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The Factor Structure and Presentation of Depression Among HIV-Positive Adults in Uganda

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Abstract

Depression is one of the most prevalent psychiatric comorbidities of HIV and one of the greatest barriers to HIV self-care and adherence. Despite this, little consensus exists on how to best measure depression among people living with HIV/AIDS (PLWHA) in African settings. Measurement of depression among PLWHA may be confounded by somatic symptoms. Some research recommends excluding these items to enhance measurement validity; sensitivity may be

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lost with this approach. We sought to characterize depression among a cohort (N = 453) of PLWHA initiating antiretroviral therapy in Uganda via factor analysis of a widely used measure of depression, the Hopkins Symptom Checklist (HSCLD). Common factor analysis was performed, associations between HSCLD and the Mental Health subscale of the Medical Outcomes Study HIV (MOS-HIV) estimated, and a Cronbach's alpha calculated to examine validity. Factor analysis yielded two factors: (1) somatic-cognitive symptoms and (2) behavioral disengagement. Persons with more versus less advanced disease (CD4 cell count of ≤200 cells/mm^3) showed no statistically significant differences in depression scores (1.7 vs. 1.7, $P \geq 0.5$). Both factors were significantly associated with the MOS-HIV (P <.01). Factor one was highly reliable (α = .81); factor two had only modest reliability (α = .65). Somatic-cognitive symptoms of depression and disengagement from life's activities appear to be distinct components of depression in this sample. Consideration of somatic items may be valuable in identifying depression in this setting.

Keywords

HIV/AIDS; Depression; Assessment; Validity

Introduction

Depression is recognized as a global health concern and a significant contributor to the global burden of disease [1]. Existing studies suggest that people living with HIV/AIDS (PLWHA) living in Africa have high rates of probable depression, with estimated rates ranging from 13 to 47 % [2, 3]. The reasons for these high rates are unclear but may be due to a combination of biological and structural factors [4–6]. Sub-Saharan Africa has the highest number of HIV infections in the world [7]. Identifying depression among PLWHA in HIV endemic settings is particularly important, as depression has been implicated in poorer adherence to antiretroviral therapy (ART), advanced disease progression, and increased mortality [8–10]. Depression is also associated with lower quality of life [11, 12], which can lead to greater functional impairment. Functional impairment may impede an individual's ability to provide for their family, as well as earn funds necessary to attend clinic visits, which are essential to successful long-term HIV care, particularly in African settings [13].

The Hopkins Symptom Checklist for depression (HSCLD) has been used to assess depression in a myriad of international settings, including some studies in Sub-Saharan Africa [14–16], but there are limited reliability and validity data to support the use of the instrument in this setting [17]. Assessing depression in PLWHA is complicated by the potential for overlap between somatic symptoms of depression and HIV disease, particularly among individuals with symptomatic HIV, such as those who have not yet started treatment; thus, some researchers have recommended excluding these items from depression self-report measures to enhance measurement validity [18]. Depression, however, may be experienced more somatically in non-Western cultures [19–21], and sensitivity may be lost by excluding somatic items from depression screening tools. Given cultural differences in how depression may be experienced, depression research could be improved upon by using locally validated measures [15].

Aims of the Study

We sought to characterize the factor structure of depression and evaluate the construct validity of the HSCLD among PLWHA in rural Uganda.

Methods

Participants

Data for this psychometric analysis were drawn from 453 PLWHA enrolled in the Uganda AIDS Rural Treatment Outcomes (UARTO) cohort study [22], an ongoing prospective adherence study of ART naïve adults (≥18 years of age) initiating ART at the Mbarara University of Science and Technology (MUST) Immune Suppression Syndrome Clinic. Patients living within 60 km of the clinic were eligible. Mbarara is a rural area in southwest Uganda close to both Rwanda and the Democratic Republic of the Congo. Participants completing a baseline assessment from January 2005 to December 2010 were included in these analyses; analyses were limited to data collected at the baseline assessment. The original sample was comprised of 504 participants, however, data on key variables (listed below) were missing for approximately 10 % of the sample (N = 51). All participants provided written informed consent, using thumbprints when literacy reasons precluded a written signature.

Measures

Demographic and health status assessment—Participants were interviewed by a member of the study team in their native language (Runyankole), and self-reported their sociodemographic data, as well when they were diagnosed with HIV. All questions and scales were translated and back-translated before use by a native speaker.

HSCLD-25: Depression subscale—The HSCLD-25 is measure of depressive and anxiety symptoms that contains two sections: a 10-item section measuring symptoms of anxiety and a 15-item section measuring symptoms of depression. Participants completed the depression subscale of the HSCLD as modified by Bolton & Ndogoni [14] (to better fit the symptom construct of depression among Ugandans) to include an item assessing psychomotor agitation and an item around how much one cares about their health. The scale is scored by taking an average of responses to all items; a score of >1.75 is used as a cut-off for likely depression caseness [23].

The Medical Outcomes Study HIV Health Survey (MOS-HIV)—The MOS-HIV questionnaire is a comprehensive health status measure originally adapted from the MOS for use in studies of PLWHA [24]. The 35-item questionnaire measures several dimensions of both physical and mental health, as well as quality of life. Evidence for its reliability and validity has been well documented [25, 26], and the questionnaire has been adapted for use in a Ugandan setting such that the questions reflect activities relevant to a rural agrarian lifestyle [27]. A summary score for the mental health subscale (MHS) was calculated per standard scoring procedures [28].

HIV RNA and CD4 count—Pretreatment HIV RNA and CD4 values were obtained. To account for non-normal distribution of HIV RNA values, the $\log_{10}$ was calculated for analyses involving HIV RNA.

Ethical Review

Ethical approval for all study procedures was obtained from the Committee on Human Research, University of California at San Francisco; the Partners Human Research Committee, Massachusetts General Hospital; and the Institutional Review Committee, MUST. Consistent with national guidelines, we received clearance for the study from the Uganda National Council for Science and Technology and from the Research Secretariat in the Office of the President.

Analyses

All analyses were conducted using the Statistical Package for the Social Sciences (SPSS), version 17. Descriptive statistics (frequencies, means, standard deviations) were performed to characterize and describe the sociodemographic characteristics of the sample as well as their level of depressive symptoms. Independent samples *t* tests were used to compare depressive symptoms by gender and by disease severity, whereby greater disease severity was defined by a CD4+ T cell count of ≤200 cells/mm^3.

Common factor analysis was used to explore the factor structure of the HSCLD. Common factor analysis was chosen over principal components analysis for three reasons. First, common factor analysis is preferred when the analytic goal is to understand manifest variables as they exist within a larger, latent variable [29]. Because our analyses were concerned with the symptom construction of depression among PLWHA in our study sample, common factor analysis was the more appropriate technique. Second, estimates calculated with common factor analysis may be more amendable to later replication [29]. Lastly, because the focus of these analyses was to provide a report on the manner in which the HSCLD functions in this setting, the method of common factor analysis is preferable. Orthogonal (varimax) rotation was then conducted. Orthogonal rotation was selected over oblique reduction as it reduces correlation between factors and aids interpretation of results [29]. Utilizing procedures specified by Floyd and Widaman [29], items with factor loadings of>.30 were retained while items that did not load on either factor were dropped.

After the factors were identified, we computed reliability estimates (Cronbach's alpha) for each of the resulting factors. We adopted Cronbach and Meehl's [30] conceptual structure for construct validity, whereby we understand the construct validity of a particular test to be the extent to which it appears to measure the theoretical construct or trait that it is intended to measure. When the test correlates with other variables with which it is expected to correlate, then this evidence of construct validation is termed "convergent validation" [31]. Therefore, in order to examine convergent validity, we used two-tailed Pearson correlations to estimate the associations between each of the identified factors and MHS scores.

Results

Sample Characteristics

Sociodemographic characteristics of the sample are listed in Table 1. Mean participant age was 34.9 (SD = 8.3), 69.3 % (*N* = 314) of the sample were women, and 40.6 % (*N* = 183) of the sample reported being married. Fifty-seven percent (*N* = 258) of participants completed primary school, and average household monthly income for the sample (data available only for 308 participants) was 88,908 Ugandan Shillings (or approximately $34 U.S. dollars, at the current exchange rate). With respect to HIV disease related characteristics, the mean number of years since diagnosis was 1.9 years (SD = 2.8). The average pre-treatment CD4 cell count was 150 cells/mm^3 (SD = 104), with 25.8 % (*N* = 117) of the sample above 200 cells/mm^3 and 74.2 % (*N* = 336) below 200 cells/mm^3. The average pre-treatment $\log_{10}$ HIV RNA was 5.0 (SD = 0.7) and values ranged from 3.0 to 5.9.

Characteristics of the HSCLD

Average item scores on the HSCLD ranged from 1.00 to 3.75, and the mean was 1.72 (SD = 0.6). Using the traditional cut-off score of 1.75 [23], 38 % (*N* = 172) of the sample met criteria for depression caseness. The frequencies for each symptom endorsed are listed in Table 2, with the most common being low energy, sexual symptoms, low appetite, worry, and sadness. Mean scores on the HSCLD were significantly higher for women than for men (1.8 vs. 1.5, t = −5.1, *P* <.01), and there were no significant differences among those with advanced HIV disease as compared to those with less advanced disease (1.7 vs. 1.7, t = .77 *P* >.05). Level of depressive symptoms was not correlated with age or time since diagnosis.

Common Factor Analysis

The common factor analysis yielded a two-factor solution that was confirmed by a visual examination of the unrotated scree plots of eigenvalues [29, 32]. The first factor consisted mainly of somatic-cognitive symptoms (e.g., “feeling sad”, “feeling lonely”, “feeling fidgety”, “feeling low in energy”) and the second factor consisted mainly of symptoms related to behavioral disengagement (e.g., “feeling no interest in things”, “thoughts of ending your life”, “feeling like I don’t care what happens to my health”). We also considered a three factor solution, because three factors with an eigenvalue of >1 emerged. However, consistent with conceptual thinking on this issue [29], we rejected the three-factor solution because the two-factor solution was the best theoretical fit. Table 3 provides the eigenvalues and degree of variance accounted for by each factor with an eigenvalue >1.

After orthogonal rotation, two items, “loss of sexual interest or sexual pleasure” and “poor appetite” were dropped due to factor loadings <.30. The deletion of the appetite item makes theoretical sense in a setting in which there is considerable food scarcity [33], and removal of the sexual interest of pleasure item also makes theoretical sense given that HIV status may influence sexual behavior in various ways. If an item loaded on both factors, it was incorporated into the factor on which it had the highest loading (e.g., “feeling sad” was assigned to Factor 1). Table 4 provides the rotated factor loadings and initial communality estimates for the two factors. This two factor solution explained 39.65 % of the variance in depressive symptoms.

Depressive Symptoms and Relationship with HIV Disease Markers by Factor

Mean depression scores and the percentage of participants meeting caseness according to the standard score of 1.75 was evaluated for each factor. For Factor 1 (somatic–cognitive), the mean item score was 1.8 (SD = .7), and 45.7 % (*N* = 207) of participants met caseness for depression. Factor 2 (*behavioral disengagement)* had a mean item score of 1.6 (SD = .5), and 28 % (*N* = 127) of the sample met caseness criteria. Neither factor was significantly correlated with CD4 count or HIV RNA (*P* >.05).

Reliability and Convergent Validity of the Factors

Factor 1 was highly reliable (α = .81) while Factor 2 had only modest reliability (α = .65). Both factors were significantly and negatively correlated with the MHS: as depressive symptoms increased, ratings of perceived mental health decreased. The correlation between the somatic-cognitive factor and the MHS of the MOS-HIV (rho = −64, *P* <.00) was somewhat larger than the correlation between the behavioral disengagement factor and the MHS of the MOS-HIV (rho = −49, *P* <.00).

Discussion

This study sought to examine the factor structure of depression and evaluate the validity of the HSCLD among a sample of PLWHA in rural Uganda. Because of the potential for overlap between symptoms of HIV disease and depression, previous research (most of which has been conducted in Western settings) has suggested excluding the somatic items from measures of depressive symptoms [18, 34]. In non-Western settings, depression may be experienced more somatically [19–21]; thus, valuable information may be lost if this approach is applied without regard to the cultural context.

In this sample, rates of depression were high with close to 40 % of the sample meeting probable caseness for depression, though similar to rates detected in comparable populations of PLWHA in Sub-Saharan Africa [2, 35]. The factor analysis yielded a two factor solution, without a clear distinction between somatic and non-somatic symptoms; somatic-cognitive symptoms of depression and disengagement from life's activities appear to be distinct components of depression in this sample of PLWHA in rural Uganda. While all study participants had advanced HIV disease, there were no differences in rates of depression based on CD4 count when dichotomized into <200 or >200, nor did either of the factors correlate with pre-treatment CD4 count or HIV RNA. These findings add some confidence to the idea that the lack of differentiation between somatic and cognitive symptoms reflects more than just advanced HIV disease. Furthermore, the factors demonstrated adequate internal consistency, particularly the somatic-cognitive factor. They also had statistically significant correlations with an extensively validated measure of mental health status, further supporting their construct validity.

Other attempts to characterize the factor structure of various depression measures among PLWHA have yielded conflicting results, and interpretation is difficult due to the use of varying assessment measures with varying item content. For example, a factor analysis of the Center for Epidemiological Studies Depression Scale (CES-D) among a sample of

PLWHA initiating ART in eastern Uganda yielded a four-factor solution consisting of depressed affect, positive affect, somatic complaints, and interpersonal concerns [2]. Factor analyses of mixed anxiety and depression related items (e.g., the Brief Symptom Inventory, Hospital Anxiety and Depression Scale, and Patient Health Questionnaire-9) have also been conducted and have yielded one to two factor solutions, that differ from the results of this study [36–39]. Two additional studies have examined the factor structure of the Hopkins Symptoms Checklist, both among samples of pregnant women in Tanzania. Lee and colleagues [40] identified a single factor using the 15 depression, while Kaaya and colleagues [17] also identified a single factor, but with both the depression and anxiety items.

Qualitative work exploring the experience of depression among PLWHA receiving ART in Uganda by Okello and colleagues [19] suggests that while traditional symptoms of depression as defined by the DSM-IV-TR [41] were present in Ugandan patient descriptions of depression, somatic complaints (e.g., sleep, low energy) and rumination were at the core of patients' descriptions. These symptoms are reflected in the somatic cognitive factor that emerged for our sample. Although the purely somatic symptoms might be less amenable to direct psychosocial intervention, it would be important to consider a depression diagnosis based on these presenting problems. Symptoms consistent with the behavioral disengagement factor may be more amenable to direct psychosocial intervention. Evidenced-based treatments for depression that involve behavioral activation [42] and problem solving [43] exist, can be disseminated, and can improve symptoms of depression. Pharmacological treatments are also effective for depression among PLWHA [44–46] and, when used in conjunction with psychosocial interventions, typically improve somatic symptoms as well (47).

Our study has some noteworthy strengths and limitations. With respect to strengths, our sample size is relatively large, there were little missing data, and we used a culturally adapted measure of depressive symptoms. With respect to limitations, these analyses were secondary analyses of an existing data set that was not designed to formally validate the HSCLD. Second, we did not conduct diagnostic interviews to determine the extent to which study participants met DSM-IV-TR criteria for Major Depressive Disorder. This limited our ability to make definitive judgments about the validity of our screening measures. We also used a modified version of the original HSCLD. While we believe this was appropriate since the modifications were made in order to better assess the experience of depression among Ugandans, any modification to a scale can change its psychometric properties. However, in this study we showed that this modified version of the HSCLD has good reliability and construct validity. Lastly, the MHS of the MOS-HIV contains questions related to anxiety as well as depression, potentially confounding our estimates of the associations between the two HSCLD factors and the MHS.

Additional work is required to identify the most effective way to assess the prevalence of depression in non-Western samples of PLWHA. However, data from the current study suggests that when assessing depressive symptoms among PLWHA in Uganda, it may be undesirable to remove somatic items from symptom checklists (even amongst untreated individuals), as somatic symptoms may be an important part of the experience of depression

in this cultural context. In clinical settings, it is important to assess the nature of somatic symptoms rather than making the assumption that they are the result of HIV disease; reassessment after successful initiation of ART is also warranted. The decisions around what assessment tool to use should ultimately be guided by the goal of the work and the importance of specificity versus sensitivity (e.g., identifying patients in need of intervention versus determining prevalence of depression). Future research should examine these factors further, and examine their predictive ability in identifying patients who are at risk for negative outcomes as a result of depression.

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Table 1

Sociodemographic characteristics of participants

Variable	Mean	SD
Age (years)	34.90	8.33
Household income	88,907.47	1.71E5
Years since diagnosis	1.88	2.78
CD4 T-lymphocyte cell count per ml	150.20	104.35
Average pre-treatment viral load $\log_{10}$	4.99	0.69
Hopkins symptom checklist for		
Depression – total score	1.72	0.55
MOS HIV Mental Health subscale score	50.63	9.44
	N	%
Gender		
Female	314	30.7
Marital status		
Never married	38	8.4
Separated, divorced, or widowed	228	50.3
Married or cohabitating	183	40.4
Educational attainment		
None	52	11.5
Primary schooling	258	57.0
Secondary schooling and beyond	113	24.9

Percentages do not always add up to 100 due to missing data

Table 2

Frequency of symptom endorsement

Item on Hopkins Symptom Checklist for depression	N	%
1. Feeling low in energy, slowed down	338	74.6
2. Loss of sexual interest or sexual pleasure	301	66.5
3. Poor appetite	242	53.4
4. Worrying too much about things	223	49.2
5. Feeling sad	192	42.4
6. Difficulty falling asleep or staying asleep	182	40.2
7. Blaming yourself for things	180	39.7
8. Feeling everything is an effort	177	39.1
9. Feeling fidgety	140	30.9
10. Feeling lonely	139	30.7
11. Feeling no interest in things	135	29.8
12. Crying easily	107	23.6
13. Feeling hopeless about the future	99	21.9
14. Feeling of worthlessness	74	16.3
15. Thoughts of ending your life	34	.5
16. Feeling like I don’t care what happens to my health	26	5.7

[a]Items that were endorsed as “a little”, “quite a bit”, or “extremely”

Table 3

Factors with eigenvalues greater than or equal to 1.0 for initial solution and percentage of variance accounted for by these factors

Factor	Eigenvalue	% of variance	Cumulative % of variance
1	5.10	31.86	31.86
2	1.25	7.80	39.65
3	1.14	7.14	46.80

Table 4

Rotated factor loadings for common factor analysis of the Hopkins Symptom Checklist for depression

Item by factor	Factor 1	Factor 2
Factor 1: Somatic cognitive		
Feeling fidgety	.64	.06
Feeling sad	.59	.47
Crying easily	.55	.31
Feeling lonely	.52	.40
Worrying too much about things	.48	.43
Blaming yourself for things	.47	.25
Feeling low in energy, slowed down	.47	.14
Difficulty falling asleep or staying asleep	.36	.20
Factor 2: Behavioral disengagement		
Feeling of worthlessness	.25	.63
Thoughts of ending your life	.12	.56
Feeling no interest in things	.31	.48
Feeling like I don’t care what happens to my health	.01	.45
Feeling everything is an effort	.36	.42
Feeling hopeless about the future	.37	.39