classification of subjects into depressed and non-depressed subgroups according to the best threshold, Spearman's correlations of classification and the CGI were calculated.

Pearson's correlations between the BDI-II and the psychometric tools were calculated. The discriminant function analysis was executed according to the severity level of the BDI-II using a canonical discriminant function to predict the category membership of the severity level and using the diagnosis of SCID-I/MDE as the criterion. All analyses were performed using SPSS 14.0, with a significance level of 0.05 for two-tailed tests.

Results

The ICC coefficient for the retest reliability of the BDI-II for the student sample was 0.89 (95%CI 0.82-0.93). The Cronbach's alpha coefficient of the BDI-II for the community sample was 0.93, and the alphas were 0.92 and 0.93 for male and female subgroups, respectively. The item-total correlation ranged from 0.44 to 0.73, indicating satisfactory item homogeneity for assessing the underlying construct.

The mean score and the standard deviation (SD) of each BDI-II item are displayed in Table 1 for the total sample and separated by gender. Men scored significantly lower than women (7.88 vs. 11.43; $F = 5.05$; $p < 0.05$).

Table 1 Means, standard deviations, and corrected item-total correlations of the BDI-II for the total sample and for the subgroups of men and women

		Total (n = 182)			Men (n = 80)			Women (n = 102)		
	Item	Mean	SD	*r*	Mean	SD	*r*	Mean	SD	*r*
01	Sadness	0.35	0.65	0.66	0,20	0.20	0.56	0.47	0.71	0.69
02	Pessimism	0.35	0.66	0.60	0,30	0.30	0.48	0.38	0.65	0.68
03	Past Failure	0.36	0.77	0.59	0,30	0.30	0.58	0.41	0.82	0.59
04	Loss of Pleasure	0.51	0.82	0.71	0,40	0.40	0.61	0.60	0.90	0.76
05	Guilty Feelings	0.44	0.70	0.55	0,39	0.39	0.50	0.48	0.73	0.57
06	Punishment Feelings	0.32	0.83	0.44	0,35	0.35	0.63	0.30	0.79	0.35
07	Self-Dislike	0.28	0.69	0.67	0,21	0.21	0.64	0.33	0.75	0.68
08	Self-Criticalness	0.47	0.80	0.52	0,39	0.39	0.46	0.53	0.90	0.54
09	Suicidal Thoughts	0.10	0.37	0.53	0,10	0.10	0.71	0.11	0.31	0.44
10	Crying	0.64	1.03	0.47	0,59	0.59	0.46	0.69	0.98	0.49
11	Agitation	0.48	0.87	0.50	0,43	0.43	0.43	0.53	0.89	0.55
12	Loss of interest	0.39	0.76	0.72	0,25	0.25	0.69	0.50	0.86	0.72
13	Indecisiveness	0.64	0.94	0.69	0,50	0.50	0.74	0.75	1.02	0.66
14	Worthlessness	0.27	0.63	0.73	0,13	0.13	0.74	0.39	0.73	0.73
15	Loss of Energy	0.70	0.76	0.69	0,64	0.64	0.60	0.75	0.85	0.73
16	Changes in Sleeping	0.76	0.90	0.61	0,64	0.64	0.56	0.86	0.94	0.62
17	Irritability	0.46	0.79	0.69	0,35	0.35	0.75	0.55	0.87	0.66
18	Changes in Appetite	0.58	0.87	0.61	0,48	0.48	0.58	0.66	0.96	0.61
19	Concentration Difficulty	0.58	0.79	0.63	0,54	0.54	0.64	0.61	0.83	0.62
20	Tiredness	0.62	0.82	0.67	0,46	0.46	0.68	0.75	0.91	0.66
21	Loss of Interest in Sex	0.53	0.89	0.51	0,28	0.28	0.29	0.73	1.05	0.57
	Total	**9.87**	**10.71**	**0.93†**	**7.88**	**9.12**	**0.92†**	**11.43***	**11.62**	**0.93†**

SD: Standard-Deviation; *r*: item-total correlation.
†Cronbach's alpha coefficient of internal consistency.
*One-way ANOVA $F = 5.05$, $p < 0.05$.

All possible scores of the BDI-II were compared with the cases of the SCID-I/MDE (Table 2). The best cut-off point was 10/11. This threshold showed a sensitivity of 70% and a specificity of 84.4%. In addition, the PPV was 84.3%, the NPV was 77%, and the misclassification rate was 23.1%. The area under the ROC curve indicated that the instrument could discriminate 82.1% (95%CI 75-89) of cases of MDE, demonstrating substantial accuracy.

When adopting a cut-off of 10/11, 121 subjects were classified as non-depressed (BDI ≤ 10) and 61 were classified as depressed (BDI > 10). The proportions of CGI scores were as follows: 87.6% of non-depressed individuals were classified as "not ill/minimally ill" (CGI 1-3), and 64.6% of depressed subjects exceeded the "moderately ill" level (CGI 4-7). The CGI was correlated with the BDI-II score and the dichotomous 10/11 classification of depression (rho = 0.67, $p < 0.05$).

Adopting the diagnosis of MDE as the criterion and the suggested severity threshold, the best discriminative performance of the BDI-II was observed between those individuals with "minimal/no depression" (scores 0-13) and those with "very severe" depression (scores 29-63), which were 81.1% and 85.7%, respectively. The overall predictive ability of cases correctly classified was 65.4%.

Regarding concurrent validity, the correlations between the BDI-II and the SRQ-20 were 0.67 and 0.89 for the student and community samples, respectively. Likewise, the

Table 2 Sensitivity, specificity, positive and negative predictive value, and misclassification rate of the Beck Depression Inventory-II for the diagnosis of a Major Depressive Episode, according to the cutoff points of the total score of the scale against the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I)

Cut-off	Sensitivity	Specificity	PPV	NPV	Misclassification
	%	%	%	%	%
0/1	95.0	23.0	100.0	33.0	67.0
1/2	91.7	32.8	91.1	53.3	46.7
2/3	90.0	40.2	90.9	55.5	44.5
3/4	90.0	44.3	90.0	57.1	42.9
4/5	86.7	52.5	88.9	61.5	38.5
5/6	86.7	59.8	90.1	66.5	33.5
6/7	81.7	65.6	87.9	68.7	31.3
7/8	80.0	70.5	87.8	72.0	28.0
8/9	73.3	77.0	84.5	73.1	26.9
9/10	70.0	78.7	83.3	73.1	26.9
10/11	70.0	84.4	84.3	77.0	23.1
11/12	63.3	86.9	82.0	76.4	23.6
12/13	61.7	87.7	81.5	76.4	23.6
13/14	58.3	87.7	80.3	75.3	24.7
14/15	56.7	88.5	79.9	75.3	24.7
15/16	51.7	90.2	77.7	73.6	26.4
16/17	50.0	91.0	77.3	73.6	26.4
17/18	48.3	91.8	77.6	74.7	25.3
18/19	45.0	93.4	76.2	74.2	25.8
19/20	43.3	95.1	76.0	75.3	24.7
20/21	40.0	98.4	75.6	76.4	23.6
21/22	35.0	98.4	74.2	75.3	24.7
22/23	30.0	98.4	73.5	74.7	25.3
23/24	28.3	98.4	73.0	74.2	25.8
24/25	23.3	98.4	72.3	73.6	26.4
25/26	21.7	98.4	71.9	73.1	26.9
27/28	20.0	98.4	71.4	72.5	27.5
29/30	20.0	99.2	71.6	73.1	26.9
30/31	18.3	99.2	71.8	73.6	26.4
31/32	15.0	100.0	70.5	72.0	28.0
32./33	13.3	100.0	70.1	71.4	28.6
34/35	11.7	100.0	69.7	70.8	29.1
38/39	10.0	100.0	69.3	70.3	29.7
41/42	8.3	100.0	68.9	69.8	30.2
43/44	5.0	100.0	68.2	68.7	31.3
47/48	3.3	100.0	67.8	68.1	31.9
50/51	1.7	100.0	67.4	67.6	32.4
52/53	0.0	100.0	67.0	67.0	33.0

PPV: Positive predictive value; NPV: Negative predictive value

correlations with the K10 were 0.63 and 0.93. The correlation with the MADRS was 0.75, and that for the HAM-A was 0.66 in the community sample.

Discussion

This study provides the first data on the psychometric performance of the Brazilian Portuguese version of the BDI-II in a non-clinical population. The instrument showed temporal stability and was internally consistent and valid for predicting the presence of depressive symptoms. While most studies have assessed student samples, our main data, along with the clinical interviews, come from community adults across wide ranges of ages and educational levels. The significance of the self-rated score of depression was also correlated with a clinical assessment of severity.

The reliability of the Brazilian Portuguese version is similar to the original coefficients reported for the American version.[2] In general, the internal consistencies of linguistically diverse versions of the BDI-II have been described as good to excellent. This similarity most likely reflects the robust underlying construct and displays the representative item quality of the revised questionnaire. The coefficient value for the Brazilian data of approximately 0.90 supports its stableness, and this coefficient is comparable to those reported for the versions in English and Spanish,[12] Turkish,[13] and Icelandic.[14]

As in most of the published investigations on the BDI-II, an effect of gender emerged consistently in the total score. The gender bias of the BDI-II is invariantly found in instruments used to assess depression, and this bias deserves future investigation.

There is controversy in the literature about the cut-score ranges used to categorize mildly, moderately, and severely depressed individuals.[1] Adopting Kendall's recommendation (10/11 for dysphoria and 15/16 mild depression), Dozois et al.[15] found a sensitivity of 71% and a specificity of 88%. However, the higher cut-offs of 13/14 and 20/21 improved the sensitivity to 81% and the specificity to 92%. Recently, Shean et al.[16] showed that the threshold of 18/19 is an adequate indicator of specificity (84.4% to 100%) for moderate to severe depression.

Our cut-off point of 10/11 is similar to the thresholds of Canadian[15] and Turkish studies.[13] In contrast, the sensitivity decreases to 58.3% and there is a small increase in specificity (87.7%) when the threshold to detect mild depression is increased to 13/14.2 Moreover, with a higher threshold (e.g., 20/21), unacceptable sensitivity and high specificity are observed. If the suggested cut-off of 26/27 for severe depression is adopted,[2] the sensitivity becomes too trivial for detecting depression (21.7%). The 10/11 threshold of this Brazilian Portuguese version works well in binary prediction for 82% of depression vs. non-depression cases. While the predictive capacity for different levels of severity is acceptable, it is lower than the 87% value of the Icelandic study.[14]

The BDI-II demonstrated high correlations with instruments applied simultaneously. In the literature, the overlap of the construct assessed by the BDI-II and common scales used to screen for depression (e.g., MADRS, HAM-D) ranged between 0.69 and 0.86. In our investigation, the BDI-II also showed good correlations with scales of general psychopathology, such as the K10 and SRQ-20.

Some weaknesses of this study should be noted. The sample was assessed in a health care setting, which may bias the results. Participants may have exaggerated their symptoms to obtain treatment for health problems. However, our results are comparable most international studies and ensure the applicability of the BDI-II to non-clinical samples. Additionally, the adoption of the SCID-I as the criterion may have hampered the prediction because the SCID-I's time frame exceeds that of the BDI-II, which only assesses the past two weeks. Therefore, some depressive symptoms may have remitted to the point of being undetectable by the questionnaire. Likewise, the periods covered by concurrent instruments (e.g., SRQ-20 and K10) also outnumber the time length covered by the BDI-II.

Much of the construct validity of the BDI-II remains to be demonstrated. Some specifiers of depression (e.g., the chronicity, remission, and symptomatic pattern of atypical presentation) should be investigated with a prospective design and a more inclusive sample. The applicability of the BDI-II should be tested in clinical samples of active cases of depression, epidemiological surveys, primary care, and general hospital settings. In conclusion, the indicators of reliability and validity of the Brazilian Portuguese version of the BDI-II were satisfactory and support its use in Brazilian non-clinical populations to predict probable depression.

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** Modest*
*** Significant*
**** Significant. Amounts given to the author's institution or to a colleague for research in which the author has participation, not directly to the author.*

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