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Short communication

Comparing the BDI-II and the PHQ-9 with outpatient substance abusers ☆

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Abstract

Because of the high co-occurrence of Axis-I mood disorders with primary substance use disorders (SUD), it is important to routinely assess substance abusers for evidence of a mood disorder. The primary goal of the present study was to examine the psychometric characteristics of two widely used self-report measures of depression (Beck Depression Inventory-II; Patient Health Questionnaire PRIME MD) with substance abusers (N=108) in an outpatient treatment setting. Using Cronbach's alpha, the reliabilities of the BDI-II and the PHQ-9 were 0.95 and 0.91, respectively. Principal component factor analyses of both measures were conducted to evaluate the relationship between a 3-factor solution (cognitive, affective, and somatic) for the BDI-II and a 1-factor solution for the PHQ-9 (depression). Both measures were correlated with severity levels of alcohol and drug use. Advantages and disadvantages of using both measures with substance abusers are discussed.
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Keywords: Beck Depression Inventory; Patient Health Questionnaire PRIME MD; Alcohol and drug abusers; Reliability; validity

Because of the high co-occurrence (estimates range up to one-third) of mood and substance use disorders (Johnson, Spitzer, Williams, Kroenke, & Linzer, 1995; Swendsen, Merikangas, Canino, Kessler, & Rubio-Stipec, 1998), symptom overlap should be routinely assessed for those with a primary Substance Use Disorder (SUD). Because somatic complains (e.g., sleep disturbances, loss of energy,

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appetite disturbance) are often associated with both substance use and depression (Gambert, 1992) accurate diagnosis of these two Axis-I disorders is important.

There is little research on self-report depression measures with substance abusers (e.g. Buckely, Parker, & Heggie, 2001). The two most widely used measures are the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996) and the depression module of the Patient Health Questionnaire PRIME MD (PHQ-9; Spitzer et al., 1994). Because a large group of substance abusers was not included in the original BDI-II normative sample (Beck et al., 1996), the validity and reliability of the BDI-II for SUD is lacking (Buckely et al., 2001). While several studies have shown that the BDI-II has good psychometric properties with many clinical disorders (e.g. depression, anxiety; Steer & Ball, 1999; Steer, Kumar, Ranieri, & Beck, 1999), such is not the case with SUD.

The PHQ-9 evaluates symptoms of depression based on the DSM-IV diagnosis (American Psychiatric Association, 1994). The PHQ-9 has excellent validity and reliability in primary health care settings (Kroenke, Spitzer, & Williams, 2001; Spitzer et al., 1994). As with the BDI-II, no studies were found that examined the psychometric properties of the PHQ-9 with SUD.

While the BDI-II and PHQ-9 are both good psychometric measures of depression, they differ in several ways. The BDI-II, validated in many different clinical settings, is usually used in psychiatric settings, whereas the PHQ-9, validated primarily in medical settings, is typically used in such settings. The PHQ-9 provides both a depressive disorder diagnosis and depression severity levels (Kroenke et al., 2001), while the BDI-II only provides depression severity levels (Beck et al., 1996). The PHQ-9 has two marked advantages over the BDI-II: (a) with fewer items (9 vs. 21), it is faster to administer; and (b) it is free, whereas the BDI-II is costly ($42 for 25 tests or $152 for 100 tests; Beck et al., 1996). The present study had two objectives: (a) to evaluate the psychometric properties of the BDI-II and the PHQ-9 with alcohol and drug abusers in an outpatient treatment setting; and (b) to examine which of the two depression measures would be better to use with individuals with SUD.

1. Methods

1.1. Design and setting

This study used data from clients who voluntarily sought treatment at the Guided Self-Change (GSC) clinic at the Nova Southeastern University Psychology Services Center in South Florida. The GSC treatment model is an evidence based brief cognitive-behavioral motivational intervention that has been extensively evaluated and described in detail elsewhere (Sobell & Sobell, 1993; Sobell & Sobell, 2005). Because the GSC intervention is brief and motivational, it primarily provides services to clients, who do not have severe SUD.

1.2. Participants

Participants were 108 alcohol ($n=69$) and drug ($n=39$) abusers. Almost all of the clients met the DSM-IV-TR criteria for dependence (American Psychiatric Association, 2004), with the exception of ten individuals diagnosed with alcohol abuse (10.1%) and five with drug abuse (12.8%). Over half of the clients were females (52.0%), 84.3% were white, 25.0% were married, 42.6% were single, 46.3% worked full-time, and 28.7% were unemployed. They had a mean of 13.8 (SD=3) years of education and on average, they were 38.0 years old (SD=11.54).

1.3. Measures

1.3.1. Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS)

Substance abuse and dependence were diagnosed accordingly to the DSM-IV-TR (American Psychiatric Association, 2004) using the alcohol and drug use modules of the AUDADIS (Grant, 1997). These modules were administered as self-report inventories. Items for each module represent the DSM-IV-TR diagnoses criteria for alcohol and substance abuse and dependence (American Psychiatric Association, 2004). Several studies have found good internal and test–retest reliability for these modules (Grant, 1997; Grant et al., 2003).

1.3.2. Beck Depression Inventory-II (BDI-II)

The BDI-II is a 21-item self-report inventory that assesses symptoms of depression. Each item is scored on a four-point scale (0–3). Scores can range from 0 to 63, with higher scores reflecting greater symptom severity (0 to 13 = no to minimal depression, 14 to 19 = mild depression, 20 to 28 = moderate depression, and $\geq$29 = severe depression; Beck et al., 1996).

1.3.3. PRIME MD PHQ (PHQ-9)

The PHQ-9, the depression module of the self-administered Patient Health Questionnaire, has nine items that represent the nine DSM-IV depression criteria (American Psychiatric Association, 1994). Each item is scored on a three-point scale (0 = not at all to 3 = nearly everyday). Scores can range from 0 to 27, with higher scores reflecting a greater symptom severity (0 to 14 = minimal depression, 15 to 19 = moderate depression, and $\geq$20 = severe depression; Spitzer et al., 1994).

1.3.4. Alcohol Use Disorders Identification Test (AUDIT)

The AUDIT, a 10-item self-administered assessment measure developed by the World Health Organization, identifies potentially problematic levels of alcohol consumption (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Each item is scored on a 4-point scale with scores ranging from 0 to 40. A score of eight or greater is suggestive of an alcohol problem (Conigrave, Hall, & Saunders, 1995), and sensitivity and specificity are maximized with a score of greater than seven and (Maisto, Carey, Carey, Gordon, & Gleason, 2000).

1.3.5. Drug Abuse Screening Test (DAST)

The DAST-10 is a 10-item self-administered assessment measure that evaluates problems associated with drug use during the last year (Skinner, 1982). Each item is answered with a yes or no response. Sensitivity and specificity are optimized with a cutoff of greater than two (Maisto et al., 2000).

2. Results

As can be seen in Table 1 and as was expected, there were some notable differences between the substance use variables between the alcohol and drug abusers. Scores on the AUDIT and DAST-10 support group membership of substance abuse. In addition, low mean number of substance use, arrests, and hospitalizations supports that these participants' were not severely dependent.

After using the Bonferroni adjustment to maintain the family wise error rate at a .05 level, an independent *t*-test analysis was conducted to evaluate depression and substance history differences

Table 1
Substance use history characteristics of alcohol and drug abusers

Variables	Alcohol abusers ($n=69$)		Drug abusers ($n=39$)		T
	M	SD	M	SD	
Years of problems	11.72	11.14	6.90	8.23	4.86*
Attempts to quit	4.66	7.43	7.84	17.87	2.16
Hospitalizations	.80	2.60	.74	1.97	2.35
Arrests	.75	1.85	.87	2.3	3.08*
AUDIT	19.66	6.78	6.76	7.01	9.20*
DAST	2.4	2.98	5.7	2.76	5.74*

Note: *$p<.05$ with the Bonferroni adjustment to maintain the family wise error rate at a .05 level.

for alcohol and drug abuser (see Table 1). The Levene's test for equality of variance was shown to be significant for some variables; therefore, adjustment on the t-statistic was performed for these variables.

Because there were no significant differences between both groups for depression severity levels for the BDI-II or the PHQ-9 [$t(106)=.09$, $p=.93$, and $t(106)=.46$, $p=.65$, respectively], both groups were combined in subsequent analyses in this study. The mean BDI-II score was 19.24 (SD=13.59, range=0 to 59) indicating minimal to mild depression (Beck et al., 1996). The mean PHQ-9 score was 9.32 (SD=7.30, range=0 to 26) indicating minimal levels of depression (Kroenke et al., 2001).

2.1. Reliability

Cronbach's alpha coefficients for the BDI-II (.95) and PHQ-9 (.90) were strong and parallel results from past studies, indicating good internal consistency. The item-total correlations ranged from .42 to .80 for the BDI-II and .45 to .83 for the PHQ-9, indicating good item-discrimination.

2.2. Factorial validity

For the BDI-II a principal-component factor analysis with a Promax rotation method was conducted, yielding a 3-factors structure with Eigenvalues larger than 1 (see Table 2). The three factors accounted for 63.13% of the variance when rotated. In the analysis of the factor-pattern coefficients, coefficients of.35 or greater were considered salient. Given the item loading, the three factors were labeled Somatic, Affective, and Cognitive. The communalities (h^2) values for each item ranged from .49 to .79, indicating that the best fit for the factor structure will be represented by more than one factor.

For the PHQ-9 a principal-component factor analysis yielded 1-factor structure. This factor was labeled Depression, and it accounted for a total of 59.57% of the variance. All the factor-pattern coefficients were above .35, indicating that all the items were salient.

2.3. Relationship between the BDI-II and the PHQ-9 and severity of alcohol and drug use

A zero-order correlation coefficient between the BDI-II and the PHQ-9 reflected high levels of association (0.84, $p<.001$) between the two depression inventories. Zero-order correlations were also computed to examine the relationship between the two depression measures and the DAST and the

Table 2
Standardized coefficients of factor loadings for the three-factor model of the BDI-II

	Component		
	Somatic	Cognitive	Affective
1. Sadness	**.393**	.217	.232
2. Pessimism	.266	**.527**	.094
3. Past failure	.017	**.453**	**.438**
4. Loss of pleasure	.245	**.730**	−.054
5. Guilty feelings	**.503**	.309	.065
6. Punishment feelings	−.024	−.190	**.870**
7. Self-dislike	.164	.346	**.390**
8. Self-criticism	.125	.152	**.541**
9. Suicidal thoughts	−.329	**.867**	.220
10. Crying	**−.397**	.222	**.777**
11. Agitation	.344	−.216	**.659**
12. Loss of interest	**.469**	.313	.125
13. Indecisiveness	**.465**	.032	**.404**
14. Worthlessness	.224	**.464**	.277
15. Loss of energy	**.646**	.220	−.029
16. Changes in sleep pattern	**.928**	−.095	−.155
17. Irritability	**.624**	**−.378**	**.512**
18. Changes in appetite	**.942**	−.030	−.095
19. Concentration difficulties	**.714**	.153	−.052
20. Tiredness or fatigue	**.799**	.209	−.088
21. Loss of interest in sex	.170	**.757**	**−.397**

Note: Pattern coefficients with values of .35 or greater are in boldface.

AUDIT. The correlation coefficients between the AUDIT and the BDI-II, and between the AUDIT and the PHQ-9 were 0.33, $p<.001$ and 0.33, $p<.001$ respectively. The correlation coefficients between the DAST and the BDI-II, and between the DAST and the PHQ-9 were very similar (0.26, $p<.01$ and 0.27, $p<.01$, respectively).

3. Discussion

The present study found that both the BDI-II and the PHQ-9 have good internal consistency with outpatient alcohol and drug abusers. These findings parallel with the results of other clinical populations (i.e., mood and anxiety disorders, health problems; Arnau, Meagher, Norris, & Bramson, 2001; Buckely et al., 2001; Kroenke et al., 2001; Steer & Ball, 1999; Steer & Clark, 1997). The exploratory factor analysis for the BDI-II yielded a 3-factor structure (somatic, cognition, and affective). These results are also consistent with past studies (Arnau et al., 2001; Dozois et al., 1988; Steer & Ball, 1999). The exploratory factor analysis for the PHQ-9 yielded a 1-factor structure (depression); however, comparisons with other studies are not available. In addition, the BDI-II and the PHQ-9 were highly correlated, indicating good convergent validity of depression. The two depression inventories were significantly correlated with severity levels of alcohol and drug use. Both measure had comparable ability to differentiate between drug and alcohol problems. Clients who had high depression scores on the BDI-II and the PHQ-9 also had high alcohol and drug severity scores.

The present study has the following limitations. First, because the results are limited to mild to moderate severity levels of SUD and depression, this study will need to be replicated with more severely dependent substance abusers. Second, this study did not assess the diagnostic utility of the depression inventories. Therefore, further studies will need to establish criterion validity of these depression measures in this population.

In summary, the present study found that both self-administered depression measures (BDI-II and PHQ-9) have good psychometric properties and were similarly correlated with SUD severity levels. With the exception that the PHQ-9 is brief and free, both measures are equally recommended for use with individuals with substance abuse disorders.

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