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Persons Newly Diagnosed with HIV Infection are at High Risk for Depression and Poor Linkage to Care: Results from the Steps Study

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Abstract

Little is known about the prevalence and impact of depression in persons newly diagnosed with HIV infection. The Steps Study is a prospective, observational cohort study of persons newly diagnosed with HIV infection. Participants were administered a battery of instruments, including the CES-D. Linkage to care was defined as attending at least one clinic appointment in each of the first two 90-day intervals following diagnosis. Of 180 participants, 67% screened positive for depression. In multivariate analysis, depression was associated with female sex, income <\$25,000, recent substance abuse, baseline poor access to medical care, and low self-efficacy. Fifty-six and sixty-eight percent of depressed and not depressed participants linked to care, respectively. In multivariate analysis, depression was a borderline significant predictor of poor linkage. Depression is very prevalent in persons newly diagnosed with HIV infection. Interventions targeting linkage to care should address depression, substance abuse, and barriers to care.

Keywords

HIV/AIDS; Depression; Cohort study; Adherence; Linkage to care

Introduction

Co-morbid psychiatric conditions, particularly substance abuse and depression, have been long recognized in HIV [1]. Reports on the actual prevalence of depression in HIV-infected persons have varied widely, from 22 [2] to 71% [3]. A meta-analysis found that the prevalence of depression in HIV-positive persons is twice that of seronegative controls [4].

Understanding co-morbid depression is of clinical importance, as depressed HIV-infected patients have lower rates of initiation of antiretroviral therapy (ART) [5] and medication adherence [6–11], though the latter is not consistently reproduced in all studies [2,12]. Even when controlling for adherence to ART, depression is a risk factor for both HIV viral load increase and CD4 cell count decline [9,13].

In addition, depression has been associated with increased all-cause and HIV-related mortality [14–16], especially in patients with end stage HIV disease [17–19]. Increased mortality is reported both dependent [20] and independent [17] of adherence to ART, implicating another confounding process (i.e., substance abuse) [21] or depression itself in disease progression. Conversely, positive affect is associated with increased survival independent of somatic symptoms [22].

Depression also has public health importance, as it is associated with increased HIV transmission behaviors. Increased risky sexual practices [23–26], including unprotected sex by those harboring treatment resistant strains [27], and needle sharing for intravenous drug use (IDU) [24] have been associated with depression.

Depression can be effectively treated, and the use of antidepressant therapy and mental health services are correlated with ambulatory health care visits [28], increased initiation [5] and utilization [7,9,29,30] of ART, and reduced mortality [17].

In contrast to studies on medication adherence and disease progression, there are few reports on the effects of depression on linkage to or retention in HIV care, despite literature demonstrating that these are important for improved outcomes [31,32]. Most studies focus on depression in outpatients already in the process of establishing care, i.e., at ART initiation [20,33] or first primary care visit [3,34,35]. The Attitudes and Beliefs and the Steps of HIV Care Study (referred to as the Steps Study) is to our knowledge the first prospective, observational study to describe a diverse cohort of persons newly diagnosed with HIV infection but as yet not linked to care. In this report, we used baseline data from the Steps Study to examine the prevalence and correlates of depression at the time of diagnosis, focusing on factors known to predict poor linkage and retention in HIV care. We then assessed the relationship between depression and clinic attendance over the first 180 days after diagnosis, with the hypothesis that depression would be associated with poorer linkage into HIV care.

Methods

Design

The Steps Study is a longitudinal, multicenter, prospective observational cohort study of persons newly diagnosed with HIV infection in Houston, Texas. Univariate and multivariate analyses were undertaken to determine the correlates of depression at baseline and then to determine the effect of depression and other baseline characteristics on successful linkage to outpatient HIV primary care.

Sample

Inclusion criteria were: age greater than 18 years; ability to speak either English or Spanish; first notification of HIV infection within the past 90 days; and not having completed a regularly scheduled outpatient primary care visit for HIV infection at the time of enrollment. Persons with dementia, active psychosis, or other conditions precluding accurate completion of the survey or informed consent were excluded. Participants were enrolled from January 2006 to September 2007 from the site of HIV diagnosis. Sites of recruitment were public facilities primarily serving indigent, uninsured patients in Houston, Texas. Inpatients were recruited from the Ben Taub General Hospital, the Lyndon B. Johnson General Hospital, and the Michael E. DeBakey Veterans Affairs (VA) Medical Center. Sites of outpatient enrollment were the VA outpatient clinics, the Ben Taub General Hospital Emergency Room, Harris County Hospital District Community Health Centers, and the City of Houston's sexually transmitted diseases clinics.

Measures

A battery of validated, interviewer-administered instruments was given to participants upon enrollment to measure depression and its correlates.

Depression—The Center for Epidemiologic Studies Depression Scale (CES-D) contains 20 questions about depressive symptoms within the last week, with responses ranging from 0 (rarely/none of the time) to 3 (most of the time). The maximum score is 60, and scores greater or equal to 16 signify high risk for depression [36]. In a community sample, approximately 21% of participants screened positive [36] with a sensitivity and specificity of 87.5 and 73%, respectively [37]. The CES-D has been successfully validated against the gold standard of clinical interview in chronically ill [38] and marginalized [39] populations and has been used extensively in HIV-infected persons [17,19,40,41]. Prior studies using this scale in HIV-infected cohorts have excluded five questions assessing somatic complaints (fatigue, poor appetite, restless sleep, lack of energy, and poor concentration) [19,40,41], as these may be symptoms of HIV itself or its medical co-morbidities and therefore artificially inflate the depression scores [42]. We have termed this abbreviated survey the CES-D 15 and conservatively retained a cut-off of 16 when calculating confirmatory analyses for depression correlates.

Correlates of Depression—Demographic information, history of substance use in the preceding 6 months, need for medical care in the last 6 months, and access to care were assessed in the structured interview using items from the HIV Cost and Services Utilization Study (HCSUS) [43]. The access to care scale contained six items assessing self-reported difficulty accessing medical care in the past, with a six point response scale (strongly disagree to strongly agree) and possible scores range from 6 to 36. The CAGE screen was used to determine the prevalence of heavy alcohol use, and a positive response on any two of the four items was considered positive [44]. To measure self-efficacy, we utilized The Measurement Group/Special Projects of National Significance (SPNS) survey [45]. The Medical Outcomes Study (MOS) instrument was used to assess social support [46]. Trust in physicians was measured using the Wake Forest Physician Trust Scale developed by Hall et al. [47]. Trust in the health care system was measured with an instrument modified from the Patient Attitudes Concerning Trust (PACT) scale originally developed by O'Malley et al. [48]. Our 4-item survey had a Cronbach's alpha of 0.86 (raw score alpha = 0.86).

Surveys on appointment-related barriers to care and perceived benefits of care were locally developed, pilot tested, and validated by our group. Appointment-related barriers to care were assessed using a 6-item scale, with responses ranging from 1 (strongly agree) to 6 (strongly disagree) and total score ranging from 6 to 36. These items functioned well as a

scale, with a standardized Cronbach's alpha of 0.70 (raw score, 0.68). Perceived benefits of care were assessed using a 5-item that employed a 6-point "strongly agree" to "strongly disagree" (1–6) response scale, recoded to create total scores ranging from 5 to 30, with higher scores reflecting greater perceived benefits of care. This scale's items functioned internally consistently, with a Cronbach's alpha of 0.76.

Scores for most constructs were split at the scale's theoretical or absolute midpoint, i.e., at the midpoint in the range of possible scores. Access to care, trust in physicians, and trust in the healthcare system scores were considered "low" if they were below the midpoint in the possible range of scores while appointment-related barriers to care scores were considered high if they were above the mid-point. Similarly, social support scores were normalized to a 0-to-100 scale and dichotomized at 50. Perceived benefits of treatment scores were generally high, so we considered a score low if <20 , which corresponds to an average response of "somewhat agree" or lower. Self-efficacy scores were dichotomized at the median observed score in our dataset because a ranking relative to others in the study population was deemed more appropriate since this construct is completely attitudinal.

Linkage to HIV Care and Medical Record Review—Participants were surveyed every 3 months in follow-up to determine if and where they entered medical care. Participants were contacted between these interviews to confirm continued enrollment and update contact information. Participants' self-reported clinic attendance over the first 180 days after diagnosis was confirmed by medical record review. We searched for clinic attendance for all participants, regardless of whether they completed follow-up interviews, in four of the five public HIV clinics in Houston, which account for about 60% of the HIV primary care in Houston, and 90% of the HIV primary care for uninsured patients in the area. Successful linkage to care was defined as one clinic visit according to medical record review during each of the first two consecutive 90-day periods following diagnosis of HIV infection. CD4 cell counts at the time of diagnosis were obtained through medical record review.

Hypothesis Testing and Data Analysis

Data were double entered by research personnel. Univariate analyses utilizing chi-square testing were used to investigate associations between depression and characteristics of the cohort. Similar analyses investigated associations between linkage to care and depression as well as other baseline characteristics. Next, multivariate models of depression were constructed to include all variables associated with depression at a level of $P < 0.2$ in the univariate analyses. Multivariate models of linkage to care were constructed using the same approach, and depression and age were forced into the final models. The null hypothesis was rejected if the P value for the appropriate test statistic was <0.05 .

All data were analyzed using SAS (SAS Version 9.2, SAS Institute, Cary, North Carolina, USA). The study design was approved by the Institutional Review Boards of Baylor College of Medicine and The University of Texas Health Science Center at Houston. All participants provided written informed consent, including consent for medical record review for 2 years following study enrollment.

Results

Description of the Cohort

The target enrollment for the study was 200 participants. Two hundred thirty-nine persons were approached for enrollment before 200 agreed to participate. The 39 persons who declined enrollment were similar in age, sex, race/ethnicity, and site of diagnosis to the 200 enrolled participants (data not shown). Of the 200 enrolled participants: 12 were excluded

because they were found to have a false positive rapid HIV test ($n = 5$); had a diagnosis of HIV older than 90 days ($n = 4$) upon medical record review; had already linked to care ($n = 2$); or were transferred outside of Houston for medical care ($n = 1$). Of the 188 eligible participants, three withdrew consent and one died before completing the baseline survey. Four in the group that completed the baseline survey did not complete the CES-D, leaving 180 participants in the present analyses; 81% were enrolled within 1 month of notification of HIV serostatus.

Participants ranged in age from 18 to 70 years (mean 38, SD, 11). Females comprised 32% of the cohort (Table 1). The majority of participants were from racial/ethnic minority backgrounds, with 51% non-Hispanic Black, 39% Hispanic, and 10% non-Hispanic White. Approximately half of the respondents had not completed high school and was unemployed, while two-thirds earned <\$15,000 per year. The majority of the cohort was uninsured. The pre-dominant HIV risk factor was heterosexual sex (60%), followed by men who had sex with men (MSM) (32%) and IDU (8%).

Forty-one percent of participants were recruited while hospitalized, while the remainder was recruited from out-patient facilities or the ER. At baseline, approximately half had CD4 cell counts of $200 \times 10^6/l$ or less. A substantial proportion (39%) of participants reported some illicit drug use in the last 6 months, primarily use of marijuana (26%), cocaine (21%), and/or pain medication or sedatives (15%). The CAGE alcoholism screen was positive in 24% of the cohort.

Depression Prevalence and Correlates in Univariate Analyses

Using the 20-item CES-D scale, 67% of participants screened positive for depression. Eliminating the five somatic items from the CES-D and retaining the same cut-point at 16 resulted in a prevalence of 45%.

In the univariate analyses, depressed participants were more likely to be women ($\chi^2 = 4.2$, $P = 0.04$) and report unemployment ($\chi^2 = 4.9$, $P = 0.03$) and lower yearly income ($\chi^2 = 9.7$, $P = 0.008$; Table 1). There were no differences in age, race, education, insurance status, place of diagnosis, baseline CD4 cell count, or HIV risk factor between the depressed and not depressed groups.

Any drug use in the preceding 6 months was highly associated with a positive depression screen ($\chi^2 = 11.8$, $P = 0.0006$). Specifically, depressed participants were over twice as likely to report recent marijuana use ($\chi^2 = 9.7$, $P = 0.002$), four times as likely to report recent cocaine use ($\chi^2 = 11.3$, $P = 0.0008$), and almost three times as likely to report recent sedative or pain medication abuse ($\chi^2 = 4.7$, $P = 0.03$), compared to non-depressed participants. Significantly more depressed than non-depressed participants screened positive for alcoholism ($\chi^2 = 3.7$, $P = 0.05$).

At the baseline survey, self-reported low access to care was strongly associated with depressive symptoms ($\chi^2 = 14.7$, $P = 0.0001$), as was a report of needing medical care in the preceding 6 months but being unable to obtain it ($\chi^2 = 8.8$, $P = 0.003$; Table 1). Depressed participants were also significantly more likely to report barriers to appointment adherence ($\chi^2 = 7.5$, $P = 0.006$). Low self-efficacy ($\chi^2 = 10.7$, $P = 0.001$) and social support ($\chi^2 = 4.3$, $P = 0.04$) were twice as prevalent in the depressed cohort compared to the non-depressed cohort. Levels of trust in the health care system and physicians and perceived benefits of care were similarly high in both groups. Univariate analyses of depression correlates using the abbreviated CES-D yielded similar results (data not shown).

Multivariate Model of Depression

The multivariate logistic regression model of depression included age, gender, education, income, employment status, HIV risk factor, CD4 cell count, alcohol use, substance abuse, unmet need for medical care in the last 6 months, access to care, barriers to adherence to appointments, self-efficacy, and social support (Table 2). Strong associations between depression and female sex (adjusted odds ratio [OR] 5.71, 95% CI 1.76, 18.5; Wald $\chi^2 = 8.4$, $P = 0.004$), any substance abuse in the last 6 months (adjusted OR 3.93, 95% CI 1.49, 10.3, Wald $\chi^2 = 7.7$, $P = 0.006$), low access to care (adjusted OR 4.69, 95% CI 1.48, 14.9, Wald $\chi^2 = 6.9$, $P = 0.009$), and low self-efficacy (adjusted OR 3.05, 95% CI 1.22, 7.63, Wald $\chi^2 = 5.7$, $P = 0.02$), were seen. Income $\geq$ \$25,000 per year (adjusted OR 0.28, 95% CI 0.09, 0.88, Wald $\chi^2 = 4.7$, $P = 0.03$), and baseline CD4 cell count between 201 and 350 cells $\times 10^6/l$ (adjusted OR 0.26, 95% CI 0.08, 0.79, Wald $\chi^2 = 5.6$, $P = 0.02$, compared to ≤ 200), were protective of a positive screen for depression. Analyses of the correlates of depression in the multivariate model using the CES-D 15 yielded similar results for gender, barriers to appointment adherence, and self-efficacy, though in the multivariate analysis income was no longer statistically significant (adjusted OR 0.69, 95% CI 0.21, 2.26, Wald $\chi^2 = 0.4$, $P = 0.54$). CD4 cell count between 201 and 350 cells $\times 10^6/l$ (adjusted OR 0.37, 95% CI 0.12, 1.17, Wald $\chi^2 = 2.8$, $P = 0.09$, compared to ≤ 200), alcohol abuse (adjusted OR 2.39, 95% CI 0.85, 6.74, Wald $\chi^2 = 2.7$, $P = 0.10$), substance abuse (adjusted OR 2.10, 95% CI 0.87, 5.06, Wald $\chi^2 = 2.7$, $P = 0.10$), and low social support (adjusted OR 2.33, 95% CI 0.88, 6.25, Wald $\chi^2 = 2.9$, $P = 0.09$), were of borderline significance.

Linkage to Care Analyses

During the first 180 days after diagnosis, 60% of the original cohort of 180 participants linked into HIV care (Table 3). There was a trend toward poorer linkage in the depressed group, as only 56% of the depressed participants were linked to care compared to 68% of the non-depressed participants, though this result was not statistically significant ($\chi^2 = 2.6$, $P = 0.11$). In the univariate analysis, variables significantly associated ($P < 0.05$) with successful linkage to care included employment and poor self-efficacy, while the other factors listed in Table 1 were not significant. In a multivariate model that also included age, gender, employment status, and self-efficacy, depression remained a borderline predictor of unsuccessful linkage to care (adjusted OR 2.00, 95% CI 0.96, 4.14, Wald $\chi^2 = 3.5$, $P = 0.06$), as did unemployment (adjusted OR 1.78, 95% CI 0.92, 3.43, Wald $\chi^2 = 3.0$, $P = 0.09$), while high self-efficacy (adjusted OR 2.72, 95% CI 1.39, 5.31, Wald $\chi^2 = 8.6$, $P = 0.003$) also predicted unsuccessful linkage. Thirty-six of the 180 participants were unable to be contacted or verified as alive and still in the Houston area at 180 days after enrollment, including 11 participants who were known to be deceased, two who withdrew consent after completing the baseline survey, and 23 who were lost to follow-up. Analyses using data from the remaining 144 persons revealed a similar relationship, with 68% of the depressed group versus 78% of the non-depressed group successfully linking into care ($\chi^2 = 1.8$, $P = 0.17$). The multivariate model in this sub-population was similar: depression was a borderline predictor of poor linkage to care (adjusted OR 2.20, 95% CI 0.87, 5.59, Wald $\chi^2 = 2.7$, $P = 0.10$), while unemployment (adjusted OR 2.46, 95% CI 1.02, 5.97, Wald $\chi^2 = 4.0$, $P = 0.05$), and high self-efficacy (adjusted OR 4.07, 95% CI 1.67, 9.91, Wald $\chi^2 = 9.5$, $P = 0.002$) were significant predictors of unsuccessful linkage.

Discussion

In this prospective, observational cohort study, we found that at least half and as many as two-thirds of persons newly diagnosed with HIV infection and not yet linked to care screen positive for depression. Compared to the general population [36], our results confirm that newly diagnosed HIV-positive persons are 2–3 times more likely to be at high risk for

depression. In addition, depression is correlated with self-reported difficulty accessing care, known risk factors of poor follow-up (e.g., substance abuse [49]), and trends towards poorer linkage to care during the first 180 days after diagnosis. Though these last results did not reach statistical significance, the observed trend and the other study results strongly suggest that depression shortly after HIV diagnosis predicts delayed linkage to HIV care. Screening for and treating depression at the time of HIV diagnosis may improve linkage to and retention in HIV care.

Similar studies of HIV-infected persons have shown comparatively lower percentages of depressed persons, from 22 to 52% [20,33–35]. The high prevalence of depression in our cohort may be due to several factors. First, it may be reflective of other distress, such as an adjustment reaction to recent notification of seropositivity [50] or somatic symptoms from other disease processes. While one report from the pre-HAART era found that depression and adjustment disorder equally account for psychiatric morbidity in 66% of persons newly presenting to an HIV clinic [51], other literature showed only a modest increase in psychological distress immediately after notification of seroconversion (28 vs. 19%) [52], suggesting that adjustment does not play a major role in psychiatric morbidity at diagnosis of HIV infection. In addition, Savetsky et al. reported that 71% of an urban cohort were depressed a mean of 840 days after diagnosis, which is beyond the timeframe of adjustment [3]. The high prevalence of depression in that study was partly explained by distress secondary to HIV-related symptoms prompting presentation to a primary care clinic. While we did not directly measure HIV-related symptoms, we addressed somatic symptoms as a potential confounder by employing the abbreviated CES-D 15 scale, with results from this approach continuing to indicate that almost 50% of the cohort was depressed. Thus, disease-related symptoms do not appear to completely account for the high prevalence of depression observed here. Even if adjustment disorder or somatic symptoms due to other conditions were contributing to our findings, the high scores seen here still represent significant psychological distress that should be merit clinical attention, regardless of etiology.

Secondly, depression in this cohort may be explained by the preponderance of co-morbid substance abuse, a well-described correlate of depression. Indeed, approximately 40% of respondents reported recent substance abuse, and 25% screened positive for alcoholism. However, these figures on drug and alcohol use are consistent with data in other studies that found lower prevalence of depression than that seen here [53], suggesting that co-morbid substance abuse, while possibly contributing to the high prevalence of depression in this study, cannot fully explain it.

Finally, existing studies describe depression in particular subsets of persons who have already been somehow engaged in care, either at the time of initiation of ART [20,33] or at entry to outpatient HIV clinical care [34,35]. Those study designs may select for persons who are less depressed. In contrast, the high prevalence of depression seen in our cohort is a true reflection of the burden of depression experienced by newly diagnosed patients, including a contingent of patients who may significantly delay follow-up or even die without initiating proper out-patient HIV primary care. Consistent with this, we found that participants who screened positive for depression reported more trouble accessing care, a history of being unable to obtain medical care, and barriers to appointment adherence. Furthermore, in our longitudinal analyses of linkage to care, we discovered trends between depression and subsequent inadequate linkage to HIV primary care. Similar associations have been seen in cross-sectional studies among select groups, such as non-urban New England patients [26], prison inmates [54], and pregnant, rural South Africans [55], and these associations are recapitulated here in a diverse, urban cohort with prospective follow-up.

In addition to self-reported access to care issues, other risk factors for poor linkage to care are overrepresented in depressed persons in this study. Both low income and unemployment were more common in depressed persons, and unemployment was consistently predictive of poor linkage even after adjustment for depression. Gardner et al. [56] reported that patients who are retained in HIV care at 1 year are significantly more likely to have had someone helping them initiate medical care. We found that depressed participants lack social support and likely do not have such resources. Depressed participants also have lower self-efficacy, a risk factor for poor outcomes in other areas of HIV care, such as medication adherence [57]. Interventions based on improving self-efficacy, on the other hand, are significantly correlated to increases in linkage to care in newly diagnosed persons [49]. Interestingly, higher baseline self-efficacy in the Steps study population was predictive of unsuccessful linkage to care after adjustment for depression. High self-efficacy might be associated with reluctance to admit some dependence on the health care system when confronted with this life-changing diagnosis, resulting in poorer or delayed linkage to care. This finding merits confirmation in other study samples.

We found that depression is highly associated with substance abuse in both the univariate and multivariate models of depression. In particular, cocaine use was over represented in the depressed cohort, and this has been specifically identified as an independent predictor for decreased linkage to and retention in HIV care [49]. In addition to cocaine, depressed persons had significantly higher rates of other substance abuse, including marijuana, sedatives or pain medications, and alcohol. “Any substance abuse” emerged as a strong predictor of depression in the adjusted multivariate analysis. Notably, IDU is also associated with decreased initiation of HIV care [58]. Co-morbid substance abuse is intimately related to depression in the HIV-infected population and is a contributing risk factor for decreased linkage to care.

Though depressed persons are at risk for poor linkage to care, they have similarly high levels of trust in the medical system and doctors and perceived benefits of treatment as non-depressed persons. Interventions to improve linkage to and retention in care should address socioeconomic support and co-morbid substance abuse in addition to depression itself, with less focus on attitudes about HIV care.

This study has several limitations. First, the CES-D is a screening test that does not diagnose depression; however, it has been widely used and accepted in lieu of a clinical interview in the study of depression in HIV-infected persons [17,19,40,41]. Second, this was by design an observational study without an HIV-negative control group. Finally, though these results are likely generalizable to the urban, ethnically diverse patients who comprise most new HIV cases, they may not be as valid for other groups.

The majority of newly diagnosed HIV infected persons exhibit co-morbid depression and, with concurrent substance abuse and other risk factors, are at high risk for poor linkage to and retention in HIV care. Screening for depression should be undertaken at diagnosis of HIV seropositivity itself to identify persons at risk for poor follow-up and target them for unique interventions designed to bolster engagement in care. While the “triple diagnosis” of HIV, substance abuse, and mental illness [1] has been recognized in other areas of HIV management, the results here underscore the importance of and interplay between these three diagnoses in the context of linkage to care and argue for implementing a comprehensive approach to patient care as soon as possible after diagnosis of HIV infection.

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Baseline characteristics and characteristics associated with depression in univariate analyses in the Steps Study cohort of persons newly diagnosed with HIV infection in Houston, TX (n = 180)

Table 1

Characteristic	All participants (n = 180) n (%)	Not depressed (n = 60) n (%)	Depressed (n = 120) n (%)	χ^2 Value
Sociodemographic characteristics				
Age, years				1.9
18–29	51 (28)	15 (25)	36 (30)	
30–39	52 (29)	20 (33)	32 (27)	
40–49	49 (27)	14 (23)	35 (29)	
>50	28 (16)	11 (18)	17 (14)	
Gender				4.2*
Female	57 (32)	13 (22)	44 (37)	
Male	123 (68)	47 (78)	76 (63)	
Race				0.78
Black	92 (51)	28 (47)	64 (53)	
Hispanic	70 (39)	25 (42)	45 (38)	
White	18 (10)	7 (12)	11 (9)	
Education ^a				5.0
Never finished high school	80 (45)	22 (37)	58 (49)	
High school diploma or G.E.D.	49 (27)	15 (25)	34 (29)	
Any college	50 (28)	23 (38)	27 (23)	
Unemployed	99 (55)	26 (43)	73 (61)	4.9*
Income, thousands of dollars per year ^d				9.7**
0–14.9	116 (66)	32 (54)	84 (71)	
15–24.9	36 (20)	12 (20)	24 (20)	
≥25	25 (14)	15 (25)	10 (8)	
Insurance status				1.1
Uninsured	49 (27)	15 (25)	34 (28)	
Uninsured, with Gold Card ^b	105 (58)	34 (57)	71 (59)	
VA, Medicare, Medicaid, or private	26 (14)	11 (18)	15 (13)	

Characteristic	All participants (n = 180) n (%)	Not depressed (n = 60) n (%)	Depressed (n = 120) n (%)	χ^2 Value
HIV risk factor ^a				5.6
Heterosexual or other ^c	107 (60)	37 (62)	70 (59)	
MSM	57 (32)	22 (37)	35 (29)	
Injection drug use	15 (8)	1 (2)	14 (12)	
Health status measures				
Place of HIV diagnosis				1.2
Hospital (inpatient)	73 (41)	21 (35)	52 (43)	
Emergency room or outpatient clinic	107 (59)	39 (65)	68 (57)	
Baseline CD4 cell count $\times 10^6/\mu$ ^a				5.8
0–50	45 (26)	11 (19)	34 (31)	
51–200	40 (24)	15 (25)	25 (23)	
201–350	31 (18)	15 (25)	16 (14)	
351–500	20 (12)	5 (8)	15 (14)	
>500	34 (20)	13 (22)	21 (19)	
Substance abuse				
Any substance abuse in the last 6 months ^a	69 (39)	12 (21)	57 (48)	11.8**
Marijuana	47 (26)	7 (12)	40 (33)	9.7**
Cocaine	38 (21)	4 (7)	34 (28)	11.3**
Pain medications or sedatives	27 (15)	4 (7)	23 (19)	4.7*
Other agents ^d	14 (8)	1 (2)	13 (11)	4.7*
Heavy alcohol use (positive CAGE) ^a	42 (24)	9 (15)	33 (28)	3.7*
Access and barriers to care				
Needed medical care in last 6 months but could not get it	38 (21)	5 (8)	33 (28)	8.8**
Low access to care	58 (32)	8 (13)	50 (42)	14.7**
High barriers to adherence to appointments	19 (11)	1 (2)	18 (15)	7.5**
Low self-efficacy ^a	90 (51)	20 (33)	70 (59)	10.7**
Low social support ^a	50 (29)	11 (19)	39 (34)	4.3*
Low trust in the health care system	11 (6)	4 (7)	7 (6)	0.05

Characteristic	All participants (<i>n</i> = 180) <i>n</i> (%)	Not depressed (<i>n</i> = 60) <i>n</i> (%)	Depressed (<i>n</i> = 120) <i>n</i> (%)	χ^2 Value
Low trust in physicians ^a	18 (10)	6 (10)	12 (10)	0.0003
Low perceived benefits of treatment	5 (3)	1 (2)	4 (3)	0.41

^aDenominators are reflective of available data; number missing: education, 1; income, 3; HIV risk factor, 1; CD4 cell count, 10; any substance abuse, 2; pain medication or sedative abuse, 1; heavy alcohol use, 2; self-efficacy, 2; social support, 5; trust in physicians, 1

^bGold Card holders are uninsured residents of Harris County eligible for free or low-cost medical treatment in Harris County Hospital District facilities

^cIncludes HIV acquired through transfusion

^dIncludes hallucinogens, heroin, inhalants, methamphetamines, or other stimulants. Questions on substance abuse were not mutually exclusive

* 0.01 < *P* ≤ 0.05;

** *P* ≤ 0.01

Table 2

Variables associated with depression in multivariate analysis in the Steps Study cohort of persons newly diagnosed with HIV infection in Houston, TX (*n* = 158)

Characteristic	Adjusted odds ratio	95% Confidence interval	Wald χ^2 value
Age, years			
18–30	Referent	n/a	n/a
31–50	1.55	0.58, 4.18	0.7
>50	1.63	0.45, 5.95	0.5
Female gender (vs. male)	5.71	1.76, 18.5	8.4***
Education			
Never finished high school	Referent	n/a	n/a
High school diploma or G.E.D.	0.67	0.21, 2.18	0.4
Any college	0.75	0.26, 2.14	0.3
Unemployed (vs. employed)	1.54	0.65, 3.64	1.0
Income $\geq$ \$25,000 per year (vs. less)	0.28	0.09, 0.88	4.7*
MSM or IDU (vs. heterosexual or other)	2.84	0.97, 8.31	3.62
Baseline CD4 cell count $\times 10^6/l$			
0–200	Referent	n/a	n/a
201–350	0.26	0.08, 0.79	5.6*
>350	0.86	0.32, 2.37	0.08
Any substance abuse, last 6 mo. (vs. none)	3.93	1.49, 10.3	7.7**
Heavy alcohol use (positive CAGE, vs. negative)	1.48	0.49, 4.49	0.5
Needed medical care in last 6 months but could not get it	2.75	0.67, 11.3	2.0
Low access to care	4.69	1.48, 14.9	6.9**
High barriers to adherence to appointments	3.86	0.38, 40.0	1.3
Low self-efficacy	3.05	1.22, 7.63	5.7*
Low social support	1.38	0.46, 4.13	0.3

n/a Not applicable

* $0.01 < P \leq 0.05$;

** $P \leq 0.01$

Table 3

Linkage to care by depression status in the Steps Study cohort of persons newly diagnosed with HIV infection in Houston, TX ($n = 180$)

Characteristic	Not depressed $n = 60$ n (%)	Depressed $n = 120$ n (%)	χ^2 Value
Linked to care at 6 months			
Linked, all participants ($n = 180$)	41 (68)	67 (56)	2.6 ^a
Linked, participants known to be alive and in Houston ($n = 144$)	40 (78)	63 (68)	1.8 ^b

^a $P = 0.11$;

^b $P = 0.17$