# Validation of the Beck Depression Inventory II in HIV-positive Patients

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***ABSTRACT***

***Objective:*** *Research on depression among HIV-positive patients has been limited by the lack of a valid and reliable measure of depression. This project addresses this problem by exploring the internal consistency reliability and the concurrent and discriminant validity of the Beck Depression Inventory-II (BDI-II) using HIV-positive patients in Jamaica.*

***Method:*** *Patients from three HIV clinics in Jamaica (n = 191 patients; 61% female, 39% male, mean age 40.5 ± 10 years) were administered the BDI-II along with the Centre for Epidemiological Studies – Depression Scale (CES-D) and the Social Provisions Scale.*

***Results:*** *Overall, the BDI-II was found to have a high degree of reliability (α = 0.89). The scale also had good concurrent validity as evidenced by a high correlation with scores on the CES-D (r = 0.74) and acceptable discriminant validity as demonstrated through a moderate correlation with the Social Provisions Scale (r = -0.42). This pattern of scores suggests that the majority of the variance underlying the BDI-II assesses depression (55%) while a smaller degree of the variability (18%) measures a conceptually similar but distinct concept.*

***Conclusion:*** *The BDI-II is a sufficiently reliable and valid measure for assessing depression in HIV-positive patients.*

**Key words:** Depression, validation studies

# Validación del Inventario de Depresión de Beck II en los Pacientes VIH-positivos

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***RESUMEN***

***Objetivo:*** *La investigación sobre la depresión entre los pacientes VIH-positivos ha estado limitada por la falta de una medida válida y confiable de la depresión. Este proyecto aborda este problema explorando la confiabilidad de la consistencia interna, así como la validez discrimínate y concurrente del Inventario de la Depresión de Beck II (BDI-II) usando pacientes VIH-positivos en Jamaica.*

***Método:*** *A los pacientes de tres clínicas de VIH en Jamaica (n = 191 pacientes; 61% hembras, 39% varones, edad promedio 40.5 ± 10 años) se les aplicó el BDI-II junto con la Escala de Depresión (CES-D) y la Escala de Provisiones Sociales – Centro de Estudios Epidemiológicos.*

***Resultados:*** *En general, se halló que el BDI-II posee un alto grado de confiabilidad (α = 0.89). La escala poseía también una buena validez concurrente, como quedó evidenciado por la elevada correlación con las puntuaciones del CES-D (r = 0.74), Igualmente, se constató que posee una validez discriminante aceptable como lo demuestran las correlaciones moderadas con la Escala de Provisiones Sociales (r = -0.42). Este patrón de puntuaciones sugiere que la mayor parte de la varianza que subyace en el BDI-II da la medida de la depresión (55%), en tanto que un grado menor de la variabilidad (18%) mide un concepto de naturaleza similar pero claramente definido.*

***Conclusión:*** *El BDI-II constituye una medida suficientemente confiable y válida para evaluar la depresión en pacientes VIH positivos.*

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**Palabras claves:** depresión, estudios de validación

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## INTRODUCTION

Major depression ranked fourth in the world as the most important determinant of human disease in 1990 and is expected to rank second by the year 2020 (1). Much of the research on depression has been done with general and psychiatric clinic samples (2−4). Relatively little research on depression has been conducted using HIV-positive patients (5−7).

HIV-infection is a very taxing illness, both physically and emotionally (8). Given the stressful nature of this illness there is a concern about the psychological adjustment to living with HIV-infection (7). Like any other chronic illness, HIV is often accompanied by a wide range of psychiatric disorders that can affect mind, mood, body and behaviour (9−11). Clinical depression is said to be the most frequently observed psychiatric disorder (12) in patients with the HIV-infection. Both depression and HIV-infection result in similar somatic or physical symptoms. Fatigue, lethargy, low libido, decreased appetite and weight loss may be manifestations of either HIV-related illnesses or depressive disorder (12). These overlapping symptoms in both illnesses result in a wide variation of reported prevalence of depression amongst patients with HIV-infection, with reports ranging from 0 to 47.8% (7). A meta-analysis of 10 studies found that HIV-positive patients were twice as likely (Relative odds ration = 1.99) to be diagnosed with major depression than individuals who were HIV negative (7).

Transient adjustment and grief reaction to HIV are difficult to differentiate from depressive disorders (13). Diagnosis of depression in HIV patients is therefore an ongoing challenge to clinicians and researchers (14, 15). The warning signs of depression may often go undiagnosed, misinterpreted and untreated (10). Symptoms of depression could be related to specific HIV-related disorders (ie mood disorder due to a general medical condition), medication side effects as well as psychosocial stressors such as associated stigmatization, isolation and discrimination (9, 13). Additionally, a majority of HIV-infected people are likely to experience periods of sadness and distress from time to time, particularly in relation to the illness or the death of friends (8, 12, 16, 17).

In order to facilitate the detection of depression in HIV-positive patients, it is first necessary to validate an established, culturally versatile (18), self-report depression scale such as the Beck Depression Inventory – II (19) using a sample of HIV-positive patients. The purpose of this project is to provide evidence for the concurrent and discriminant validity of the BDI-II among HIV-positive patients.

It is hypothesized that the BDI-II will have an acceptable degree of concurrent and discriminant validity in a sample of HIV-positive patients attending public health clinics. In accordance with past research (20−22), it is hypothesized that HIV-positive women will report more and stronger symptoms of depression than their male counterparts, BDI-II depression scores for both males and females will increase with age, and age and gender will combine to accelerate age-related increases in depressive symptoms among HIV-positive symptomatic women.

## METHOD

*Sample*

The sample consisted of 191 patients (61% female, 39% male, mean age 40.5 ± 10 years) diagnosed with HIV-infection attending HIV clinics at three sites in Kingston and St Andrew, Jamaica. All participants who attended the clinics during a three-month time period were invited to take part in the research. Patients below the age of 18 years, diagnosed with HIV less than a year, as well as those who have ever been diagnosed with or treated for depression or any other psychiatric disorder were excluded from the study. On average, patients included in the study had been diagnosed with HIV-infection for 5.5 years (1 years to 18 years). This project was reviewed and approved by ethical review committees of the Faculty of Medical Sciences, The University of the West Indies/University Hospital of the West Indies and the Ministry of Health, Jamaica. All participants were read an informed consent form and provided their consent to take part in the project. Participants were told that they could withdraw from the project at anytime without jeopardizing their medical treatment.

*Instruments*

Three instruments were used to provide evidence for the validity of the BDI-II. These included the Beck Depression Inventory-II (BDI-II), the Centers for Epidemiological Studies Depression Scale (CES-D) and the Social Provision Scale (SPS). In addition, a brief demographic questionnaire was completed to provide information on participants' age, gender, level of education and medical history. The CES-D served to provide evidence of the concurrent validity of the BDI-II, while the Social Provisions Scale provided evidence of discriminant validity. If the BDI-II has concurrent and discriminant validity we would expect that scores on the reduced BDI-II would be strongly correlated with scores on the CES-D and only weakly correlated with scores on the Social Provisions Scale.

*Beck Depression Inventory-II (BDI-II)*

The Beck Depression Inventory-II is a 21-item measure of depressive symptoms. It has been used extensively with a wide variety of psychiatric and non-psychiatric populations

with great success (23). Factor analyses of the BDI-II have suggested that the measure consists of two factors: a Somatic-Affective factor and a Cognitive factor (24). Based on a meta-analysis of psychometric research, the BDI-II has been found to have acceptable levels of internal consistency with an estimated coefficient alpha of 0.81 for non-psychiatric populations and 0.86 for psychiatric populations (23). The BDI-II correlates highly with other measures of depression and with clinical ratings of depression (23). Past research has provided evidence for the concurrent and discriminant validity of the BDI-II in Jamaican and Trinidadian adolescents (18, 23, 25). To reduce the influence of shared symptoms, five items from the BDI-II were removed from the calculation of total scores. These items assessed loss of energy (item 15), changes in sleeping patterns (item 16), changes in appetite (item 18), tiredness or fatigue (item 20) and loss of interest in sex (item 21).

*Center for Epidemiological Studies – Depression Scale (CES-D)*

The CES-D is a 20-item measure of the symptoms of depression (26). It samples a broad spectrum of symptoms of depression, but emphasizes the affective symptoms of depression. Items for the scale were derived from existing measures of depression, from research literature and from factor analytic studies of depression. While the CES-D is specifically designed for use in epidemiological studies of non-clinical populations, it has also been found useful for detecting symptoms of depression in clinical and psychiatric patients (27). It has been administered to many different populations and found to have acceptable levels of test-retest reliability ($r_{tt}$ = 0.51 to 0.32) and internal consistency reliability (alpha = 0.85 to 0.90). The CES-D has been found to have acceptable levels of concurrent validity and is able to distinguish depressed from non-depressed populations (27).

*Social Provisions Scale*

The Social Provisions Scale [SPS] (28) is a 24-item measure of social support consisting of six separate sub-scales. It is based on Weiss' (29) conceptualization of six social provisions or resources that people may gain from relationships with others. These provisions are: Guidance, Reliable Alliance, Reassurance of Worth, Opportunity for Nurturance, Attachment and Social Integration. The SPS measures each social provision using four items; two positively phrased and two negatively phrased. The Guidance sub-scale assesses the perception that others may be relied upon for advice or information. The Reliable Alliance sub-scale assesses the perception that others may be relied upon for tangible assistance when needed. The Reassurance of Worth sub-scale assesses the degree to which the person feels their skills, competencies and talents are recognized and valued by others. The Opportunity for Nurturance sub-scale measures the degree to which other people rely on the respondent for their well-being. The Attachment sub-scale assesses the extent to which the person gains a sense of security through emotional closeness with others. The Social Integration sub-scale measures the perception that one belongs to a group of friends who share similar interests, concerns and activities. The Social Provision Scale has been administered and found to be valid and reliable with a variety of people including school teachers, nurses, new mothers and university students. The SPS has been used with people who reported their ethnicity as Caribbean (30, 31). A confirmatory factor analysis supported the existence of the six sub-scales (28). Internal consistency reliability for each of the six sub-scales is reasonably good ranging from 0.65 to 0.76, with the reliability for the full scale being excellent [0.92] (28). The SPS has been shown to have good concurrent validity as evidenced by moderate correlations with existing measures of social support and good discriminant validity through low correlations with measures of social desirability, depression, introversion-extroversion and number of stressful events (28).

*Background Questionnaire*

A background questionnaire was used to obtain demographic information as well as information on participants' medical history and treatment.

*Procedure*

Prior to data collection, five research assistants were trained to administer the package of research measures and the data collection procedures. In addition, research assistants were trained on the use of a personal digital assistant and the EpiSurveyor software that was used to collect data.

Patients at each of the three clinics were invited to participate in the study by the research assistants. Prior to being interviewed they were asked if they were currently being treated for depression. Patients who were currently undergoing treatment for depression were excluded from the study. If the individual was not being treated for depression, the research assistant explained the purpose of the study, the exclusion criteria and asked participants to complete an informed consent form. Consenting participants were taken to a private location and individually interviewed. For their cooperation, participants were provided with a small incentive (a snack). On average the interview took 45 to 55 minutes.

## RESULTS

A two stage approach was used to establish the reliability and validity of the BDI-II. First, the internal consistency reliability of the BDI-II was examined using Cronbach's Coefficient Alpha. Following this, the concurrent and discriminant validity of the BDI-II was examined using Pearson's product moment correlations. Prior to conducting all analyses, the mean score, rounded to the nearest whole number, was substituted for missing values on individual BDI-II items, and CES-D and Social Provision Scale items.

As expected, there was a significant gender ($t$ (189) = 2.56, $p < 0.05$) difference in depression on the BDI-II such that females reported significantly higher levels of depression ($\bar{x}$ = 14.1 ±11.0) than their male counterparts ($\bar{x}$ = 10.2 ± 9.1).

The BDI-II was found to have a high degree of internal consistency reliability ($\alpha$ = 0.89). The CES-D and the SPS were also found to have high levels of internal consistency ($\alpha$ = 0.85 and 0.91 respectively). Overall, results of the validity analyses suggest that the BDI-II has an acceptable degree of concurrent and discriminant validity (Table I).

Table 1: Concurrent and discriminant validity coefficients for the Beck Depression Inventory-II

| Scale | BDI | CES-D | SPS |
|---|---|---|---|
| BDI | 1.00 | | |
| CESD | 0.74 | 1.00 | |
| SPS | -0.42 | -0.39 | 1.00 |

Scores on the BDI-II strongly correlated (r = 0.74) with the CES-D, suggesting that the BDI-II has a moderate degree of concurrent validity. In contrast, scores on the BDI-II correlated less strongly with scores on the Social Provisions scale (r = -0.42) suggesting the BDI-II has an acceptable degree of discriminant validity. This pattern of scores suggests that the majority of the stable variance underlying the BDI-II assesses depression (55%) while a smaller degree of the variability (18%) measures a conceptually similar but distinct construct.

A Principal Components Analysis using oblique rotation was conducted to explore the dimensionality of the BDI-II. This analysis found three clear components underlying the BDI-II. The three components assessed cognitive, affective and somatic symptoms of depression respectively (Tables 2 and 3). These three components were moderately correlated with one another (r12 = 0.36, r13= 0.53) suggesting that a single general depression factor may underlie the BDI-II. The items loading on the Cognitive-Affective component and the Somatic strongly resembled those of previous analyses with the exception of the items assessing a loss of interest in sex and indecision which did not load on any component.

As there are overlapping physical symptoms between major depression and HIV, we sought to reduce this potential confound by removing the physical symptoms of depression from the overall BDI-II scale. Thus we created a version of the BDI-II which excluded physical symptoms of depression. This new version of the BDI-II was then correlated with CES-D and the Social Provisions Scale to assess concurrent and discriminant validity (Table 4). The BDI-II scale without physical symptoms correlated 0.72 with CES-D scores, indicating that it had an acceptable level of concurrent validity. Similarly, the BDI-II scale without physical symptoms correlated 0.39 with the Social Provisions Scale, indi-

Table 2: Pattern matrix from the Confirmatory Principal Components Analysis of the BDI-II

| | Component | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Loss of interest | .778 | | |
| Agitation | .745 | | |
| Suicidal thoughts | .734 | | |
| Sadness | .664 | | |
| Crying | .585 | | |
| Past failure | .557 | | |
| Irritability | .537 | | |
| Pessimism | .519 | | |
| Loss of pleasure | .415 | | |
| Self dislike | | .824 | |
| Self criticalness | | .627 | |
| Punishment feelings | | .515 | |
| Changes in sleeping | | .421 | |
| Guilty feelings | | | |
| Loss of energy | | | .792 |
| Tiredness or Fatigue | | | .713 |
| Worthlessness | | | .696 |
| Concentration difficulty | | | .621 |
| Changes in appetite | | | .544 |
| Indecisiveness | | | .532 |
| Loss of interest in sex | | | .457 |

Table 3: Structure matrix from the Confirmatory Principal Components Analysis of the BDI-II

| | Component | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Sadness | .758 | | .500 |
| Agitation | .734 | | |
| Loss of interest | .718 | | |
| Irritability | .691 | | .580 |
| Suicidal thoughts | .688 | | |
| Crying | .683 | .486 | |
| Pessimism | .658 | .435 | .465 |
| Past failure | .639 | | |
| Loss of pleasure | .597 | .508 | .455 |
| Self dislike | | .809 | |
| Self criticalness | .410 | .704 | |
| Guilty feelings | .516 | .562 | .515 |
| Punishment feelings | | .527 | |
| Changes in sleeping | | .483 | |
| Loss of energy | .449 | | .800 |
| Worthlessness | .416 | | .718 |
| Tiredness or fatigue | | | .696 |
| Indecisiveness | .502 | | .666 |
| Concentration difficulty | | | .610 |
| Changes in appetite | | | .560 |
| Loss of interest in sex | | | .502 |

Table 4: Concurrent and discriminant validity coefficients for the Beck Depression Inventory-II without physical symptoms

| Scale | BDI | CES-D | SPS |
|---|---|---|---|
| BDI | 1.00 | | |
| CESD | 0.72 | 1.00 | |
| SPS | -0.39 | -0.39 | 1.00 |

cating that it had an acceptable degree of discriminant validity.

## DISCUSSION

The BDI–II was found to have an acceptable level of concurrent and discriminant validity among patients with HIV. In keeping with past research (19, 24, 32, 33), the BDI-II had an acceptable level of internal consistency reliability. A Principal Components Analysis of the BDI-II using this sample found three moderately correlated components, one of which assessed the cognitive dimension, a second which assessed the affective dimension and a third which measured the somatic dimension of depression. While HIV and depression both have somatic components, the BDI-II retained concurrent and discriminate validity even after the somatic dimension of the scale was removed.

Depression has affective, cognitive and somatic manifestations, with the affective symptoms appearing in the earlier stages of the illness while the cognitive symptoms appear later (34). As a measure of depression, the BDI–II contains a larger number of items assessing the affective symptoms of depression than the cognitive symptoms. The over-inclusion of affective symptoms may make it more appropriate in the assessment of the early presentation of depression. Due to the overlap of somatic symptoms in both HIV-infection and depression, it may not be possible to suggest that the somatic symptoms are solely attributable to depression. As this research has found adequate, concurrent and discriminate validity for the BDI-II without the somatic component, it is recommended that when assessing depression among HIV-positive patients, the somatic items be deleted from the scale. In doing so, a more accurate assessment of depressive symptoms may be obtained.

As anticipated, we found a gender difference in BDI–II depression scores. Mean differences between male and female participants were statistically significant, ($p < 0.05$). Based on this sample, we can conclude that gender differences seem to hold true on the BDI–II scores such that HIV-positive women report higher scores than their male counterparts.

A limitation of the current project is the use of Jamaican HIV-positive patients as a sample. While this sample of HIV-positive patients represented a wide and older age range and a larger proportion of HIV-positive females than that of North American HIV-positive population (35), this population is still not representative of all HIV-positive populations worldwide.

The current study provides some preliminary evidence for the concurrent and discriminant validity of the BDI–II among HIV-positive patients. The BDI-II appears to have sufficient concurrent and discriminant validity to be used as a measure of depressive symptoms in research studies with HIV-positive patients.

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