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Factor structure and diagnostic efficiency of the BDI-II in treatment-seeking substance users

Paul J. Seignourel *, Charles Green, Joy M. Schmitz

Department of Psychiatry and Behavioral Sciences, University of Texas, Houston, 1300 Moursund Street, Houston, TX 77030, United States

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Abstract

Screening instruments are needed to rapidly and efficiently identify depression in drug and alcohol users. The Beck Depression Inventory-Second Edition (BDI-II) has excellent validity in psychiatric, normative and primary care samples, but its diagnostic efficiency has not been examined in substance users. Using a large sample of treatment-seeking substance users and the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV) to establish diagnosis, we examined the factor structure of the BDI-II and its ability to detect clinical depression, defined as the presence of a Major Depressive Disorder (MDD) or substance-induced depression. A three-factor structure provided the best fit, and the diagnostic efficiency of the BDI-II was moderate, and independent of gender and substance of abuse. Subscores had lower diagnostic efficiency than the BDI-II total score. A range of possible cutoff scores with corresponding sensitivity, specificity, positive predictive power and negative predictive power is provided to aid clinicians and researchers in choosing the optimal parameters for their screening needs.

Keywords: Substance use disorders; Depression; BDI-II; Factor analysis; Diagnostic efficiency

1. Introduction

1.1. Depression in substance users

Depression is a common and serious comorbidity of drug and alcohol related disorders (Currie et al., 2005; Levy and Deykin, 1989; Murphy et al., 1992; Nunes and Levin, 2004). Proper identification of depression in this population is critical for adequate treatment and referral. Unfortunately, assessing depression in substance users is difficult, as symptoms related to substance use or withdrawal such as poor sleep, concentration difficulties or appetite changes can mimic symptoms of depression (Charney et al., 2001; Liappas et al., 2002). Specific guidelines have been developed that show good reliability (Hasin et al., 2006, 1996), but they require lengthy interviews by trained clinicians, which may be impractical in community settings. Thus, there is a need to develop and validate screening instruments that can reliably detect depression in this population (Castel et al., 2007; Kush and Sowers, 1997).

1.2. Screening for depression in substance users

Previous research examining the diagnostic efficiency of self-report measures of depression in substance users has produced mixed results. Early studies (Grant et al., 1989; Hesselbrock et al., 1983; Rounsaville et al., 1979; Weiss et al., 1989) reported poor sensitivity and/or specificity among a set of existing measures, including the Beck Depression Inventory (BDI; Beck et al., 1988), the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), and the Zung self-rating depression scale (Zung, 1965). In some (Rounsaville et al., 1979; Weiss et al., 1989) but not all studies (Grant et al., 1989; Hesselbrock et al., 1983), the BDI compared favorably with other measures, but specificity remained unacceptably low. Recent instruments, including the BDI—Fast Screen for Medical Settings (Beck et al., 2000), the K6 brief screening scale (Kessler et al., 2002) and the 13-item BDI have shown promising diagnostic efficiency in alcohol and drug-dependent samples (Luty and O'Gara, 2006; Rissmiller et al., 2006; Swartz and Lurigio, 2006). Results,

* Corresponding author at: Moss Rehabilitation Research Institute, 60 East Township Line Road, 2nd floor, West, Elkins Park, PA 19027, United States. Tel.: + 1 215 663 6607; fax: +1 215 663 6113.
E-mail address: SeignouP@einstein.edu (P.J. Seignourel).

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however, should be considered preliminary, as the aforementioned studies had small sample sizes (Luty and O'Gara, 2006; Rissmiller et al., 2006) and/or did not include a formal clinical interview for diagnosing depression (Luty and O'Gara, 2006; Rissmiller et al., 2006; Swartz and Lurigio, 2006).

1.3. Major depression versus substance-induced depression

Studies to date have examined the diagnostic efficiency of measures of depression symptomatology using Major Depressive Disorder (MDD) as the target diagnostic criterion. One difficulty in doing so, however, is related to the presence of substance-induced depression. Substance-induced depression is determined by the presence of depressive symptoms that exceed what would be expected based on the effects of the substance (or from substance withdrawal), but that cannot be established to be temporally independent from substance use. Independent depression, in contrast, is suspected if clinically significant depression either preceded substance use or persisted during an abstinence period of at least 1 month (American Psychiatric Association, 2000). Thus, MDD and substance-induced depression differ primarily in terms of history rather than current symptoms, and measures of depression symptomatology would not be expected to discriminate well between the two. Diagnostic interviews inquiring about history as well as current symptoms are needed to distinguish between MDD and substance-induced depression.

1.4. Use of the Beck Depression Inventory-Second Edition (BDI-II)

The diagnostic efficiency of the BDI-II (Beck et al., 1996) has not been examined in substance users. The BDI-II, an index of depression symptomatology over the past 2 weeks, has excellent internal consistency, test–retest reliability and validity in normal and psychiatric samples (Beck et al., 1996). Compared to the original BDI, it more closely matches MDD diagnostic criteria as defined by the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV; American Psychiatric Association, 2000). Moreover, its sensitivity and specificity for detecting MDD are adequate (both above .8) in adolescent psychiatric inpatient and primary care samples (Arnau et al., 2001; Dutton et al., 2004; Kumar et al., 2002), and may be higher than for other measures of depression symptomatology, including the BDI (Dutton et al., 2004). In substance users, the BDI-II is internally consistent and has a three-factor structure consisting of Cognitive, Affective and Somatic factors (Buckley et al., 2001; Johnson et al., 2006). Thus, it is an excellent candidate as a screening tool for depression in substance users.

1.5. Goals

We examined the ability of the BDI-II to detect "clinical depression," as defined by the presence of MDD or substance-induced depression, and provided information regarding its sensitivity and specificity depending on a range of possible cut-off scores. Our study addresses previous limitations by using a large sample and a gold-standard method for diagnosing depression, the Structured Clinical Interview for DSM-IV (SCID-IV; First et al., 1996). As previous studies have focused on the detection of MDD, we also examined the sensitivity and specificity of the BDI-II with respect to MDD alone.

Two additional questions were investigated. First, we examined the diagnostic efficiency of BDI-II subscores. Previous authors have suggested that, in substance users, somatic symptoms of depression may be confounded by the effects of substance use or withdrawal (Johnson et al., 2006; Steer et al., 1992). Johnson et al., in particular, suggested that the somatic items of the BDI-II may not be good markers of depression. We tested this hypothesis by: (a) confirming the factor structure of the BDI-II in our sample and, (b) comparing the diagnostic efficiency of each subscore in addition to the total score. We also examined the diagnostic efficiency of two-item variables, which have shown good sensitivity and specificity in other populations and offer a cost-efficient way of screening for depression (Huffman et al., 2006; Whooley et al., 1997).

Second, we examined the invariance of the factor structure and diagnostic efficiency of the BDI-II across genders and substances of abuse. Both variables play an important role in depression (Jané-Llopis and Matytsina, 2006; Nolen-Hoeksema, 1990), and one previous study found gender differences in the factor structure of the BDI in alcohol-dependent individuals (Dunkel et al., 2002).

2. Methods

2.1. Procedures

The sample consisted of participants enrolled in research studies conducted at the Substance Abuse Research Center of the University of Texas, Houston. All studies consisted of pharmacological and/or psychosocial interventions for the treatment of alcohol, opioid and/or cocaine dependence. Recruitment strategies were similar across studies and have been described in detail elsewhere (Sayre et al., 2004): they consisted of advertisements in newspapers and yellow pages, referrals from other institutions, friends and family, and program materials distributed in local clinics, social service organizations and other settings. All studies began with an initial assessment, which included the BDI-II (Beck et al., 1996), the SCID-IV (First et al., 1996), a comprehensive drug and medical history and a physical examination. The BDI-II was always administered before the SCID-IV, and both were always administered during the 2-week intake assessment period before starting treatment.

2.2. Research participants

All studies required participants to be between 18 and 65 years old, English-speaking, free of serious legal and medical problems and competent to give informed consent. Individuals currently using psychotropic medications were excluded. Participants who did not meet initial inclusion criteria were excluded before completing the BDI-II and SCID-IV. We also excluded participants with missing or incomplete/invalid BDI-II and/or SCID-IV, or for whom basic demographic information (gender, age or race/ethnicity) was not available. Cases having missing data (i.e., more than one missing item on the BDI-II) or for whom diagnostic uncertainties arose after completion of the SCID-IV were also excluded. Out of an initial sample of 919 participants, 582 met all inclusion and exclusion criteria. Reasons for exclusion were: failure to complete assessment ($N = 143$, 42%), serious medical problem ($N = 75$, 22%), use of psychotropic medications ($N = 43$, 13%), did not meet drug use criteria ($N = 23$, 7%), missing or incomplete/invalid SCID-IV ($N = 11$, 3%), missing or incomplete BDI-II ($N = 8$, 2%), other reasons ($N = 34$, 10%).