

Assessment of depression in medical patients: A systematic review of the utility of the Beck Depression Inventory-II

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To perform a systematic review of the utility of the Beck Depression Inventory for detecting depression in medical settings, this article focuses on the revised version of the scale (Beck Depression Inventory-II), which was reformulated according to the DSM-IV criteria for major depression. We examined relevant investigations with the Beck Depression Inventory-II for measuring depression in medical settings to provide guidelines for practicing clinicians. Considering the inclusion and exclusion criteria seventy articles were retained. Validation studies of the Beck Depression Inventory-II, in both primary care and hospital settings, were found for clinics of cardiology, neurology, obstetrics, brain injury, nephrology, chronic pain, chronic fatigue, oncology, and infectious disease. The Beck Depression Inventory-II showed high reliability and good correlation with measures of depression and anxiety. Its threshold for detecting depression varied according to the type of patients, suggesting the need for adjusted cut-off points. The somatic and cognitive-affective dimension described the latent structure of the instrument. The Beck Depression Inventory-II can be easily adapted in most clinical conditions for detecting major depression and recommending an appropriate intervention. Although this scale represents a sound path for detecting depression in patients with medical conditions, the clinician should seek evidence for how to interpret the score before using the Beck Depression Inventory-II to make clinical decisions.

KEYWORDS: Beck Depression Inventory; Depression; Medical Illness; Psychometric Scale; Screening; Validation Study.

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INTRODUCTION

Patients with chronic medical illness have a high prevalence of major depressive illness (1). Depressive symptoms may co-occur with serious medical illnesses, such as heart disease, stroke, cancer, neurological disease, HIV infection, and diabetes (1-3). The functional impairment associated with medical illnesses often causes depression. Patients who present depression along with medical illness tend to have more severe symptoms, more difficulty adjusting to their health condition, and more medical costs than patients who do not have co-existing depression (2). While prompt treatment of depression can improve the outcome of the co-occurring physical illness, proper and

early recognition of treatable depression can result in a faster recovery and can shorten the patient's hospital stay.

Formal assessment of depression by a liaison psychiatrist or clinician-administered instruments, such as the Hamilton Depression Rating Scale (4) and the Montgomery-Åsberg Depression Rating Scale (5), are onerous to implement in routine clinical settings. In contrast, self-report measures for depression can be cost-effective for use in busy specialty medical clinics. Throughout the second half of the 20th century, along with the discovery of effective antidepressant drugs and the development of cognitive-behavioral therapy, several patient-rated assessment scales for detecting depression were proposed. Popular instruments include the Beck Depression Inventory (BDI) (6), the Self-Rating Depression Scale (7), the Center for Epidemiologic Studies Depression Scale (8), the Patient Health Questionnaire-9 (9), the Inventory of Depressive Symptomatology (10), and the Depression in the Medically Ill (11). Alternative scales have been developed to measure depression in specific populations, such as postpartum women (12) and patients with schizophrenia (13). Other scales have been devoted to quantify depression in specific age groups, such as adolescents (14) and the elderly (15). The utility of these

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scales in the medically ill is challenging because the frequent presence of somatic symptoms in physical diseases can mislead their score interpretation. If the clinician is unable to decide which existing instrument to use and how to interpret the results, the advancement of self-rating scales can represent a step backward.

Among the investigations on using self-assessment measures to evaluate depression, the BDI outnumbers the other measures in the amount of published research: there are more than 7,000 studies so far using this scale. Aaron T. Beck and colleagues developed the 21-item BDI in 1961 to aid clinicians in the assessment of psychotherapy for depression (6). The easy applicability and psychometric soundness of this scale have popularized its use in a variety of samples (16-19) and in healthcare settings worldwide (20-22). This inventory has received two major revisions: in 1978 as BDI-I_A (23) and in 1996 as BDI-II (24). This later reformulation covers psychological and somatic manifestations of a two-week major depressive episode, as operationalized in the DSM-IV (25). Four items of the BDI-I_A (weight loss, distorted body image, somatic preoccupation, and inability to work) were replaced with agitation, worthlessness, difficulty concentrating, and energy loss to assess the intensity of depression. The items of appetite and sleep changes were amended to evaluate the increase and decrease in depression-related vegetative behaviors (24,26-28). Different from the original version, which intended to measure negative cognitions of depression, the BDI-II does not reflect any particular theory of depression. The English version of BDI-II has been translated and validated in 17 languages so far, and it is used among countries in Europe, the Middle East, Asia, and Latin America (29-32).

Investigations on depression and its instrumentation must be considered in view of the pressure for evidence-based decisions in clinical practice and the information explosion of the literature. Recently, the BDI-II has been ever-increasingly used in the medically ill to evaluate depressive states that occur at high prevalence in healthcare settings. The authors systematically reviewed the validity of the BDI-II to quantify the severity of depression among medical patients and discuss the interpretation of its metric conventions. The performance of the BDI-II (and its short version) among patients with medical illnesses who often present somatic complaints is contrasted with its performance among non-medical patients, among whom psychological symptoms are the most prominent features.

METHODS

Both investigators, with previous experience on psychometric instruments, conducted this systematic review by searching the Web of Sciences (ISI), Medline, and PsycINFO databases. The following MeSH terms were used to scan studies through the search builder of each database: "valid*" OR "reliab*" OR "sensitiv*" OR "specific*" OR "concurrent" OR "divergent" OR "convergent" OR "factor analysis". Following the search, we filtered articles containing the term "Beck Depression Inventory" published during the time period "1/1/1996 to 10/10/2012". There was no language or age range restriction. The initial search resulted in 822 retrieved articles, with 409 from ISI, 328 from Medline, and 85 from PsycINFO. The reference sections of the review articles of the depression instruments (33-35) and book chapters (36-38) were examined to identify potential

studies. Additional efforts to locate relevant studies by hand and to contact experts in the field identified seven psychometric articles on medical samples, totaling 829 articles.

After checking for duplication and overlap, 528 articles remained in the list. Filtering non-medical articles, we eliminated 170 articles in which "student," "psychiatric," or "community" was mentioned in the title or abstract. The retained 358 articles were screened for eligibility by reading the abstract. Two articles were not accessible, even upon request to the author, resulting in 356 full-text articles that were assessed for eligibility.

The exclusion criteria were as follows: (1) non-psychometric studies, such as clinical trials, editorials, letters, reviews, meta-analyses, practice guideline, randomized controlled trials, and case reports; (2) non-medical samples (student, psychiatric, or non-clinical); (3) small sample size ($N < 30$); (4) BDI-I; and (5) reanalysis or duplicated analysis of an original dataset. The sample was considered "non-clinical" when study participants consisted of workers, caregivers, and community dwellers. Regardless of the nosological controversy of chronic fatigue syndrome and chronic pain as medical illnesses, these conditions were included due to their high occurrence in healthcare settings. Samples with less than 30 participants were only retained when the study addressed a very important problem, such as between-version comparison or content analysis. A summary analysis of the complete sample was preferable when multiple analyses were available (such as separate reports by gender, ethnicity, or depressed versus non-depressed groups).

The reasons for excluding 286 articles were as following: 174 studies did not contain the original data using the BDI-II (167 non-psychometric studies and seven reviews); 95 studies utilized non-medical samples (34 student samples, 31 psychiatric samples, and 30 non-clinical samples); 13 studies provided a reanalysis or secondary data analysis; three studies used BDI-I; and one study had a small sample size. The final list resulted in 70 articles that are dedicated to investigating the psychometric performance of the BDI-II in medical patients. The flowchart in Figure 1 displays each step of the search process.

Studies on medical diseases were grouped according to the sample recruitment source as outpatients or primary care ($k = 52$) and hospital ($k = 12$) (Table 1). Studies investigating the short version BDI-FS ($k = 10$) are displayed separately. Four studies reported data on both BDI-II and BDI-FS. Several investigations did not provide a clear description of the healthcare setting or recruited participants from different levels of health service. Likewise, the heterogeneous selection of patients might reflect different groups of participants or stages of disease course. Sixteen studies reported a sample size with less than 100 respondents, but all of the studies had more than the minimum of 30 subjects.

Among the 70 retained studies, the BDI-II was administered to adults in primary care ($k = 4$) and clinics of cardiology ($k = 12$), neurology ($k = 12$), obstetrics ($k = 8$), brain injury ($k = 6$), nephrology ($k = 5$), chronic pain ($k = 4$), chronic fatigue ($k = 4$), oncology ($k = 3$), and infectious disease ($k = 3$). Only two studies assessed adolescent medical patients (39,40).

Almost all of the identified studies were published after 2000, and the great majority (approximately 64%) of studies

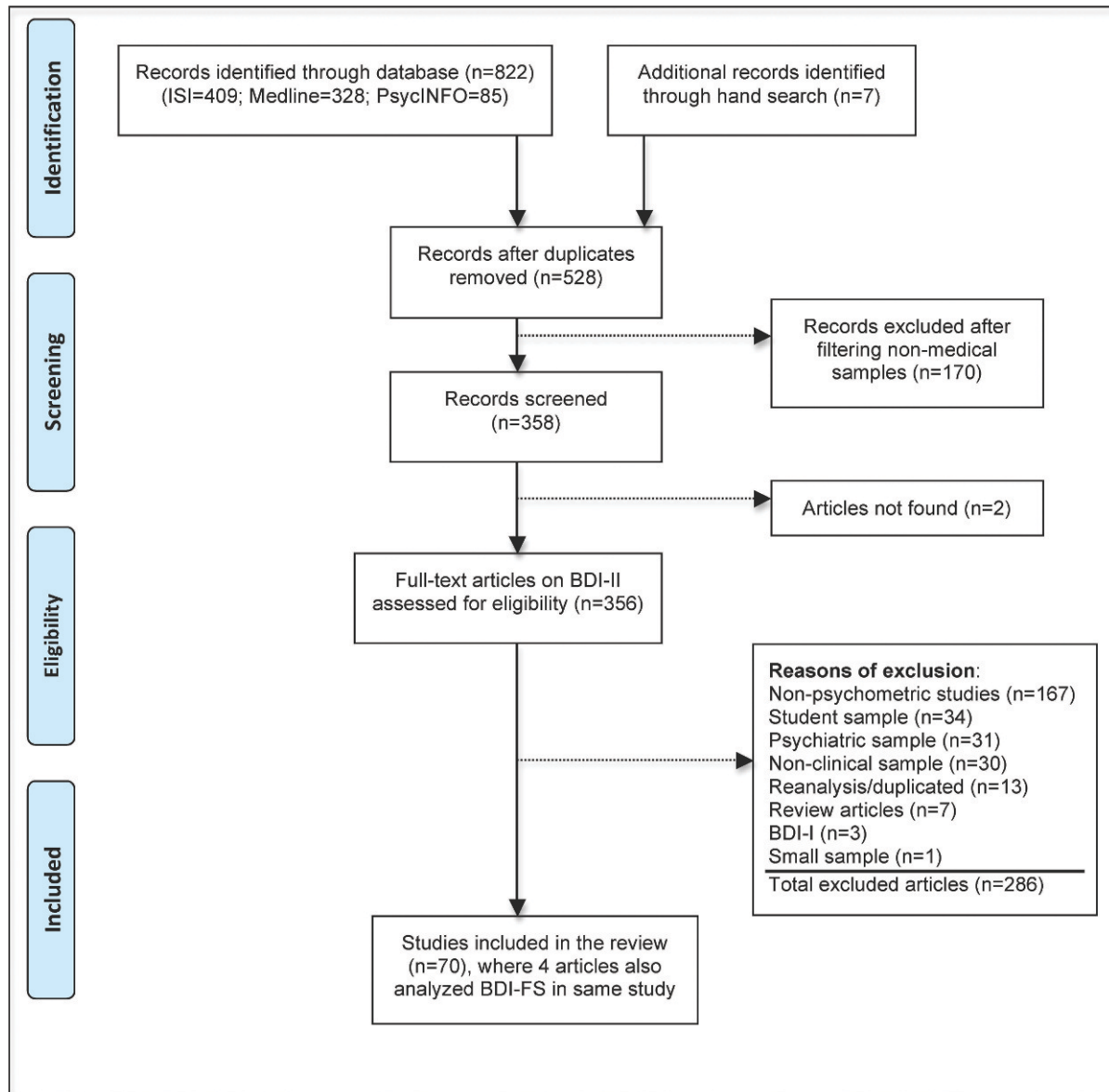


Figure 1 - Flowchart of the search to scan for studies investigating psychometric properties of the Beck Depression Inventory-II among medical patients.

was published in the past five years, suggesting a recent trend for using the BDI-II in medical settings. Nearly 70% of the articles applied the English version of BDI-II, but 13 non-English versions of the scale were found.

Overview

The BDI-II performed well in adult patients with a wide array of medical diseases (Table 1). For the purpose of comparison, data from Beck's studies on non-medical and medical samples (24,26) are listed as normative references. Usually, non-patient samples reported the item scores in the lower part of the range of possible scores (from 0 to 3), with a skewed distribution of item scores. Based on scores of 500 psychiatric outpatients, Beck et al. (24) suggested the following ranges of BDI-II cut-off scores for depression: 0–13 (minimal), 14–19 (mild), 20–28 (moderate), and 29–63 (severe). As an example, the mean score of the BDI-II in samples with mood disorder was $M=26.6$, and the

mean scores for major depressive episode, recurrent depression, and dysthymia were 28.1, 29.4, and 24.0, respectively.

Confirming the expectation that medical patients would report more somatic symptoms, most of the investigations reported a slightly higher mean total score for medical patients than non-patients (Table 1), but scores were still around or below the threshold of 13/14 that is recommended by Beck to detect mild depression. Exceptions of this observation were studies on chronic pain (29,61,70,77), with mean total scores ranging from 17.2 to 26.9. The type of respondents might influence item endorsement and the scale total score.

In comparison with the previous version, the item characteristics of the BDI-II have been changed in terms of endorsement rate, homogeneity, and content coverage (34). The homogeneity of the scale was described for 17 of 21 items in the original study (24), showing acceptable item-total



Table 1 - Description of psychometric studies of the Beck Depression Inventory-II in medical samples by language version, sample size (N), sample description, gender distribution (%W), mean score (SD), and reliability (Cronbach's alpha).

Authors, year	Language	N	Sample description	%W	Mean Score (SD)	Alpha
Normative sample						
Beck et al., 1996 (24)	English	120	College students	44	12.6 (9.9)	0.93
		500	Psychiatric outpatients	62	22.5 (12.8)	0.92
Outpatients/Primary Care (k = 52)						
Arnarson et al., 2008 (41)	Icelandic	248	Adult outpatients	82	21.3 (12.2)	0.93
Arnau et al., 2001 (42)	English	333	Adult - primary care	69	8.7 (9.4)	0.94
Brown et al., 2012 (43)	English	111	Chronic fatigue outpatients	83	17.7 (9.1)	0.89
Beck & Gable, 2001 (44)	English	150	Postpartum outpatients	100	NR	0.91
Bunevicius et al., 2012 (45)	Lithuanian	522	Coronary outpatients	28	11.0 (8.2)	0.85
Carney et al., 2009 (46)	English	140	Insomnia outpatients	74	14.1 (10.2)	0.91
Carvalho Bos et al., 2009 (47)	Portuguese	331	Pregnancy outpatients	100	NR	0.88
		354	Postpartum outpatients	100	NR	0.89
Chaudron et al., 2010 (48)	English	198	Postpartum outpatients	100	NR	NR
Chilcot et al., 2008 (49)	English	40	Renal hemodialysis outpatients	40	11.1-12.9 (9.3-9.4)	NR
Chilcot et al., 2011 (50)	English	460	Renal disease outpatients	35	11.9 (8.3)	NR
Chung et al., 2010 (51)	Chinese	62	Heart disease outpatients	31	18.2 (7.9)	NR
Corbière et al., 2011 (29)	French	206	Chronic pain outpatients	53	17.2 (11.5)	0.84
Dbouk et al., 2008 (52)	English	129	Hepatitis C outpatients	50	17.1 (11.6)	NR
de Souza et al., 2010 (53)	English	50	Huntington's disease	48	8.8 (8.9) ND 26.8 (6.9) ^D	NR
del Pino Pérez et al., 2012 (54)	Spanish	205	Coronary outpatients	26	9.2 (7.6)	NR
Dutton et al., 2004;	English	220	Adult - primary care	52	12.6 (10.4)	0.90
Grothe et al., 2005 (55,56)						
Findler et al., 2001 (57)	English	98	Traumatic brain injury (mild)	55	12.2 (9.6)	NR
		228	Traumatic brain injury (moderate to severe)	33	9.7 (8.1)	NR
Frasure-Smith & Lespérance, 2008 (58)	English/French	804	Coronary outpatients	19	NR	0.90
Griffith et al., 2005 (59)	English	132	Epilepsy outpatients	72	15.9 (11.1)	NR
Hamid et al., 2004 (60)	Arabic	493	Women - primary care	100	13.0 (8.1)	NR
Harris & D'Eon, 2008 (61)	English	481	Chronic pain outpatients	58	26.9 (11.7)	0.92
Hayden et al., 2012 (62)	English	83	Obese bariatric outpatients	71	13.4 (9.1)	0.89
Jones et al., 2005 (63)	English	174	Epilepsy outpatients	66	NR	0.94
Kanner et al., 2010 (64)	English	193	Epilepsy outpatients	68	10.6 (6.3)	NR
King et al., 2012 (65)	English	489	Traumatic brain injury	10	19.7 (11.8)	NR
Kiropoulos et al., 2012 (66)	English	152	Coronary heart disease outpatients	34	9.4 (8.9) ND 17.8 (8.7) ^D	NR
Kirsch-Darrow et al., 2011 (67)	English	161	Parkinson outpatients	31	9.5 (7.2)	0.89
Ko et al., 2012 (68)	Korean	121	Epilepsy outpatients	35	9.7 (6.3) ND 29.9 (11.7) ^D	NR
Lipps et al., 2010 (69)	English	191	HIV infection outpatients	61	14.1 (11.0) ^W 10.2 (9.1) ^M	0.89
Lopez et al., 2012 (70)	English	345	Chronic pain outpatients	0	23.0 (12.2)	0.93
Masuda et al., 2012 (71)	Japanese	327	Myasthenia gravis outpatients	67	11.3 (7.9)	NR
Neitzer et al., 2012 (72)	English	150	Renal hemodialysis outpatients	48	12.3 (10.8)	NR
Ooms et al., 2011 (73)	Dutch	136	Tinnitus outpatients	35	11.3 (9.5)	NR
Osada et al., 2011 (74)	Japanese	56	Fibromyalgia outpatients	85	NR	NR
Patterson et al., 2011 (75)	English	671	Hepatitis C outpatients	3	16.2 (12.2)	0.84-0.91
Penley et al., 2003 (30)	English/Spanish	122	Chronic renal outpatients	41	15.0 (12.5)	0.92
Pereira et al. 2011 (76)	Portuguese	503	Pregnant outpatients	100	NR	NR
Poole et al., 2009 (77)	English	1227	Chronic pain outpatients	62	24.7 (11.6)	0.92
Rampling et al., 2012 (78)	English	266	Epilepsy outpatients	59	NR	0.94
Roebuck-Spencer, 2006 (79)	English	60	Systemic lupus erythematosus outpatients	80	NR	NR
Su et al., 2007 (80)	Chinese	185	Pregnant outpatients	100	7.0 (5.0) ND 17.0 (10.2) ^D	NR
Suzuki et al., 2011 (81)	Japanese	287	Myasthenia gravis outpatients	67	11.1 (8.1)	NR
Tandon et al., 2012 (82)	English	95	Perinatal women	100	NR	0.9
Teng et al., 2005 (83)	Chinese	203	Postpartum outpatients	100	7.8 (6.3) ND 25.8 (10.4) ^D	NR
Turner et al., 2012 (84)	English	72	Stroke outpatients	47	13.4 (12.9)	0.94
Turner-Stokes et al., 2005 (85)	English	114	Brain injury outpatients	43	Median 10 (IQR 5-19)	NR
Viljoen et al., 2003 (86)	English	127	Adult - primary care	63	NR	NR
Wan Mahmud et al., 2004 (87)	Malay	61	Postpartum I outpatients	100	4.4 (5.5)	0.89
		354	Postpartum II outpatients	100	6.2 (6.4)	
Warmenhoven et al., 2012 (88)	Dutch	46	Cancer outpatients	43	14.7 (9.9)	NR
Williams et al., 2012 (89)	English	229	Parkinson disease outpatients	33	6.5 (5.2) ND 14.7 (7.4) ^D	0.90
Young et al., 2007 (90)	English	194	Cardiac outpatients	35	8.6-13.4 (7.7-12.3)	NR
Zahodne et al., 2009 (91)	English	71	Parkinson disease outpatients	32	11.7 (7.9)	NR
Hospitalized (k = 12)						
Di Benedetto et al., 2006 (92)	English	81	Acute cardiac syndrome	19	NR	> 0.90
Gorenstein et al., 2011 (93)	Portuguese	334	Adult - hospitalized	48	12.2 (11.6)	0.91
			170 physically disabled		14.5 (11.2)	
			164 intellectually disabled		9.7 (11.4)	



Table 1 - Continued.

Authors, year	Language	N	Sample description	%W	Mean Score (SD)	Alpha
Homaifar et al., 2009 (94)	English	52	Traumatic brain injury *	10	25 (14.6)	NR
Huffman et al., 2010 (95)	English	131	Myocardial infarction	20	9.8 (9.4)	NR
Jamroz-Wisniewska et al., 2007 (96)	Polish	104	Multiple sclerosis	74	14.4 (9.2)	NR
Low & Hublely, 2007 (97)	English	119	Coronary disease	25	8.0 (7.1)	0.89
Pietsch et al., 2012 (40)	German	314	Adolescents patients* (252 hospital inpatients)	60	7.5 (6.5) ND 25.8 (10.1) ^D	0.91
Rowland et al., 2005 (98)	English	51	Traumatic brain injury	28	5.6 ND 20.1 ^D	NR
Siegert et al., 2009 (99)	English	353	Neurological diseases	40	13.6 (10.1)	0.89
Thomas et al., 2008 (100)	English	50	Stroke	38	12.7 (8.9)	NR
Thombs et al., 2008 (101)	English/French	477	Acute myocardial infarction	17	9.2 (7.9)	NR
Tully et al., 2011 (102)	English	226	Cardiac heart disease	17	8.6 (6.2) ^a 9.1 (6.4) ^b	0.85 0.87
BDI Fast Screen version (k = 10)						
Beck et al., 1997 (26)	English	50	Medical inpatients	60	5.8 (4.5)	0.86
Brown et al., 2012 (43)†	English	111	Chronic fatigue outpatients	83	4.3 (3.2)	NR
Neitzer et al., 2012 (72)†	English	146	Renal hemodialysis outpatients	48	2.7 (3.4)	NR
Pietsch et al., 2012 (40)†	German	314	Adolescents* (252 hospital inpatients)	60	1.9 (2.4) ND 8.1 (3.5) ^D	0.82
Poole et al., 2009 (103)†	English	1227	Chronic pain outpatients	62	7.1 (4.30)	0.84
Scheinthal et al., 2001 (104)	English	75	Geriatric outpatients	56	2.3 (3.1)	0.83
Servaes et al., 2000 (105)	Dutch	85	Disease-free cancer outpatients	43.5	0.4-2.3 (0.9-1.8)	NR
Servaes et al., 2002 (106)	Dutch	16	Chronic fatigue outpatients	50	2.6 (1.8)	NR
		57	Disease-free breast cancer outpatients	100	2.3-4.2 (2.2-3.9)	
Steer et al., 1999 (107)	English	57	Chronic fatigue outpatients	100	3.3 (2.6)	NR
		120	Medical outpatients	50	2.2 (3.0)	
Winter et al., 1999 (39)	English	100	Adolescent outpatients	50	1.9 (3.1)	0.88

N: sample size; %W: percentage of women; SD: standard deviation; Alpha: Cronbach's alpha coefficient of internal consistency;

NR: not reported.

M: men, W: women; ND: non-depressed; D: depressed; a: pre-surgery; b: post-surgery.

*Mixed sample of in- and outpatients.

†Separate analysis of the short version of the BDI-II in the same study.

IQR: interquartile range.

correlations of $r_{it} \geq 0.5$ (108). Different item endorsements and coverage are reported for different versions of the instrument: substantial item-total correlation was described for 15 items in the Brazilian-Portuguese version (93) and 10 items in the Arabic version (32). Direct comparison of the scores between different language versions should be avoided.

In contrast with patient samples, somatic items, such as "change in sleeping pattern" and "change in appetite," presented low scores for non-clinical samples. However, "tiredness or fatigue," might present special clinical significance in patients with chronic fatigue syndrome (43) or cardiac coronary disease (45,51). Regardless of the severity of depression, the item "loss of sexual interest" displayed the worst item-total correlation, although it was significantly related to the whole construct under consideration (23,24). Thombs et al. (101) suggested that the assessment of symptom severity with BDI-II would be substantially biased in medically ill patients compared with non-medically ill patients due to the misattribution of somatic symptoms from medical conditions to depression. The authors found that post-acute myocardial infarction patients did not have higher somatic symptom scores than psychiatry outpatients who were matched on cognitive/affective scores. Compared with undergraduate students, somatic symptom scores in cardiac patients were only approximately one point higher, indicating that somatic symptom variance is not necessarily related to depression in medically ill and non-medically ill respondents.

The item "suicidal thoughts" was the least reported item among non-medical settings; however, a substantial correlation still demonstrates its contribution to depression (23,24). Investigations on the ability of separate items, e.g., "pessimism" and "loss of energy," to predict disease outcome or treatment response can help clinicians in the management of depression. The contribution of self-rated somatic vs. cognitive symptoms in medical samples should be clarified by item analysis to identify whether items are appropriately assigned to a scale.

BDI-Fast Screen

Experts view somatic symptoms among medical patient as the harbinger of depression and anxiety in the healthcare setting (3,109-111). Preferably, the assessment of depression in patients with medical illness should avoid confounding physical symptoms. The correct identification of comorbid depressive disorders in medical patients is crucial in understanding its origin and in controlling the physical symptom burden.

Two measures were designed with the objective of eliminating somatic items. The first proposed measure is the Hospital Anxiety Depression Scale (HADS) (112), which has a seven-item depression subscale. Despite the lack of comprehensive data on its psychometric properties (113) and challenges to its factorial validity (114), the HADS remained widely used as a research measure of depression in the medically ill.



The seven-item BDI for Primary Care (BDI-PC) (26) was developed in 1997 after removing somatic items, such as fatigue and sleep problems, from the BDI. This version was projected for evaluating depression in patients whose behavioral and somatic symptoms are attributable to biological, medical, alcohol, and/or substance abuse problems that may confound the diagnosis of depression. The BDI-PC was later renamed the BDI[®] Fast Screen for Medical Patients (BDI-FS), and it consists of items 1 to 4 and 7 to 9 of the BDI-II (27).

The BDI-FS requires less than five minutes for completion, and scoring is similar to the BDI-II. For interpretation, the manual suggests that scores 0–3 indicate minimal depression; 4–6 indicate mild depression; 7–9 indicate moderate depression; and 10–21 indicate severe depression (27). Validation studies ($k=10$) have demonstrated the ability of this non-somatic scale to discriminate depressed vs. non-depressed medical patients (39,26,104,107), chronic pain patients (103), and conditions where fatigue is a prominent feature (43,105,106). Less popular than its full version, more investigations are needed to establish the utility of this short version in medical settings before recommending its extensive use.

Reliability

Thirty-seven of 70 retrieved psychometric articles (52.9%) did not report reliability coefficients for the data. In comparison to the internal consistency of previous versions of the BDI (average Cronbach's alpha coefficient of approximately 0.85) (23), the reliability of the BDI-II among medical samples was satisfactory, with an alpha of approximately 0.9, ranging between 0.84 and 0.94 (Table 1). In addition, Beck (26) reported a coefficient of 0.86 for the BDI-FS, and further studies reported the coefficient ranging from 0.82–0.88 (39,40).

No information on the retest reliability is available for medical samples. However, the stability of the BDI-II, as expressed by retest coefficients of Pearson's r of 0.92 and 0.93, was reported by Beck and colleagues (24) for psychiatric and student samples, respectively. Further evidence of acceptable stability through re-application of the BDI-II was demonstrated for student samples (range: 0.73–0.96) (115,116).

The retest effect – that is, lower scores on the second application, even without intervention – may affect the reliability of BDI-II in healthcare settings. This effect could be unrelated to a true change in severity and could be purely the result of the measurement process. Although this fact would not preclude using this scale in follow-up or interventional studies among medical patients, nothing should be stated concerning the scale performance in this respect. Therefore, clinicians should be careful when making important treatment decisions based on non-empirical information assumed from non-clinical samples.

Item Response Theory

Most validation studies of BDI-II were analyzed in accordance with classic test theory, assuming a true score for each respondent's summed score and disregarding the measurement error. In other words, two individuals with the same total score may differ greatly in terms of relative severity and frequency of symptoms. This discrepancy might be particularly taxing in medical settings, where physical symptoms are common complaints and overlap with "true" depression-related somatic symptoms.

In the last decades, the item response theory (IRT) is an increasingly used method in psychometrics, in addition to the dominant classic test theory of true score paradigm. Briefly, the IRT distinguishes between moderate and severe cases of depression using item-level analysis to account for measurement error (117). The response of a respondent for a given ability should be modeled to each item in the test. For example, when a given depression scale is composed only of items that measure mild depression, this instrument would have great difficulty identifying severe depression because both levels of severity should be characterized by high scores on all items. In addition, if items assessing psychological and physical symptoms were only loosely related, a single score would not distinguish between two potentially different groups of depressed patients – with primarily psychological or with primarily vegetative symptoms. This scenario is particularly pressing in medical settings that are investigating clinical changes in depressive syndrome.

Seigert and colleagues (99) reported an illuminating study after examining each BDI-II item for differential item functioning in a neurological sample ($n=315$). The authors identified misfits to model expectations for three items that seemed to measure different dimensions: changes in sleeping pattern, changes in appetite, and loss of interest in sex. These vegetative items were removed and re-scored in an iterative fashion to the scale. In the real world, the likelihood of receiving a rating of 1 on the insomnia item was essentially the same, regardless of the overall severity of depression, but the likelihood of receiving a rating of 3 on sad mood could be low, even when overall depression was severe.

Waller and colleagues (118) investigated the latent structure of the BDI-II through differential item functioning and item level factor analysis in samples of women with breast cancer and women with clinical depression. Items of negative cognitions about the self, e.g., worthlessness, self-dislike, and punishment feelings, were less likely to be reported by breast cancer patients than depressed patients. Negative cognitions about the self appear to be related to different factors in breast cancer. The analyses also found many differences at both the item and factor scale levels, suggesting caution when interpreting the BDI-II in breast cancer patients.

These studies advocate that the rating scheme is not ideal for many BDI-II items, thus affecting the scale's capacity to detect change in medical conditions. Systematic IRT analysis of the BDI-II items can strengthen the scale coverage in assessing heterogeneous depressive conditions among medical patients.

Convergent and Divergent Validity

Table 2 displays the studies that compared the BDI-II with scales measuring depression, anxiety, and miscellaneous constructs as criteria that were determined at essentially the same time to check for concurrent validity. The convergent validity between the BDI-II and the BDI-I was 0.93 (28). The shorter version, BDI-FS, also presented an acceptable correlation of 0.85 (72). In general, the overlap of the construct measured by BDI-II with other widely used scales to assess depression, e.g., the Center for Epidemiologic Studies of Depression, the Hamilton Depression Rating Scale, Edinburgh Postnatal Depression Scale, and the Hospital Anxiety and Depression Scale-Depression, was adequate and ranged from 0.62 to 0.81 (Table 2).



Table 2 - Concurrent validity of the Beck Depression Inventory-II with measures of depression, anxiety, and other miscellaneous constructs in medical samples.*

Concurrent instrument		r	Study
Depression measure			
BDI-I	Beck Depression Inventory – I	0.93	28
BDI-FS	Beck Depression Inventory – Fast Screen	0.85	72
HADS-D	Hospital Anxiety and Depression Scale-Depression	0.62 - 0.71	26†, 41
CES-D	Centre for Epidemiologic Studies of Depression	0.72 - 0.87	29, 41, 52, 63, 69
HRSD	Hamilton Rating Scale for Depression - revised	0.71 - 0.75	24, 87
EPDS	Edinburgh Postnatal Depression Scale	0.72 - 0.82	44, 83, 87
GDS	Geriatric Depression Scale	0.81	104 †
PHQ	PRIME-MD Patient Health Questionnaire	0.84	52
CDS	Cardiac Depression Scale	0.65; 0.69	66, 92
POMS-D	Profile of Mood States Depression Scale	0.77	59
PDSS	Postpartum Depression Screening Scale	0.68; 0.81	44, 76
DISC	Depression Intensity Scale Circles	0.66	85
NGRS	Numbered Graphic Rating Scale	0.65	85
Anxiety measure			
BAI	Beck Anxiety Inventory	0.60	24, 41
HARS	Hamilton Anxiety Rating Scale - revised	0.47	24
STAI	State-Trait Anxiety Inventory	0.64; 0.83	66, 92
PSWQ	Penn State Worry Questionnaire	0.61	41
HADS-A	Hospital Anxiety and Depression Scale-Anxiety	0.65	41
Miscellaneous			
SSI	Scale for Suicide Ideation	0.37	24
BHS	Beck Hopelessness Scale	0.68	24
MPQ-PRI	McGill Pain Questionnaire (Pain Rating Index)	0.32	61
SF-36 MH	Short Form 36-Item Health Survey – Mental Health	0.45 - 0.70	43†, 57
SF-36 PH	Short Form 36-Item Health Survey – Physical Health	0.12 - 0.29	43†, 57
SPS	Social Provisions Scale	0.39 - 0.42	69
CIS-F	Checklist Individual Strength - Fatigue	0.58	105
NDDI-E	Neurologic Disorders Depressive Inventory in Epilepsy	0.81 - 0.85	64, 68
NSI	Neurobehavioral Symptom Inventory	0.77	65
MG-QOL	Myasthenia Gravis Quality of Life Scale	0.52	71
JFIQ	Fibromyalgia Impact Questionnaire	0.58	74
ANAM	Automated Neuropsychological Assessment Metrics-Mood	0.67	79
SCQR	Stroke Cognitions Questionnaire Revised	0.54 - 0.80	100
STOP-D	Screening Tool for Psychological Distress	0.83	90
LARS	Lille Apathy Rating Scale	0.45	91
AS	Apathy Scale	0.58	91
UPDRS-III	Unified Parkinson's Disease Rating Scale	0.38	91

r: Pearson's product moment correlation. Negative correlation is omitted in the numerical value.

†The concurrent validity refers to the BDI-FS version.

*A complete list of retrieved studies can be obtained from the authors upon request.

Additionally, the convergent validity between the BDI-II and scales that assess anxiety was significant and differed across comparison instruments: Beck Anxiety Inventory (0.60) (24,41), Hamilton's Anxiety Rating Scale (0.47) (24), State-Trait Anxiety Inventory (0.83) (92), Penn State Worry Questionnaire (0.61) (41), and Hospital Anxiety and Depression Scale-Anxiety (0.65) (41). These results were expected due to the extent that anxiety symptoms were highly comorbid with depressive symptoms or that they could be attributed to the characteristics of the compared instruments. As a broad indicator of mental health, a high score on the BDI scale could also be explained by other disorders, physical illnesses, or social problems (69). Most likely, the construct covered by the BDI-II is beyond the "pure" depressive-type of psychopathology. As such, the convergent validity of the scale with hopelessness (24) and fatigue (105) was also substantial. In the medical setting, the clinician should not assume depression as a primary issue when BDI-II is used without a thorough clinical assessment.

Concerning divergent validity, studies have indicated poor correlation ($r < 0.4$) with instruments assessing chronic pain (61), physical health (43), and substance use disorders (119). Suicidal ideation, which is one of core features of depression and an item on the BDI-II, was only poorly correlated with the instrument (24).

Criterion-oriented Validity

Psychometric experts view the interpretation of the raw scores on tests, such as the BDI-II, as problematic, unless they are converted into standardized scores (e.g., T score or stanine method) (108,120). No known standardized norms have been reported for the BDI-II to date. As an alternative to the norm-referenced method, the criterion-referenced method is the most widespread practice for interpreting BDI-II scores. Usually, the total score is compared with a cut-off score established according to a gold-standard criterion (e.g., clinical assessment or structured interview).

When clinicians intend to screen probable cases of major depression in medical settings, the sensitivity should be



Table 3 - Criterion validity and cut-off point of the Beck Depression Inventory-II for detecting major depressive episode in medical samples.

Authors	Sample	Cut-off	Sensitivity	Specificity	PPV	NPV	AUC	% MDD	Criterion
Outpatients									
Arnanson et al. (41)	Adult outpatients	20	82	75	NR	NR	87	42.1	MINI
Arnau et al. (42)	Adult - primary care	18	94	92	54	99	96	23.2	PHQ
Beck & Gable 2001 (44)	Postpartum outpatients	20	56	100	100	93	95	12	SCID-I
Bunevicius et al. (45)	Coronary outpatients	14	89	74	29	98	90	11	MINI
Carney et al. (46)	Insomnia outpatients	17	81	79	NR	NR	83.8	NR	SCID-I
Chaudron et al. (48)	Postpartum outpatients	20	45.3	91.1	NR	NR	90	37	SCID-I
Chilcot et al. (49)	Renal hemodialysis	16	89	87	89	87	96	22.5	MINI
de Souza et al. (53)	Huntington's disease	11	100	66	48	100	85	50	SCAN
Dutton et al. (55)	Adult - primary care	14	87.7	83.9	69.5	94.2	91	29.5	PRIME-MD
Frasure-Smith & Lespérance (58)	Coronary outpatients	14	91.2	77.5	NR	NR	92	13.7	SCID-I
Jones et al. (63)	Epilepsy outpatients	11	96	80	48	99	94	17.2	MINI
		15	84	87	55	97	92		SCID-I
		11	95.7	78.3	42	99	94		MINI + SCID
Hayden et al. (62)	Obese bariatric outpatients	13	100	63.9	29.7	100	84.7	13.3	SCID-I
Pereira et al. (76)	Pregnant outpatients	16	83.3	93.1	14.3	99.7	95	1.3	DIGS
Ramplung et al. (78)	Epilepsy outpatients	14	93.6	74	44	98	90	17.7	MDI (ICD-10)
		15	93.8	78.9	49.5	98	93	18	MDI (DSM-IV)
Su et al. (80)	Pregnant outpatients	12	72.7-75.0	82.7-82.9	NR	NR	81.9-86.6	12.4	MINI
Tandon et al. (82)	Perinatal women	12	84.4	81.0	NR	NR	91	33.7	SCID-I
Teng et al. (83)	Postpartum outpatients	14	92	83	42	99	NR	11.8	MINI
		12	96	79					
Turner et al. (84)	Stroke outpatients	11	92	71	NR	NR	89	18	SCID-I
Turner-Stokes et al. (85)	Brain injury outpatients	14	74	80	69	84	NR	39.8	DSM-IV
Wan Mahmud et al. (87)	Postpartum outpatients	9	100	98	87.5	100	99.5	48	CIS
Warmenhoven et al. (88)	Cancer outpatients	16	90	69	NR	NR	82	22	PRIME-MD
Williams et al. (89)	Parkinson outpatients	7	95	60	62	94	85	34.1	SCID-I
Hospital sample									
Homaifar et al. (94)	Traumatic brain injury	19	87	79	NR	NR	NR	44.2	SCID-I
Huffman et al. (95)	Myocardial infarction	16	88.2	92.1	62.5	98.1	96	13	SCID-I
Low & Hubley (97)	Coronary disease	10	100	75	21	100	92	11.8	SCID-I
Pietsch et al. (40)	Adolescents	19	86	93	47	99	93	6.7	Kinder-DIPS
BDI-FS									
Beck et al. (26)	Medical inpatients	4	82	82	NR	NR	92	66	PRIME-MD
Neitzer et al. (72)	Renal hemodialysis	4	97.2	91.8	81.4	98.9	98	28.7	BDI-II ≥ 16
Pietsch et al. (40)	Adolescents	6	81	90	37	99	92	6.7	Kinder-DIPS
Poole et al. (103)	Chronic pain outpatients	4	81	92	NR	NR	94	59.4	BDI-II ≥ 19
		5	75	93	NR	NR	94	47.8	BDI-II ≥ 22
Scheinthal et al. (104)	Geriatric outpatients	4	100	84	NR	NR	93	11	Clinical assessment
Steer et al. (107)	Medical outpatients	4	97	99	NR	NR	99	24.2	PRIME-MD
Winters et al. (39)	Adolescent outpatients	4	91	91	NR	NR	98	11	PRIME-MD

PPV: positive predictive value; NPV: negative predictive value; AUC: area under the curve;%MDD: proportion of major depression disorder; NR: not reported.

PHQ: PRIME-MD Patient Health Questionnaire; MINI: Mini International Neuropsychiatric Interview; PRIME-MD: Primary Care Evaluation of Mental Disorders; CIS: Clinical Interview Schedule; SCID-I: Structured Clinical Interview for DSM-IV Axis I Diagnosis; MDI: Major Depression Inventory; Kinder-DIPS: Diagnostisches Interview bei psychischen Störungen im Kindes und Jugendalter; DIGS: Diagnostic Interview for Genetic Studies; SCAN: Schedules for Clinical Assessment in Neuropsychiatry.

viewed as the most important indicator to minimize the chance of false-negative cases (Table 3). Sometimes, the BDI-II can overestimate the prevalence of depression in particular conditions, e.g., medically ill patients would record more items that address physical complaints. According to the samples, medical studies have reported good performance with high sensitivity (from 72% to 100%). Occasionally, the researcher might want to improve the specificity to select a pure sample of depressed patients. For research purposes, Beck et al. (24) recommended raising the cut-off score to 17 to obtain homogeneous samples of depressed individuals.

According to Table 3, the best cut-off to indicate cases of depressive syndrome in medical samples was established on the ground of the unique characteristics of the sample. The possible threshold ranged widely, from 7 to 22 (89,103).

For example, Poole et al. (103) found that raising the BDI-II cut-off score to 22 could reduce the number of false-positives produced by the uneven item response of chronic pain patients. Consequently, the researcher can change the flexibility of the cut-off score by comparing different thresholds for a new sample or study purpose.

A significant diagnostic accuracy of 82% and higher, as expressed by the area under the receiver operating characteristics (ROC) curve, was calculated according to the tradeoff between sensitivity and specificity. However, the ability of a scale to differentiate between depressive vs. non-depressive groups depends not only on the sensitivity and specificity of its cut-off scores but also on the frequency of the disorder in the samples that are being studied. In addition, sources of threshold variation may depend on the type of the sample (outpatient or hospitalized), medical



disease, and external gold-standard criterion for depression. Most investigators were unanimous in recommending the BDI-II as a screening tool in the first phase of two-stage studies to prevent excessive cases of false positives if the scale is used as a single tool (121). Caution is warranted when using the cut-off guidelines presented for criterion-referenced interpretation and when the BDI-II is misused as a diagnostic instrument.

The BDI-FS was projected to reduce the number of false-positives for depression in patients with medical problems. Similar to its full version, the BDI-FS has shown excellent performance to detect probable cases of depression with a cut-off of 4, as expressed by a large area under the ROC curve (Table 3). To reduce the number of false-positives in chronic pain patients, Poole et al. (103) suggested raising the cut-off value to 5. To detect depression in German adolescent medical patients, Pietsch et al. (40) recommended a threshold of 6. In comparison to the 21-item version, this non-somatic version of BDI has been less extensively investigated, which prevents a more conclusive recommendation for systematic use in medical conditions.

Using rating scales to identify patients for detailed assessment has been advocated to improve the search for depression through screening programs, but the detection rates, treatments, and outcomes are controversial. There is no agreement on the score interpretation of rating scales as screening tools, e.g., the Hamilton Rating Scale for Depression is viewed as a non-trustworthy judgment of the severity of a patient's depression (122,123). In addition, the four-option formulation of the BDI items is viewed as being more complicated than the yes-no alternative of a screening questionnaire, such as the Geriatric Depression Scale (15). Although existing literature supports the use of the BDI-II as a screening measure of depression, in-depth analysis of moderator factors that influence the performance of this scale should be conducted.

Content and Construct Validity

The acceptance of the content as a qualitative representation of the measured trait is critical for the content validity of a given scale (124). The BDI-I reflected six of the nine criteria for DSM-based depression (21,125), while the BDI-II encompassed all DSM-based depressive symptoms. As a consequence, the tests' ability to detect a broader concept of depression has been changed (28,126). The content covered by the BDI-II seems adequate but narrower than its former version (34).

Construct validation interprets a test measure through a specific attribute or quality that is not "operationally defined," demonstrated as a latent structure or construct (127). Exploratory and confirmatory factor analyses determine which psychological events make up a test construct by reducing the item number to explain the structure of data covariance. This family of multivariate techniques demonstrates the dimensionality of a given scale and the pattern of item clustering on one, or more than one, factor (128). A robust measurement instrument for depression should establish the dimensions being measured and the types, categories, and behaviors that constitute an adequate representation of depression.

Table 4 lists 20 investigations that reported the factor structure of the BDI-II, which was used in 43% of the retained studies. These articles were grouped according to the healthcare setting and the factor extraction framework.

Researchers have adopted both exploratory and confirmatory strategies with different purposes, e.g., to identify problems with items that have non-significant factor loadings or data cross-validation. The use of the state-of-art confirmatory approach is a trend in studies investigating the latent structure of BDI-II.

Using an exploratory strategy, Beck and colleagues reported a two-factor oblique structure for student and psychiatric samples (24), the cognitive-affective and somatic-vegetative dimensions. Although this bidimensional structure could be replicated among medical patients (30,42,43,50,54,56,75,77,86), several investigators reported different solutions (29,47,61,67,69,70,87). Somatic symptoms of depression have clustered as a dominant dimension, e.g., in primary care (42,86) and in coronary patients (54), or as an independent third dimension (29,61,67,69).

These alternative solutions could not be replicated by confirmatory strategy, but the somatic factor was observed as an ever-present factor among medical patients (Table 4). Summarizing the factor structure of the existing BDI investigations through meta-analysis (35), much of the data variability can be explained by the common dimension of "severity of depression" and by the other part, "somatic symptoms." Due to the misattribution of somatic symptoms from medical conditions to depression, the assessment of depressive symptom severity with the BDI-II can be substantially biased in medically ill patients compared with non-medically ill patients. Among factor analytical investigations, the somatic dimension has emerged as being highly correlated with the cognitive dimension (>0.50 , range 0.49-0.87).

The heterogeneous characteristics of depressive conditions could partially explain these proposed factor structures in medical patients. The alternative structural analysis of the BDI-II was strengthened by two model breakthroughs: the hierarchical model and the bifactor model. The hierarchical structure of higher-order depression to explain the variance of the lower-order cognitive and somatic dimensions was tested in several medical samples (42,54,56,61). Although scant, the bifactor model identified a scale solution with a general depression, in addition to the traditional bidimensional structure (50,101). The data variance of the BDI-II supported a higher order, or a parallel construct, of "general depression" and suggested caution when interpreting subscale scores.

■ DISCUSSION

The present systematic review is intended to aid practicing professionals and clinical researchers in several specialties in assessing depression in their patients and in interpreting the score through the BDI-II. Ideally, deciding which depression scale is optimal for use in medical settings should meet some desirable features from the patient's and the clinician's perspectives. Patients should find the measure user-friendly and the instructions easy to follow. The questions should be understandable and applicable to the patient's problem. The scale should be brief to allow routine administration at intake and follow-up visits. From the clinician's perspective, the instrument should provide clinically convenient information to increase the efficiency of medical evaluation. Clinicians should find the instrument user-friendly and easy to administer and score with minimal training. To be trustworthy, the information



Table 4 - Construct validity of the latent structure of the Beck Depression Inventory-II in medical samples.

Study	Sample	Method	Factor 1	Factor 2	Factor 3	Factor 4
Normative study						
Beck et al. (24)	College students	EFA	Cognitive-affective	Somatic-vegetative		
	Psychiatric outpatients	EFA	Cognitive-affective	Somatic-vegetative		
Outpatient/Primary Care						
Arnau et al. (42)	Adult - primary care	PCA	Somatic-affective	Cognitive	(Depression)	
Brown et al. (43)	Chronic fatigue outpatients	EFA	Cognitive	Somatic-affective		
	Pregnancy outpatients	PCA	Cognitive-affective	Anxiety	Fatigue	
Carvalho Bos et al. (47)	Postpartum outpatients	PCA	Cognitive-affective	Somatic-anxiety	Guilt	
	Renal disease outpatients	EFA	Cognitive	Somatic	General depression (G)	
Chilcot et al. (50)		CFA	Cognitive	Affective		Somatic
Corbière et al. (29)	Chronic pain outpatients	CFA	Cognitive	Cognitive	(Depression)	
del Pino Pérez et al. (54)	Coronary outpatients	EFA	Somatic-affective	Cognitive	(Depression)	
		CFA	Somatic-affective	Cognitive	Somatic	
Grothe et al. (56)	Adult - primary care	CFA	Cognitive	Somatic	(Depression)	
Harris & D'Eon (61)	Chronic pain outpatients	CFA	Negative attitude	Performance difficulty	Somatic	(Depression)
Kirsch-Darrow et al. (67)	Parkinson outpatients	CFA	Dysphoric mood	Loss of interest/pleasure	Somatic	(Depression)
Lipps et al. (69)	HIV infection outpatients	C-PCA	Cognitive	Affective	Somatic	
Lopez et al. (70)	Chronic pain outpatients	EFA	Negative rumination	Somatic Complaint	Mood	
Patterson et al. (75)	Hepatitis C outpatients	EFA	Cognitive-affective	Somatic		
		CFA	Cognitive-affective	Somatic		
Penley et al. (30)	Chronic renal outpatients	CFA	Cognitive	Somatic-affective		
Poole et al. (77)*	Chronic pain outpatients	EFA	Negative thoughts	Behavior and activities		
		CFA	Negative thoughts	Behavior and activities		
Viljoen et al. (86)	Adult - primary care	EFA	Somatic-affective	Cognitive	(Depression)	
Wan Mahmud et al. (87)	Postpartum outpatients	PCA	Affective	Somatic	Cognitive	
Hospital sample						
Gorestein et al. (93)	Adult - hospitalized	EFA	Cognitive-affective	Somatic		
Rowland et al. (98)	Traumatic brain injury	PCA	Negative self-evaluation	Symptoms of depression	Vegetative symptoms	
Siegert et al. (99)	Neurological disease	PCA	Cognitive-affective	Somatic		
		CFA	Cognitive-affective	Somatic		
Thombs et al. (101)	Acute myocardial infarction	CFA	Cognitive	Somatic	General depression (G)	
Tully et al. (102)	Cardiac heart disease	CFA	Cognitive	Affective	Somatic	

EFA: exploratory factor analysis; PCA: principal component analysis; C-PCA: confirmatory principal component analysis; CFA: confirmatory factor analysis. (G) General factor of depression for the bifactor model. (Depression) Higher order depression dimension for the hierarchical model. *Only 18 items were used in the factorial model.

provided by any measure for depression should rely on sound psychometric characteristics and demonstrate good reliability, validity, and sensitivity to change.

The BDI-II is a brief scale that is acceptable to patients and clinicians, covers all DSM-IV diagnostic criteria for major depressive disorder, and stands as a reliable indicator of symptom severity and suicidal thoughts. Its validity and case-finding capability as a screening instrument is well established. Conversely, its use as an indicator of sensitivity to change, medical patient's remission status, psychosocial functioning, and quality of life deserve further investigation. The BDI-II is copyrighted and must be purchased from the publisher, which obstructs its wider use. Because direct comparisons demonstrating that the BDI-II is more reliable or valid than other depression scales are lacking, it is unwise to justify the cost of its systematic adoption.

Systematic reviews are susceptible to publication bias, that is the likelihood of over-representation of positive studies in contrast with non-significant results that frequently remain unpublished. In psychometric analyses due to its descriptive nature this kind of bias is minimized. Despite its reasonable psychometric characteristics, the BDI-II has some limitations. The spectrum bias refers to the differential performance of a test between different settings, thus affecting the general-

izability of the results. For example, the somatic factor is a primary dimension among medical patients (42,54,86) instead of depressive cognition in non-clinical individuals. In addition, the work-up or verification bias occurs when respondents with positive (or negative) diagnostic procedure results are preferentially referred to receive verification by the gold-standard procedure, allowing considerable distortion in the accuracy of a given test. For example, medical patients with multiple somatic complaints might be routinely referred to psychiatric assessment and, thus, would be more likely labeled as depressed. To the extent that these types of bias may occur, the cut-off scores need to be checked psychometrically to convey the sample characteristics. Techniques assessing the item-level (e.g., item-total correlation and IRT analysis) and the scale-level (e.g., signal detection analysis and factor analysis) can improve the feasibility and strengthen the validity of using this scale to detect depressive symptoms in medical settings.

In the healthcare context, the perceived burden of scale completion by the clinician is the major obstacle to using standardized scales, such as the Hamilton Depression Rating Scale, which is unlikely to meet with success. As a self-report questionnaire to measure depression, the BDI-II holds the advantages of releasing the overburdened



clinician from the paperwork of scale administration and of improving the efficiency of the clinical encounter by providing mental status assessment that correlates well with clinician-rated tools.

The stated purpose of the BDI-II is not to diagnose major depressive episode; thus, the investigators must grasp its appropriateness for detecting depressive symptoms and monitoring treatment efficacy and its comparability with observer-rated scales, such as the Hamilton Depression Rating Scale of Depression or the Montgomery-Åsberg Depression Rating Scale. Short scales that are less reliant on physical symptoms, such as the BDI-FS, should receive more investigation to demonstrate their usefulness in screening for depression in medically ill patients.

Finally, the BDI-II suffers from the intrinsic limitations of self-report questionnaires. Some individuals cannot complete the scale due to illiteracy, physical debility, or compromised cognitive functioning. The widespread use of the BDI-II among the elderly is not suggested. Reporting bias that minimizes or over-reports symptom severity is a possible hazard that reduces its validity in several patients.

As a tradeoff between the psychometric robustness and enumerated disadvantages of the BDI-II, this self-report scale can be viewed as a cost-effective option because it is inexpensive in terms of professional time needed for administration and because it correlates well with clinician's ratings. Therefore, the BDI-II stands as a valid DSM-based tool with broad applicability in routine screening for depression in specialized medical clinics.

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■ AUTHOR CONTRIBUTIONS

Both authors performed the review, collected data, interpreted the results, and have written and approved the final version of the manuscript.

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