BRIEF REPORT: Factors Associated with Depression Among Homeless and Marginally Housed HIV-Infected Men in San Francisco

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OBJECTIVES: To evaluate the prevalence of and factors associated with depression among HIV-infected homeless and marginally housed men.

DESIGN: Cross-sectional study.

PARTICIPANTS AND SETTING: Homeless and marginally housed men living with HIV in San Francisco identified from the Research on Access to Care in the Homeless (REACH) Cohort.

MEASUREMENTS: The primary outcome was symptoms of depression, as measured by the Beck Depression Inventory (BDI). Multivariate logistic regression was used to identify associations of sociodemographic characteristics, drug and alcohol use, housing status, jail status, having a representative payee, health care utilization, and CD4 T lymphocyte counts.

RESULTS: Among 239 men, 134 (56%) respondents screened positive for depression. Variables associated with depression in multivariate analysis included white race (adjusted odds ratio [AOR]=2.2, confidence interval [CI]=1.3 to 3.9), having a representative payee (AOR=2.4, CI=1.3 to 4.2), heavy alcohol consumption (AOR=4.7, CI=1.3 to 17.1), and recently missed medical appointments (AOR=2.6, CI=1.4 to 4.8).

CONCLUSIONS: Depression is a major comorbidity among the HIV-infected urban poor. Given that missed medical appointments and alcohol use are likely indicators of depression and contributors to continued depression, alternate points of contact are necessary with many homeless individuals. Providers may consider partnering with payees to improve follow-up with individuals who are HIV-positive, homeless, and depressed.

KEY WORDS: depression; homeless; HIV; representative payee.

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Depression is at least 3 times as likely among individuals with HIV when compared with the general population, with prevalence estimates of 36% to 37% of HIV-infected individuals.^{1,2} Depression has been linked with poor functional status³ and the necessity for third-party assistance in activities of daily living, like bill paying by a representative payee.⁴ It is also associated with poor health, decreased antiretroviral (ARV) adherence, and more rapid progression to AIDS and death among people with HIV in the United States.^{5–9} The im-

pact of depression on HIV outcomes is exacerbated by the fact that mental health services are significantly underutilized among individuals with HIV.^{2,10,11} Treating depression in HIV-infected individuals is associated with improved ARV utilization and adherence.^{10,12,13}

Homeless individuals have high rates of HIV, depression, and poor access to health services, including mental health treatment.^{14–16} While recently living on the street, previous mental health hospitalization, low education, and concurrent medical illness have been associated with depression,¹⁷ no study to our knowledge has examined correlates of depression among homeless, HIV-infected individuals. As depression can negatively impact HIV outcomes, and homeless HIV-infected patients face unique challenges to accessing care, it is important to better characterize depression in this population. We therefore estimated the prevalence of depression and associated factors in a sample of homeless and marginally housed men living with HIV in San Francisco.

METHODS

Participants, Design, and Setting

Male participants were identified from The Research on Access to Care in the Homeless (REACH) Cohort, a reproducible cohort of HIV-infected homeless and marginally housed adults recruited from San Francisco homeless shelters, free-meal programs, and single room-occupancy hotels charging less than \$600/month, as described previously.^{14,15} Recruitment took place for approximately 3 months in 1996, 1998, 2000, and 2002; only 2% of participants have been lost to follow-up each year. Structured interviews, and blood collections to assess CD4 counts and viral loads were performed on a quarterly basis for all participants. Participants were reimbursed \$15 for each interview. Written consent was obtained from all participants. The cross-sectional data presented here were collected between June 1999 and October of 2000. The Committee on Human Research at University of California, San Francisco approved all study procedures.

Measurements

The primary outcome for this study was depression, as measured by a Beck Depression Inventory (BDI) version II¹⁸ score of greater than 13. The BDI II consists of 21 items, and has been demonstrated to be a reliable and valid measure of depressive symptoms in a variety of populations.¹⁹ Beck Depression Inventory scores of 14 to 28 correspond to mild-to-moderate de-

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pression, and scores greater than 28 correspond to severe depression. The BDI has been shown to have a sensitivity of 100% and a specificity of 87% for detecting depression.²⁰

Covariates for this study included age ($>$ or $\leq$ population mean), race (white or nonwhite), income ($>$ or $\leq$ population mean), education ($>$ or $\leq$ high-school diploma), any reported history of missed medical appointments over the previous 90 days, and a lifetime history of heroine use, crack use, methamphetamine use, and incarceration. Homelessness was defined as sleeping on the street or in a shelter. Delayed highly active antiretroviral therapy (HAART) utilization was defined as not being on HAART despite meeting clinical or CD4 criteria for HAART use at the time of the interview. Heavy alcohol use was defined in accordance with the National Institute of Alcohol Abuse and Alcoholism's definition of risky drinking for men (> 14 drinks/wk). Respondents were also asked whether they had a representative payee, which refers to a third party or agency receiving all forms of income and paying bills on behalf of the client in order to help the clients manage their finances and meet their basic needs of daily living.

Analysis

Data were analyzed using the SAS statistical analysis software (SAS Institute, Cary, NC, Version 8). Multiple logistic regression was used to determine factors associated with a BDI score > 13 . Independent variables were deleted from the model using a backward stepwise approach. As recommended by Hosmer and Lemeshow,²¹ each variable with a P value $\leq .25$ in bivariate analysis was entered into the model. Variables with an adjusted P value $\leq .05$ were retained in the final model. To ensure that BDI scores in the depression range were not a result of HIV somatic symptoms, analyses were also conducted using only the cognitive/affective portions of the BDI. As results did not differ when using this modified measure, we present re-

sults for the full BDI. Regression diagnostic procedures yielded no evidence of colinearity.

RESULTS

Beck Depression Inventory scores were available for 239 of the 279 male REACH participants. The remainder either died ($n=17$), were lost to follow-up ($n=9$), or did not complete the interview ($n=14$). Two participants had 1 missing response from the BDI, which were replaced by the individual's mean responses across the remaining questions. Among the 239 study participants, 43% were white, 35% had completed high school, and the mean age was 41.6 (SD 8.68) (Table 1). Over 75% of respondents reported a history of drug use, and 74% reported a history of incarceration.

Of the 239 participants, 101 (42%) had BDI scores from 14 to 28, consistent with mild-to-moderate depression, and 33 (14%) had BDI scores > 28 , consistent with severe depression. There were no significant differences in baseline HIV risk behavior profiles between depressed and nondepressed individuals.

In unadjusted analyses, the odds of screening positive for depression were almost twice as high for white respondents and those older than 42 years of age. The odds of depressive symptoms were approximately twice as high among those who had a representative payee, and more than twice as high for those who missed medical appointments or reported a history of homelessness. Individuals who reported heavy alcohol consumption had nearly 5 times the odds of screening positive for depression (Table 2). In adjusted analyses, white race, heavy alcohol consumption, having a representative payee, and missing medical appointments maintained strong associations with depression. Drug abuse variables including a history of crack, heroin, and methamphetamine abuse were not significantly associated with depression when looked

Table 1. Characteristics of Homeless and Marginally Housed HIV-Infected Men in the San Francisco REACH Cohort[†]

Characteristic	All Participants, N=239	Depressed Participants, [‡] N=134 (56.1%)	Nondepressed Participants, [§] N=105 (43.9%)
Age (mean, SD)	41.6 ($\pm$ 8.7)	43.1 ($\pm$ 9.5)*	40.4 ($\pm$ 7.8%)*
White	102 (42.7%)	66 (64.7%)*	36 (35.3%)*
$\leq$ High-school education	156 (65.3%)	87 (55.8%)	69 (44.2%)
Having a representative payee	101 (42.4%)	67 (66.3%)**	34 (33.7%)**
Income (mean, SD)	754.8 ($\pm$ 466.3)	697.1 ($\pm$ 409.2)	828.4 ($\pm$ 523.1)
Lifetime history of incarceration [¶]	175 (73.5%)	95 (54.3%)	80 (45.7%)
History of homelessness	208 (87.0%)	122 (58.7%)	86 (41.4%)
Current homelessness	48 (20.1%)	32 (66.7%)	16 (33.3%)
Missed medical appointments within 90 days	72 (30.1%)	52 (72.2%)**	20 (27.8%)**
History of crack use	186 (77.8 %)	104 (55.9%)	82 (44.1%)
History of methamphetamine use	157 (65.7%)	91 (58.0%)	66 (42.0%)
History of heroin use	122 (51.1%)	66 (54.1%)	56 (45.9%)
Heavy alcohol consumption (> 14 drinks/wk)	19 (8.0%)	16 (84.2%)*	3 (15.8%)*
History of delayed HAART [#]	64 (27.4%)	39 (60.9%)	25 (39.1%)
CD4 < 200 ^{††}	61 (26.2%)	35 (57.4%)	26 (42.6%)

[†]P values compare depressed and nondepressed participants for each characteristic. * $P < .05$; ** $P < .01$.

[‡]Defined as BDI > 13 .

[§]Defined as BDI ≤ 13 .

^{||}Missing responses = 1.

[¶]Missing responses = 1.

[#]Delayed HAART is defined as not being on HAART therapy despite fulfilling clinical or CD4 criteria for HAART use at the time of the interview. Missing responses = 5.

^{††}Missing responses = 6.

REACH, Research on Access to Care in the Homeless; HAART, highly active antiretroviral therapy.

Table 2. Factors Associated with Depressive Symptoms among Homeless and Marginally Housed HIV-Infected Men in San Francisco*

Characteristic	OR (0.95 CI)	Adjusted OR [†] (0.95 CI)
Age > mean	1.86 (1.11 to 3.12)	—
White (vs. nonwhite)	1.86 (1.10 to 3.15)	2.22 (1.26 to 3.91)
≤ High-school education	0.97 (0.57, 1.65)	—
Having a representative payee	2.06 (1.21 to 3.50)	2.37 (1.34 to 4.17)
Missed medical appointments within 90 days	2.70 (1.48 to 4.90)	2.57 (1.37 to 4.81)
Current homelessness	1.75 (0.90 to 3.39)	—
History of homelessness	2.25 (1.05 to 4.99)	—
Heavy alcohol consumption (> 14 drinks/wk)	4.61 (1.31 to 16.27)	4.70 (1.29 to 17.10)
CD4 < 200	1.14 (0.63 to 2.06)	—
Income ≤ mean	1.23 (0.73 to 2.07)	—
Education ≤ high school	0.97 (0.57 to 1.65)	—
History of heroin use	0.85 (0.51 to 1.42)	—
History of methamphetamine use	1.25 (0.73 to 2.14)	—
History of crack use	0.97 (0.53 to 1.8)	—
Lifetime history of incarceration	0.78 (0.44 to 1.40)	—
History of delayed HAART [‡]	1.39 (0.77 to 2.49)	—

*The multivariate regression model was derived using stepwise regression and trimming non-significant predictors.

[†]Hosmer and Lemeshow Goodness-of-Fit Test $\chi^2=4.0071$, $Pr > \chi^2 = 0.5484$.

[‡]Delayed HAART is defined as not being on HAART despite fulfilling clinical or CD4 criteria for HAART use at the time of the interview.

OR, odds ratio; CI, confidence interval; HAART, highly active antiretroviral therapy.

at either independently or as a composite measure of substance abuse.

DISCUSSION

Among a sample of homeless and marginally housed men living with HIV in San Francisco, we found that over half of the participants screened positive for depression as measured by the BDI, which is substantially higher than the 36% to 37% prevalence of depression reported in 2 national probability samples of HIV-infected individuals.^{1,2} This study underscores our need to better screen for and treat depression among homeless and marginally housed HIV-infected men. As both depression and homelessness are independently associated with worse health outcomes,^{5,7,22} and this population often faces unique challenges in accessing health care services, our findings highlight the need to find more accessible models of mental health delivery for this population.

We found that men of white race were more than twice as likely to screen positive for depression compared with individuals of other racial backgrounds. While some studies have reported that depression is more common among nonwhite individuals,^{10,23} a higher prevalence of depression among white individuals was similarly found in a study among HIV-infected Medicaid recipients,¹² and in a recent nationally representative sample of nearly 8,500 individuals across the United States.²⁴ Possible explanations for these discrepant findings include differential access to mental health treatment by race

that may influence prevalence of current depression,²⁴ or effect modification by socioeconomic class of the relationship between race and depression.^{23,25}

Payee status was also significantly associated with depression in this study. This finding is consistent with previous studies reporting that patients who are most disabled by mental illness and drug use are most likely to be assigned a representative payee.²⁶ One study found that nearly 50% of participants in a representative payee program had a lifetime diagnosis of a mood disorder, and most participants fulfilled criteria for at least 1 Diagnostic and Statistical Manual of Mental Disorders (DSM)-defined psychiatric disorder.⁴ Health providers may consider partnering with representative payees in order to improve clinical follow-up with this patient population. Persons who recently missed medical appointments were over twice as likely to screen positive for depression. These variables likely mediate one another in that antidepressants or psychotherapy cannot be recommended until the individual presents for treatment; yet, depression impedes health-seeking behavior and access to ARV therapy.^{9,10} Missed medical appointments also indicate inconsistent care, which could be influencing a host of health issues including continued depression and decreased ARV adherence, both of which contribute to more rapid progression to AIDS and death.^{5,7,8} The strong overlap between alcohol use and depression^{27,28} further complicates these relationships, as both conditions negatively affect health care utilization and ARV adherence.^{9,10} The fact that respondents who had payees, drank heavily, and missed medical appointments were more likely to be depressed highlights the importance of eliciting cues on social functioning to better detect depression in this population.

Limitations include that our study was cross-sectional, that use of stepwise regression techniques limits generalizability, and that unique risk behavior profiles, social attitudes, and institutional resources among San Francisco's homeless populations may limit generalizability to other metropolitan areas. In addition, the BDI measures current symptoms of depression and does not provide a diagnosis of a major depressive disorder. People with other mental illnesses may screen positive for depressive symptoms while having other underlying diagnoses, such as bipolar disorder, which would overestimate depression in this population.

In summary, our results attest to the strong overlap between depression, housing status, poor functional status, and HIV, and the critical need to detect and treat depression in homeless and marginally housed HIV-infected men.

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Sincerely,

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