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Psychosocial Functioning and Depressive Symptoms Among HIV-Positive Persons Receiving Care and Treatment in Kenya, Namibia, and Tanzania

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Abstract

In sub-Saharan Africa, the prevalence of depressive symptoms among people living with HIV (PLHIV) is considerably greater than that among members of the general population. It is particularly important to treat depressive symptoms among PLHIV because they have been associated with poorer HIV care-related outcomes. This study describes overall psychosocial functioning and factors associated with depressive symptoms among PLHIVattending HIV care and treatment clinics in Kenya, Namibia, and Tanzania. Eighteen HIV care and treatment clinics (six per country) enrolled approximately 200 HIV-positive patients (for a total of 3,538 participants) and collected data on patients' physical and mental well-being, medical/health status, and psychosocial functioning. Although the majority of participants did not report clinically significant depressive symptoms (72 %), 28 % reported mild to severe depressive symptoms, with 12 % reporting severe depressive symptoms. Regression models indicated that greater levels of depressive symptoms were associated with: (1) being female, (2) younger age, (3) not being completely adherent to HIV medications, (4) likely dependence on alcohol, (5) disclosure to three or more people (versus one person), (6) experiences of recent violence, (7) less social support, and (8) poorer physical functioning. Participants from Kenya and Namibia reported greater depressive symptoms than those from Tanzania. Approximately 28 % of PLHIV reported clinically significant depressive symptoms. The scale-up of care and treatment services in sub-Saharan Africa provides an opportunity to address psychosocial and mental health needs for PLHIV as part of comprehensive care.

Keywords

Depression; Psychosocial; Health; HIV-positive; Africa

Background

Sub-Saharan Africa continues to be disproportionately affected by the global HIV/AIDS pandemic, accounting for more than two thirds of the burden (UN Joint Programme on HIV/AIDS (UNAIDS) 2010a). For example, Tanzania, Kenya, and Namibia all have generalized HIV epidemics with HIV prevalence rates of 5.7, 6.2, and 13.5 %, respectively (National AIDS Control Council and National AIDS and STI Control Programme 2012; Republic of Namibia Ministry of Health and Social Services (MOHSS) 2012; Tanzania Commission for AIDS, National Bureau of Statistics, Office of the Chief Government Statistician, and Macro International 2008). In recent years, HIV prevention, care, and treatment efforts have rapidly expanded, and more than 5 million people are now receiving antiretroviral treatment (ART), a 13-fold increase since 2004 (UNAIDS 2010b). Approximately 72 % of people in Kenya needing antiretroviral therapy are currently receiving treatment, followed by 67 % in Namibia and approximately 55 % in Tanzania (National AIDS Control Council and National AIDS and STI Control Programme 2012; Republic of Namibia Ministry of Health and Social Services (MOHSS) 2012; Tanzania Commission for AIDS and Zanzibar AIDS Commission 2012). The scale-up of HIV care and treatment has led to more people living with HIV (PLHIV) having healthier and longer lives (UNAIDS 2010a, b). As HIV has

become more of a chronic illness, it is important for health care providers to be aware of and address not only physical issues associated with HIV but also the mental and psychosocial well-being of PLHIV.

Depression, anxiety, and general psychological distress are often highly prevalent among PLHIV (Ickovics et al. 2001; Makoae et al. 2005). Estimates of depression among PLHIV in sub-Saharan Africa vary from 2 to 56 % (Antelman et al. 2007; Breur et al. 2011; Freeman et al. 2007; Kaharazu et al. 2006; Martinez et al. 2008; Marwick and Kaaya 2010; Monahan et al. 2008; Ramadhani et al. 2007), depending on the context and population studied. These estimates are considerably greater than are the estimates for the general population in sub-Saharan Africa, which range from 1 to 34 % (Gureje et al. 2010; Kinyanda et al. 2011; Nduna et al. 2010; Wong et al. 2008). This clearly indicates that there is a need to assess depressive symptoms and to identify factors associated with of depressive symptoms among PLHIV.

Poor emotional and physical health often co-occur among PLHIV, contributing to a complex mix of affective and somatic symptoms which have the potential to impact various aspects of their daily lives (Lawler et al. 2011; Makoae et al. 2005). Depressive symptoms and psychological distress among PLHIV have been associated with poorer self-perceptions of physical health (Monahan et al. 2008; Siziya and Fylkesnes 2005), poorer adherence to ART (Ammassari et al. 2002; Lawler et al. 2011), lower CD4 counts (Ickovics et al. 2001; Kaharazu et al. 2006; Leserman 2008), progression of their HIV infection (Antelman et al. 2007; Leserman 2008), and increased mortality (Antelman et al. 2007; Ickovics et al. 2001; Leserman 2008). Although psychological distress and depressive symptoms are common among PLHIV, mental health services are often not available as part of care and treatment services in resource-limited settings (Lawler et al. 2011; Remien and Mellins 2007).

Additional psychosocial factors play an important role in the well-being of PLHIV. HIV-positive women have been more likely to report experiences of violence than are HIV-negative women (Maman et al. 2002). Also, studies in developing countries have shown that support groups and perceived social support are associated with decreased psychological distress and depressive symptoms, increased coping, increased physical functioning, and lower likelihood of being diagnosed with a mental disorder (Collins et al. 2006; Freeman et al. 2007; McInerney et al. 2008). Social support also has been associated with whether HIV status was disclosed to family members (Wouters et al. 2009), and disclosure has been found to be a protective factor against psychological distress (Bennett-Murphy et al. 1999; Green and Smith 2004). Moreover, findings have shown a relationship between increased disclosure of HIV status and increased adherence to antiretroviral medications (ARVs), with adherence being a protective factor against virological failure and disease progression (Ramadhani et al. 2007; Stirratt et al. 2006). Together, these findings suggest that social support and disclosure are important factors for physical and mental health among PLHIV.

Previous studies have examined psychosocial issues and depressive symptoms among PLHIV, but these studies have investigated a relatively limited number of variables and were conducted in a single country. This paper is one of the first to describe psychosocial factors, health factors, and depressive symptoms and to investigate factors associated with

depressive symptoms among PLHIV in a relatively large sample across multiple countries. Participants were PLHIV receiving services at HIV care and treatment clinics in Kenya, Namibia, and Tanzania. The purpose of the present study is to contribute to a better understanding of the mental health and psychosocial functioning of PLHIV and subsequently inform efforts to deliver comprehensive care and support services.

Methods

Participants and Study Design

Participants were 3,538 HIV-positive patients, part of a longitudinal group-randomized HIV prevention intervention trial, and were randomized at the clinic level. Participants were recruited from 18 HIV care and treatment clinics (approximately 200 per clinic, 3 clinics per country, three control and 3 intervention sites) in Kenya, Namibia, and Tanzania. The current analyses used only baseline data. Baseline data collection began in October 2009 and was completed in all countries by April 2010. Inclusion criteria for participation were: being HIV-positive, receiving care at the study clinic at least twice prior to enrollment, being at least 18 years old, having vaginal and/or anal sex within the past 3 months, and planning to attend the clinic for at least 1 year. Participants also had to be able to complete an interview in English (Kenya, Namibia, and Tanzania), Kiswahili (Kenya and Tanzania), Oshiwambo (Namibia), or Afrikaans (Namibia). Since family planning counseling and pregnancy were intervention outcomes, pregnant women and male partners of pregnant women were excluded.

Informed consent and a questionnaire that took approximately 1 h were administered individually by a trained interviewer. Information from participant medical charts also was collected by trained study staff. More detailed information regarding the study design and methods is provided in a previous paper (Kidder et al. 2013).

Measures

Sociodemographic Variables—Sociodemographic variables included country, gender, age, marital status (married/living together, single/never married, separated/divorced, and widowed), number of children, and paid work during the past 6 months. Participants also were asked about their partner's HIV status (HIV-positive, HIV-negative, or unknown) for each of their sexual partners in the previous 3 months. For these analyses, data from the most recent spouse or main partner were used, and if the participant had no spouse or main partner, data for the most recent non-main partner were used.

Health Status—Variables extracted from each patient's medical charts included their most recent CD4 count (cells per cubic millimeter), time since HIV diagnosis (years), whether patients were taking ARVs (yes/no), and number of clinic visits during the past 6 months.

HIV Medication Adherence—Participants were asked whether they had missed any dose of their current HIV medications (ARVs and/or cotrimoxazole) in the past 30 days (Chesney et al. 2000; Reynolds et al. 2007). Participants were categorized as not on HIV medications, 100 % adherent, or not completely adherent (missed any doses during the past 30 days).

Alcohol Use—The Alcohol Use Disorders Identification Test (AUDIT) is a ten-item screening measure that assesses alcohol use during the past 6 months and identifies individuals with alcohol problems or alcohol use disorders (Babor et al. 2001; Reinert and Allen 2007). The AUDIT has been widely used in a variety of settings throughout sub-Saharan Africa (Kalichman et al. 2006; Luchters et al. 2011; Nakimuli-Mpungu et al. 2012; Peltzer and Ramlagan 2009; Zetola et al. 2012). Most items use a five-point Likert scale from 0 (never) to daily or almost daily (4), and total AUDIT scores range from 0 to 40. Based on the total score, participants are categorized into the standard AUDIT categories: non-drinker (0), non-problem drinker (less than 8), harmful drinker (8 or more), or likely dependent on alcohol (13 or more for women, 15 or more for men; Johnson et al. 2013).

Social Support—Perceived availability of social support was assessed by eight dichotomous (yes/no) questions on whether participants had sources of physical, emotional, and financial support. Each “yes” response was coded as “1” and the eight item scores were summed to create a total score, with increasing scale scores indicating greater levels of perceived availability of social support.

Disclosure—Participants reported the total number of household members to whom they had disclosed their HIV status. This continuous variable was included in the regression model examining factors associated with depressive symptoms. Additionally, for descriptive purposes, separate questions assessed the overall total number of individuals to whom they had disclosed their HIV status as well as whether they had disclosed to a parent, child, any relative, friend, spouse, and any sex partner (yes/no). Finally, concerns regarding disclosure were assessed, including fear of partner violence, losing friends, stigma, or others gossiping.

Violence—Three items assessed whether participants experienced physical or sexual violence (a) during their lifetime and (b) during the past 6 months. Questions on violence for each time period asked: whether any of their current partners had hit, slapped, kicked, or done anything else to hurt them physically; whether anyone else had hurt them physically; and whether anyone had forced them to have sexual intercourse or perform other sexual acts. Participants responding “yes” to any one of the three questions were categorized as experiencing violence either over their lifetime and/or during the past 6 months.

Physical and Mental Well-being—The SF-8 (Ware et al. 2001) is an eight-item measure that assesses overall health-related well-being. The items measure general health, physical functioning, role limitations due to physical health problems, bodily pain, energy/fatigue, social functioning, psychological distress and well-being, and role limitations due to emotional problems (Turner-Bowker et al. 2003; Ware et al. 2001). Items are weighted to create physical component summary (PCS) and mental component summary (MCS) scores. The SF-8 is population-normed in the USA with scores ranging from 0 to 100, a mean of 50, and a standard deviation of 10. The SF health surveys have been widely used in multiple settings, including in Africa (Roberts et al. 2008; Roberts et al. 2010; Ware et al. 2001). Cronbach’s alpha for the present study was .87.

Depressive Symptoms—The Center for Epidemiologic Studies–Depression (CES-D) Scale is a 20-item measure used to identify depressive symptoms that the individual

experienced during the past week (Radloff 1977). Items assess symptoms such as depressed mood, feelings of guilt, feelings of worthlessness, feelings of helplessness, loss of appetite, and sleep difficulties. Participants use a four-point scale that ranges from 0 (rarely) to 3 (most days, 5–7 days). Total scores range from 0 to 60, with increasing scores indicating greater self-reported depressive symptomatology. Specifically, scores between 16 and 26 suggest mild depressive symptomatology. Scores greater than 27 suggest severe depressive symptoms and are indicative of being at risk for major depression (Ensel 1986; Zich et al. 1990). The CES-D has been well validated and used in Africa with HIV-positive individuals (Farley et al. 2010; Kaharazu et al. 2006; Myer et al. 2008; Nakasujja et al. 2010). Cronbach's alpha for the present study was .89.

Data Analyses

Descriptive statistics (means and standard deviations for continuous variables and frequencies for categorical variables) were computed for all variables prior to fitting models to check distributional assumptions and assess for missing data. Mixed model regression was used for all analyses, with a random effect for clinic to adjust variances appropriately for correlation of patients within clinics. SAS PROC MIXED was used to fit a linear mixed model for age, and SAS PROC GLIMMIX was used to fit a generalized linear mixed model for paid work.

Associations between the outcome variables of interest and sociodemographic, clinical, and psychosocial variables were examined in unadjusted models and models adjusting for all covariates of interest, with all models containing a random effect for clinic. SAS PROC MIXED was used to fit models (SAS Institute Inc 2008) and if the two-tailed p value was less than 0.05, the regression coefficient was considered significantly different from 0. The model estimated one covariance parameter, common to all clinics, and degrees of freedom were computed using the containment method. Variables for each model were selected based on the literature and in an effort to reduce multicollinearity.

Results

Sociodemographics

A total of 3,538 participants were included in the analyses: 2,054 (58.1 %) were females and 1,484 (41.9 %) were males (see Table 1 for all participant characteristics). The mean age for participants was 37.2 years, and women were younger (M=34.6) than the men (M=40.8, t=23.06, p<.0001). The majority of participants reported being married or living with a main partner (61.4 %). Nearly half of participants reported that their spouse or most recent partner was HIV-positive (47.6 %), but 33.4 % reported that they did not know their partner's HIV status. Most of the participants reported having children (90.4 %) with an average number of approximately 3 (SD=2.1). Only 44 % reported any paid work during the past 6 months, with men significantly more likely to report paid work than women (55 vs. 37 %, p<0.0001).

Health Status

Twenty-six percent of participants reported that they were diagnosed with HIV less than 1 year prior, whereas 31 % had been diagnosed 3 or more years ago. On average, participants

knew their HIV diagnosis for approximately 2 years (SD=2). Approximately 24 % of participants had a CD4 count less than 200 cells/mm^3; 30 % had CD4 counts between 200 and 349 cells/mm^3, and the median CD4 count was 348 (IQR=210–504) cells/mm^3. Patients with CD4 counts ≤350 were eligible for ARVs. Eighty-eight percent of participants reported taking HIV medications (ARVs and/or cotrimoxazole), and 64 % were taking ARVs. Of the patients who were taking HIV medications, 82.6 % reported that they adhered completely (100 %) to their medication schedule during the past 30 days. Finally, when examining perceptions of physical health, the average score on the SF-8 PCS score was 50.9 (SD=8.4), which indicated average levels of physical functioning.

Psychosocial Functioning

Overall, participants reported relatively high levels of social support, with an average score of 6 (SD=2.1) out of 8. For example, the majority of participants reported having someone to contact for a personal problem (85.8 %), someone for support and guidance (75 %), and someone to take care of them if they were in bed for a few weeks (86.3 %). For those who had children, 82.2 % reported that someone could take care of their children if they became sick. Over half of participants reported knowing someone from whom they could borrow money for small, immediate help (57.2 %) or for a medical emergency (52.6 %). In terms of disclosure, 95 % reported that they had disclosed their HIV status to someone, and approximately 82 % reported disclosing to a household member. Among those who disclosed, 49 % reported disclosing to a parent, 22 % to a child, 64 % to any relative, 39 % to a friend, 62 % to a spouse, and 31 % to any sex partner. Among all participants, some of the most common concerns of how others would react or what would happen if they disclosed their HIV status included people gossiping (36.4 %), losing friends (19.3 %), and having their family treat them differently or not respect them (7 %). Of note, 41.8 % of participants reported no concerns about how others would react if their HIV status was disclosed, and only 1.2 % reported concerns about potential partner violence.

Lifetime physical or sexual violence was reported by 22.5 % of participants, with 8.5 % reporting physical or sexual violence in the past 6 months. Among those who reported violence in the past 6 months, 50.3 % reported physical violence by a partner, 38.1 % reported physical violence by someone else, and 27 % reported sexual violence.

In terms of alcohol use, the majority of the sample reported not drinking alcohol during the past 6 months (80.1 %). Among the 20 % of participants (*N*=702) who consumed alcohol, 71 (10.1 %) participants were likely dependent on alcohol, 113 (16.1 %) were harmful drinkers, and 518 (73.8 %) were non-problem drinkers.

Depressive Symptoms

The average score on the CES-D was 11.5 (SD=10.8; Table 1). Approximately 28 % of participants obtained a score of 16 or above on the CES-D, indicating depressive symptomatology. More specifically, 16 % of the overall sample reported mild depressive symptoms (score of 16–26) and 12 % of the overall sample reported severe symptoms (score ≥27). When examining depressive symptoms by gender, 32 % of female participants reported depressive symptoms; 18 % reported mild depressive symptoms and 14 % reported

severe symptoms. Twenty-two percent of male participants reported depressive symptoms; 13 % reported mild depressive symptoms and 9 % reported severe depressive symptoms. When examining perceptions of their mental health, the average SF-8 MCS score was 52 (SD=8.6), which indicated average levels of mental well-being when compared to the normed population.

After adjusting for all covariates, several factors were independently associated with depressive symptoms. As shown in Table 2, being female and younger age were associated with greater levels of depressive symptoms. Participants who did not completely adhere to their HIV medication schedule and who reported poorer physical functioning (as measured by the SF8-PCS) also reported greater depressive symptoms. Additionally, participants who were likely dependent on alcohol were more likely to report greater depressive symptoms than those who were non-drinkers. Experiences of violence during the past 6 months and low social support also were associated with greater depressive symptoms. Participants who reported disclosing to three or more people reported greater depressive symptoms when compared to participants who disclosed to one person. Finally, participants from Kenya and Namibia were more likely to report depressive symptoms than those from Tanzania.

Discussion

This multi-country study is one of the first studies to examine gender, age, health and psychosocial factors, and their associations with depressive symptoms reported by PLHIV who were receiving care and treatment services. Although participants generally reported high levels of social support and disclosure, a relatively smaller percentage of PLHIV reporting poor psychosocial functioning (e.g., alcohol use, experiences with violence) and greater depressive symptoms. Overall, 16 % of participants reported mild depressive symptoms, and 12 % reported severe symptoms. Additionally, 32.1 % of women reported depressive symptoms, with 14 % reporting severe symptoms, and 22 % of men reported depressive symptoms, with 9 % reporting severe symptoms. For comparison, in a recent study, approximately 14 % of men and 21 % of women among the general population reported depressive symptoms in the mild to significant range using the CES-D in sub-Saharan Africa (Nduna et al. 2010). This indicates that over a quarter of PLHIV in this sample may be in need of assistance to address their depressive symptoms, with women reporting greater depressive symptoms.

The findings also revealed a number of medical/health and psychosocial factors that were associated with depressive symptoms. Consistent with previous research, participants who were female, did not completely adhere to their medication schedule, were likely dependent on alcohol, and experienced less social support were more likely to report that they experienced greater depressive symptoms (Brandt 2009; Collins et al. 2006; Freeman et al. 2007; Gonzalez et al. 2011; Longmire-Avital et al. 2012; Nakimuli-Mpungu et al. 2012). These findings provide a clearer picture of some of the issues that PLHIV may be experiencing. These factors also are important because they can significantly impact physical functioning and, in turn, likely affect morbidity and mortality among PLHIV. Therefore, it may be important to intervene with patients who experience one or more of these issues.

An unexpected finding was that disclosure of HIV status to three or more people as opposed to disclosure to one person was associated with greater depressive symptoms. It is possible that individuals experiencing greater levels of depressive symptoms disclosed their HIV status to more people because they were seeking support to help them cope with the negative thoughts and feelings they were already experiencing (Freeman et al. 2007). On the other hand, it also is possible that disclosure to more people may have been associated with stigma, feelings of isolation, and having limited supported to cope with their illness (Greeff et al. 2008), which may have led to greater levels depressive symptoms. Therefore, when discussing disclosure with PLHIV, it is important to consider other contextual factors that may be associated with non-disclosure and to address those issues with PLHIV. Overall, the findings suggest that depressive symptoms are associated with multiple psychosocial and health-related factors, which are often intertwined and can impact both the health and well-being of PLHIV (Meyer et al. 2011).

There were some limitations to this study. Data were cross-sectional; therefore, causal and temporal associations cannot be assessed. Bidirectional relationships may exist and some of the predictors of depressive symptoms also may be outcomes. With the exception of some data from patient medical charts, self-report data were used. As a result, the data were potentially subject to recall biases and socially desirable responses. Finally, since the clinics and participants were not selected randomly, the results may not generalize to all PLHIV in these three countries, particularly to PLHIV who are not receiving care and treatment services.

Given the impact mental well-being can have on physical health (Collins et al. 2006; Lawler et al. 2011; Makoae et al. 2005), it is important that PLHIV receive comprehensive care and treatment services that address all of their health needs. The current study indicates that a considerable number of PLHIV were experiencing mild to severe levels of depressive symptoms and poorer psychosocial functioning and should be identified for appropriate services. Primary health care providers can be trained to screen for mental health issues and to refer and link patients to appropriate clinic and community services (Freeman et al. 2005). Task shifting, or delegating responsibilities from more highly trained staff to other health staff (e.g., health care providers to nurses or nurses to lay counselors), increases access to important services, increases efficiency, and is cost-effective (Zachariah et al. 2009). For psychosocial issues around disclosure, alcohol use, adherence, and social support, peer educators or lay counselors can be trained to provide these services within clinic settings. Support groups within clinics also provide an avenue for PLHIV to increase their social support and discuss issues with others who may be having similar experiences. Additionally, support groups for adherence and alcohol use may be useful in providing necessary support, particularly in settings where there may be a limited number of lay counselors or peer educators and individual services may not be feasible. However, for more serious mental health issues (e.g., trauma, serious psychiatric disorders) referrals to mental health counselors or social workers would be more appropriate.

Limited training of providers in mental health issues, high volume clinics, and limited staff and other resources pose challenges to providing comprehensive services to PLHIV (Breur et al. 2011; Jenkins et al. 2010). It may be difficult to justify the provision of mental health

services in resource-limited settings in which there may be competition and greater perceived need for other services (Jenkins et al. 2010; Remien and Mellins 2007). However, findings from the present and earlier studies findings have highlighted the importance of addressing psychosocial and mental health issues among PLHIV (Collins et al. 2006; Lawler et al. 2011; Makoae et al. 2005; McInerney et al. 2008; Remien and Mellins 2007), which in turn may impact their physical functioning and overall quality of life. Participants in Tanzania were less likely to report depressive symptoms. Further research is needed to have a better understanding of these differences.

In conclusion, ongoing psychosocial issues and depressive symptoms may contribute to poor adherence to ARVs and overall poor health and as a result may have a role in determining the success of care and treatment services in resource-limited settings (Collins et al. 2006). With increased access to treatment, it is important to screen PLHIV for mental health issues and to integrate psychosocial and mental health services into care and treatment so that issues regarding adherence, alcohol reduction, coping skills, and overall psychosocial support can be addressed, if needed. It is possible that early detection of psychosocial challenges and depressive symptoms as well as support services for PLHIV could help improve the overall quality of life for PLHIV.

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Table 1

Demographics, health status, psychosocial well-being and depressive symptoms of participants

	N **(%) or** ***M*** **(SD)**
Demographics	
Country	
Kenya	1,156 (32.7 %)
Namibia	1,186 (33.5 %)
Tanzania	1,196 (33.8 %)
Age (years)	37.2 (8.4)
Gender	
Male	1,484 (41.9 %)
Female	2,054 (58.1 %)
Marital status	
Married/living together	2,171 (61.4 %)
Single, never married	781 (22.1 %)
Separated/divorced	359 (10.2 %)
Widowed	225 (6.4 %)
Partner's HIV status	
HIV−	652 (19.1 %)
HIV+	1,624 (47.6 %)
HIV unknown	1,139 (33.4 %)
Health status	
Medication adherence	
Not on HIV meds	420 (11.9 %)
On meds and not adherent	542 (15.3 %)
On meds and 100 % adherent	2,575 (72.8 %)
Most recent CD4	
<200	828 (23.7 %)
200–349	1,037 (29.6 %)
350–500	797 (22.8 %)
≥501	838 (23.9 %)
Time since HIV diagnosis	
<1 years	925 (26.2 %)
1 to <2 years	807 (22.8 %)
2 to <3 years	723 (20.5 %)
≥3 years	1,081 (30.6 %)
Number of clinic visits, past 6 months	
1–2	944 (26.8 %)
3–4	1,361 (38.6 %)
5–6	998 (28.3 %)
≥7	225 (6.4 %)
Mean SF8-Physical Component Summary Score	50.9 (8.4)

	***N* (%) or *M* (SD)**
Psychosocial factors and depressive symptoms	
Alcohol use, past 6 months	
Non-drinker	2,827 (80.1 %)
Non-problem drinker	518 (14.7 %)
Harmful drinker	113 (3.2 %)
Likely dependent on alcohol	71 (2.0 %)
Number of household members disclosed HIV status to	
0	629 (18.1 %)
1	1,698 (48.8 %)
2	417 (12.0 %)
≥3 people	739 (21.2 %)
Physical or sexual violence, past 6 months	
Yes	297 (8.5 %)
No	3,211 (91.5 %)
Mean social support score	
6.0 (2.1)	
CES-D mean score (SD)	11.5 (10.8)
<16 (normal)	2,552 (72.2 %)
16–26 (mild)	561 (15.9 %)
27 or greater (severe)	424 (11.9 %)
Women CES-D mean score (SD)	12.7 (11.2)
<16	1,394 (67.9 %)
16–26	368 (17.9 %)
27 or greater	292 (14.2 %)
Men CES-D mean score (SD)	9.9 (9.9)
<16	1,158 (78.1 %)
16–26	193 (13 %)
27 or greater	132 (8.9 %)

Table 2

Results of regression models examining factors associated with depressive symptoms among HIV-positive patients enrolled in care and treatment services

Correlate	Mean CES-D	Unadjusted β(95 % CI)	*p*	Adjusted β (95 % CI)	*p*
Demographics					
Country			.1031		.0002
Kenya	12.96	3.59 (0.09, 7.10)		4.56 (2.12, 7.00)	
Namibia	12.30	2.90 (−0.60, 6.41)		3.97 (1.43, 6.52)	
Tanzania	9.38	Ref		Ref	
Age (years)	—	−0.11 (−0.15, −0.07)	<.0001	−0.04 (−0.09, 0.00)	.0452
Gender			<.0001		<.0001
Female	12.70	3.01 (2.32, 3.69)		2.10 (1.36, 2.84)	
Male	9.91	Ref		Ref	
Marital status			.0004		.4009
Single, never married	12.07	0.81 (−0.14, 1.77)		0.18 (−0.82, 1.17)	
Separated/divorced	11.91	1.77 (0.59, 2.95)		0.78 (−0.42, 1.98)	
Widowed	13.59	2.34 (0.89, 3.78)		1.02 (−0.44, 2.48)	
Married/living together as married	11.06	Ref		Ref	
Partner's HIV status			<.0001		.4788
HIV+	10.81	−0.42 (−1.36, 0.52)		−0.14 (−1.01, 0.72)	
HIV unknown	12.62	1.80 (0.82, 2.78)		0.35 (−0.61, 1.32)	
HIV−	10.89	Ref		Ref	
Health status correlates					
Medication adherence[a]			<.0001		.0003
Not on HIV meds	12.80	1.41 (0.24, 2.58)		0.51 (−0.66, 1.68)	
On meds and not adherent	13.78	2.71 (1.74, 3.67)		1.87 (0.96, 2.79)	
On meds and 100 % adherent	10.85	Ref		Ref	
Most recent CD4			.5889		.8155
<200	11.94	−.24 (−1.24, 0.76)		0.18 (−0.82, 1.17)	
200–349	11.35	−0.38 (−1.32, 0.56)		0.43 (−0.47, 1.32)	
350–500	11.13	−0.69 (−1.70, 0.31)		0.14 (−0.80, 1.07)	
≥501	11.57	Ref		Ref	

Correlate	Mean CES-D	Unadjusted β(95 % CI)	*p*	Adjusted β (95 % CI)	*p*
Time since HIV diagnosis			0.0371		.7762
<1 year	12.10	0.43 (−0.52, 1.39)		0.39 (−0.56, 1.35)	
1 to <2 years	10.94	−0.60 (−1.57, 0.38)		−0.04 (−0.98, 0.89)	
2 to <3 years	10.84	−0.92 (−1.92, 0.07)		−0.01 (−0.95, 0.94)	
≥3 years	11.93	Ref		Ref	
Number of clinic visits, past 6 months			.0249		.7187
1–2	12.44	−0.35 (−2.13, 1.43)		−0.19 (−1.90, 1.51)	
3–4	10.84	−1.63 (−3.24, −0.01)		−0.56 (−2.08, 0.95)	
5–6	11.03	−1.35 (−2.93, 0.23)		−0.15 (−1.62, 1.33)	
≥7	13.75	Ref		Ref	
SF8-Physical component summary	–	−0.46 (−0.49, −0.42)	<.0001	−0.38 (−0.42, −0.34)	<.0001
Psychosocial Correlates					
Alcohol use, past 6 months			<.0001		.0008
Non-problem drinker	10.28	−1.04 (−2.03, −0.06)		−0.33 (−1.27, 0.60)	
Harmful drinker	14.54	1.76 (−0.20, 3.72)		0.54 (−1.34, 2.41)	
Likely dependent on alcohol	18.75	6.29 (3.85, 8.73)		4.58 (2.31, 6.85)	
Nondrinker	11.47	Ref		Ref	
Number household members disclosed to			<.0001		.0289
0	12.36	−0.27 (−1.41, 0.87)		−0.95 (−2.07, 0.16)	
1	10.54	−1.92 (−2.85, −0.99)		−1.02 (−1.92, −0.12)	
2	12.34	0.20 (−1.04, 1.44)		−0.27 (−0.91, 1.44)	
≥3	12.21	Ref		Ref	
Physical or sexual violence, past 6 months			<.0001		<.0001
Yes	18.71	7.52 (6.31, 8.73)		4.40 (3.22, 5.59)	
No	10.87	Ref		Ref	
Social support	–	−1.48 (−1.65, −1.32)	<.0001	−1.08 (−1.25, −0.92)	<.0001

A total of 3,098 of 3,538 (87.6 %) participants had complete data on all variables and were included in the adjusted regression model.

[a]HIV medications include ARVs and/or cotrimoxazole