BRIEF REPORT

Validation of the Beck Depression Inventory—II in a Low-Income African American Sample of Medical Outpatients

Karen B. Grothe and Gareth R. Dutton
Louisiana State University

Jamie Bodenlos and Martin Ancona
Louisiana State University

Glenn N. Jones
Louisiana State University Health Sciences Center

Phillip J. Brantley
Pennington Biomedical Research Center

The Beck Depression Inventory—II (BDI–II; Beck, Steer, & Brown, 1996) is one of the most frequently used measures of the severity of depression in adolescents and adults by both researchers and clinicians (Brantley, Dutton, & Wood, 2004). The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) was developed in 1961, revised in 1978 (BDI–IA; Beck, Rush, Shaw, & Emery, 1979), and again in 1996 (BDI–II). The BDI–II is more consonant with the American Psychiatric Association’s (1994) Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM–IV) diagnostic criteria for major depressive episode than the earlier forms.

Previous research has established that the BDI–II has good psychometric properties. The BDI–II has demonstrated high internal consistency, good test–retest reliability, and good construct and concurrent validity with other common measures of depression in clinical and nonclinical samples (Beck et al., 1996; Whisman, Perez, & Ramel, 2000). Discriminant validity has also been demonstrated through weaker relationships with measures of other psychopathology, such as anxiety (Steer, Ball, Ranieri, & Beck, 1997).

Several studies have examined the factor structure of the BDI–II in differing populations with varying consistency. A two-factor solution (Cognitive, Somatic) has been identified for psychiatric outpatients (Beck et al., 1996), primary care medical patients (Arnau et al., 2001), depressed geriatric inpatients (Steer, Rissmiller, & Beck, 2000) and college students (Beck et al., 1996; Dozois, Dobson, & Ahnberg, 1998; Whisman et al., 2000). Two of these studies further demonstrated that the BDI–II consists of two first-order factors, representing cognitive and somatic symptoms that comprise one second-order factor of Depression (Arnau et al., 2001; Steer et al., 1999).

Alternatively, a few studies have identified a three-factor solution for the BDI–II with adolescent psychiatric outpatients (Cognitive, Somatic, and Guilt/Punishment; Steer, Kumar, Ranieri, & Beck, 1998) and college students (Negative Attitude, Performance Difficulty, and Somatic Elements; Osman et al., 1997).

Although these studies indicate that the BDI–II has moderately stable psychometric properties across groups, the majority of subjects were Caucasian and middle-class, with no study including more than 15% of their sample as African American. Therefore, little is known about its psychometric properties in minority and low-income samples. Because racial differences in the expression of depressive symptoms have been found, it cannot be assumed that the reliability and validity for the BDI–II established with primarily Caucasian samples remain accurate for African Americans. Specifically, it has been demonstrated that African Americans evidence more somatic symptoms, in particular, sleep disturbance (Ayalon & Young, 2003; Brown, Schulberg, & Madonia, 1996), and they articulate fewer typical depressive symptoms than depressed Caucasians (Wohl, Lesser, & Smith, 2002). Further, the American Psychological Association’s (2002) Ethical Principles of Psychologists and Code of Conduct explicitly states that it is the...
responsibility of psychologists to ensure that assessment instruments used in our field demonstrate sound psychometric properties in a variety of ethnic minority groups (p. 1072; see also Okazaki & Sue, 1998).

The purpose of the present study was to examine the reliability and validity of the BDI–II in a sample of African American, low-income, medical patients. Specifically, we established reliability by examining item-total correlations and the internal consistency of item scores. To assess validity, we used confirmatory factor analysis (CFA) in an attempt to replicate the hierarchical structure identified in previous studies, and we examined criterion-related validity with the use of a brief structured interview.

Method

Sample

Participants included self-identified African American patients who were at least 18 years of age. They were recruited from the waiting rooms of two medical outpatient clinics at a teaching hospital in the southeastern United States. This facility provides medical care to a predominantly low-income, uninsured, minority population. Participants were approached while waiting for their regularly scheduled medical appointments.

Measures

Demographic questionnaire. A demographic questionnaire was administered to all participants in order to collect the following information: age, gender, marital status, employment status, education level, and chronic medical conditions.

Woodcock–Johnson III Oral Comprehension. Participants were administered the oral comprehension portion of the Woodcock–Johnson III Tests of Achievement (Woodcock, McGrew, & Mather, 2001). Specifically, patients were administered Items 7–13 on the comprehension subtest, as correct performance on these items is indicative of at least a fifth-grade comprehension level, the reading level of the BDI–II.

BDI–II. The BDI–II consists of 21 items assessing symptoms of depression experienced during the past 2 weeks. Each item contains four statements reflecting varying degrees of symptom severity. Respondents are instructed to circle the number (ranging from zero to three, indicating increasing severity) that corresponds with the statement that best describes their symptoms. Ratings are summed to calculate a total BDI–II score, which can range from 0 to 63.

Primary Care Evaluation of Mental Disorders (PRIME-MD) Mood Module. The PRIME-MD Mood Module is a structured interview consisting of yes–no questions originally designed for use by primary care physicians (Spitzer et al., 1994). The PRIME-MD covers the diagnostic criteria for major depressive disorder as outlined by the DSM–IV. Spitzer et al. (1994) reported satisfactory agreement (κ = .61) between depression diagnoses made with the PRIME-MD and diagnoses reached by mental health professionals using lengthier clinical interviews and who were blind to PRIME-MD results.

Procedure

Six doctoral students in clinical psychology were trained in the administration of the PRIME-MD Mood Module and suicide assessment. The interviewers approached patients in clinic waiting rooms, provided a brief description of the study, and went with interested patients to a private examination room or a separate area within the waiting room. Participants were informed that they would receive a snack after completion of the study as an incentive to participate. Written informed consent was obtained, which was followed by the measure of oral comprehension. Patients had to demonstrate a fifth-grade comprehension level to ensure adequate understanding of subsequent questions. Those who did not pass the comprehension test were excluded from the study. Eligible persons were administered a demographic questionnaire and completed the BDI–II individually when possible. Study personnel then administered the Mood Module of the PRIME-MD orally prior to scoring the BDI–II. Referrals were made to mental health services on the basis of responses to the BDI–II and PRIME-MD. The Institutional Review Board of Louisiana State University Health Sciences Center approved this study.

Results

Sample Characteristics

Of the 220 participants (115 women, 105 men) in the current study, ages ranged from 20 to 81 (M = 49.26, SD = 10.91). Although 60% of the patients had graduated high school, average education level was lower (M = 11.5, SD = 1.98), ranging from 3 to 16 years. Thirty-six percent were employed either full- or part-time. Twenty-eight percent of the sample was married, 38% was single, and 34% was divorced or widowed. The average number of chronic illnesses for this sample was 1.51 (SD = 1.34), with a range of 0 to 6. Forty-six of 281 patients approached (16%) declined participation, and 12 (4%) did not pass the oral comprehension test. The mean BDI–II total score was 12.63 (SD = 10.39), and PRIME-MD results indicated that 29.5% (95% CI = 23.6%, 36.1%) of the sample met criteria for current major depressive disorder.

Factorial Validity

Given that the BDI–II factor structure has been replicated in several samples, we conducted a CFA to verify the same factor structure in the current minority sample. Thus, we attempted to replicate the Arnaud et al. (2001) and Steer et al. (1999) findings of two first-order factors (Cognitive and Somatic) that are indicators of a second-order factor (Depression).

The following BDI–II items were restricted to load on the Cognitive factor on the basis of Beck et al.’s (1996) original factor loadings of the BDI–II for the psychiatric outpatient sample: sadness, pessimism, past failure, guilty feelings, punishment feelings, self-dislike, self-criticalness, suicidal thoughts or wishes, and worthlessness. The remaining 12 items were restricted to load on the Somatic factor. The first-order factors were treated as indicators of the second-order factor. To identify the second-order Depression factor, we constrained the two first-order factors to have equal covariances (unstandardized loadings) with the Depression factor. Thus, the nine Cognitive factor symptoms were constrained to have zero loadings on the Somatic factor and vice versa, but the two factors were allowed to correlate by virtue of both being indicators of the underlying depression factor. We performed the CFA with EQS 6.1 (Bentler, 2003).

Figure 1 presents the model. As expected, the two factors correlated with each other (r = .75). All of the standardized path coefficients of the symptoms for the two first-order factors were salient (> .35). The normal theory maximum-likelihood chi-square test for the CFA model was significant, $\chi^2(188, N = 220) = 281.49, p < .01$, suggesting that the model does not explain all the covariance among the items and that residual variance requires explanation. However, other indices of goodness of fit indicated that the two-factor solution resulted in an adequate fit for the data.
according to Hatcher’s (1994) criteria (shown in parentheses) for acceptability of fit. The fit criterion ($\chi^2/df$) was 1.34 (and <2.0), the root-mean-square residual was .04 (and <.10), the comparative fit index was .94 (and >.90), and the nonnormed fit index was .93 (and >.90). The Satara–Bentler scaled chi-square also indicated that the model was an excellent fit, $\chi^2(118, N = 220) = 201.02, p < .25$. This statistic is robust to violations of normality and is probably a more appropriate test for item-level data (see, e.g., Chou & Bentler, 1995). Therefore, we concluded that acceptance of the hierarchical model, in which two first-order factors (Cognitive and Somatic) represented one second-order factor (Depression), was appropriate.

**Internal Consistency**

Internal consistency of the BDI–II and its factors was quite high (BDI–II total score, $\alpha = .90$; Cognitive factor, $\alpha = .81$; Somatic factor, $\alpha = .87$). As L. E. Clark and Watson (1995) pointed out,
items for the current sample are presented in Table 1.

### Criterion Validity

Although the BDI–II was not specifically designed for diagnostic purposes, it assesses the presence and severity of depressive symptoms, and patients with major depression should have higher BDI–II scores on average than patients without this diagnosis. The presence or absence of major depression in the present sample was established with the PRIME-MD. Analyses indicated that patients with a diagnosis of current major depression had significantly greater BDI–II total scores ($M = 23.12, SD = 8.66$) compared with patients without this diagnosis ($M = 8.23, SD = 7.50$); $t(218) = 12.83, p < .01$; $\eta^2 = .43$; Cohen’s $d = 1.90$. A receiver operating characteristic analysis has been presented elsewhere (see Dutton et al., 2004).

### Discussion

The present study examined the factor structure of the BDI–II in a sample of African American, low-income medical patients. Our results demonstrate strong evidence for the reliability and validity of the BDI–II in this sample and are quite consistent with previous findings for primarily Caucasian samples. Factorial validity was demonstrated through acceptance of the hierarchical model composed of two first-order factors (Cognitive and Somatic) that both reflect a second-order factor (Depression). This factor structure appears to be as appropriate for low-income, African American medical patients as it was for the primarily Caucasian samples of previous work. Our results are particularly parallel to the results of Steer and colleagues (1999) and Dozois and colleagues (1998) in that the chi-square test for the current CFA model was significant, yet the fit indices suggest the model is an acceptable fit. Indeed, the fit indices for the present sample of African American medical patients actually appear better than the fit indices Osman et al. (1997) obtained in their sample of college students for the Beck et al. (1996) correlated two-factor model.

With regard to reliability, the BDI–II demonstrated excellent internal consistency (.90) in this sample, which was comparable with coefficient alphas for primarily Caucasian samples reported by Beck and colleagues (1996) for psychiatric outpatients (.92) and college students (.93), by Steer et al. (1999) for clinically depressed outpatients (.90), and by Arnau et al. (2001) for primary care medical patients (.94). In addition, item-total correlations ranged from .35 to .67, which is similar to those reported by Beck et al. (1996), Osman et al. (1997), and Dozois et al. (1998). The lowest item-total correlation for our sample was for the suicidal thoughts or wishes item (.35), which may be related to the finding that African Americans are less likely to endorse suicidal thoughts than Caucasians (Ayalon & Young, 2003). Evidence for criterion validity revealed that depressed patients had higher BDI–II scores than nondepressed patients. These results were also similar in magnitude to those identified by Arnau et al. (2001) for medical outpatients.

Validation of the BDI–II in a medical setting is particularly salient, as the use of somatic items in measures of depression for medical patients has been criticized. It has been suggested that somatic symptoms often endorsed by medical patients cause these patients to score highly on measures of depression, regardless of

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alpha is influenced by the number of items, and a more appropriate index of internal consistency is the average interitem correlation ($r_{ii}$). These estimates of internal consistency were of similar magnitudes (total BDI–II, $r_{ii} = .32$; Cognitive factor, $r_{ii} = .34$; Somatic factor, $r_{ii} = .37$). Means, standard deviations, corrected item-total correlations, and item intercorrelations of the 21 BDI–II items for the current sample are presented in Table 1.
depression status (D. C. Clark, Cavanaugh, & Gibbons, 1983). Arnau and colleagues (2001) determined that the inclusion of somatic items on the BDI–II was appropriate for their medical sample. Our results demonstrate the same finding with the criteria they set forth. It would be expected that corrected item-total correlations for somatic items would be lower if these items were not good indicators of depression, which was not the case in the present study. In addition, all items made salient contributions to the first-order factors, which argues for the inclusion of somatic items.

Several limitations to the present study should be noted. First, the sample included in this study was a sample of convenience. All participants were low-income, African American medical outpatients attending physician appointments. Thus, the generalizability of these results is limited to low-income, African American medical patients and should be replicated with African Americans of differing economic status as well as psychiatric inpatients and outpatients. Second, we experienced a 16% refusal rate for participation among our population. Although patients were not queried directly as to why they refused to participate, this may be a result of sampling from a medical population attending physician appointments, as many patients appeared ill or lethargic. Third, although used in the present study to enhance comparison with previous research, the PRIME-MD Mood Module is a brief measure designed for use in medical settings. The use of a more extensive psychiatric interview may have enhanced our attempt to establish criterion validity. Finally, although the present study adds to the research examining psychometric properties of assessment instruments in minority populations, our sample was restricted to African Americans. Given the widespread use of the BDI–II, it is important that the measure is validated with other ethnic minority groups.

References


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