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Depressive Symptoms and Food Insufficiency Among HIV-Infected Crack Users in Atlanta and Miami

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Abstract

Depression contributes to worse general and HIV-related clinical outcomes. We examined the prevalence of and factors associated with depressive symptomatology among HIV-infected crack cocaine users recruited for Project HOPE (Hospital Visit is an Opportunity for Prevention and Engagement with HIV-positive Crack Users). We used multiple logistic regression to determine socio-demographic correlates associated with screening in for depression. Among 291 participants, three-quarters (73.5%) were identified as depressed. Higher odds of screening in for depression was associated with food insufficiency and monthly income below \$600. Alcohol and crack use were not associated with screening in for depression. Depressive symptomatology is extremely prevalent among HIV-infected crack cocaine users and is associated with food insufficiency and lower income. Screening for depression and food insecurity should be included in HIV prevention and treatment programs. Improved recognition and mitigation of these conditions will help alleviate their contribution to HIV-related adverse health outcomes.

Keywords

Depression; HIV/AIDS; Food insecurity; Crack cocaine

Introduction

Prevalence estimates suggest up to half of HIV-infected individuals may suffer from depression [1–7]. Major depressive disorders are also more likely in HIV-positive persons than in the general population [8]. In HIV-infected individuals, depression has been associated with low health-related quality of life, social isolation, poor physical health status, missed medical appointments, decreased adherence to antiretroviral therapy, and more rapid progression to AIDS and death [6,9–14].

Crack cocaine use remains common among HIV-infected persons in certain urban settings and is known to contribute to the spread of HIV through high-risk sexual behaviors [15–17]. In HIV-infected persons, crack cocaine use is associated with reduced antiretroviral adherence, accelerated HIV disease progression independent of antiretroviral medications, and a greater risk of AIDS-related death [18,19]. Despite the common co-occurrence of substance abuse and mental health problems in this population, few studies have examined correlates associated with depression specifically among HIV-positive crack cocaine users [20–22].

Studies that have examined correlates of depression in this population have reported associations with female gender, lower educational achievement, perceived need for treatment, anxiety and more frequent crack use [22,23]. The lives of crack cocaine users are chaotic and crack use may compromise even the most basic human needs. Given the significant role that food plays both biologically and socially, unpredictability in food acquisition may be one domain that is particularly damaging to mental health. Consistent with this, food insecurity, defined as having “uncertainty about future food availability and access, insufficiency in the amount and kind of food required for a healthy lifestyle, or the need to use socially unacceptable ways to acquire food”, has emerged as an independent correlate of depression in studies of individuals with and without HIV-infection [24–28]. This relationship highlights the pervasive stress associated with situations where one’s ability to accomplish even the basic activities of daily living, such as obtaining food for oneself and one’s family, is limited and unpredictable. Drug-users have many of the known risk factors for food insecurity or insufficiency [29–31]. In addition, food insecurity appears common among HIV-infected individuals with prevalence estimates as high as five times that of the general population [27,32,33]. The experience of being food insecure compromises clinical HIV outcomes, including antiretroviral adherence and complete viral suppression [33–35]. These adverse health outcomes may be partially mediated through mental health pathways.

To further our understanding of depressive symptoms among HIV-infected crack cocaine users, the present study sought to identify the prevalence of and factors associated with depressive symptoms among a sample of HIV-infected crack users from Atlanta and Miami, with a specific focus on the possible association with food insufficiency.

Methods

Study Population and Setting

Participants were identified from the inpatient hospital wards at Grady Memorial Hospital (GMH) in Atlanta, Georgia and Jackson Memorial Hospital (JMH) in Miami, Florida. Structured interviews were administered to eligible participants upon their enrollment in a behavioral intervention study for sexually active HIV-infected crack users called Project HOPE (**H**ospital Visit is an **O**pportunity for **P**revention and **E**ngagement with HIV-positive Crack Users). Participants provided written consent and were reimbursed \$25 for the baseline interview. Interviewers collected interview data at hospital bedside using Handheld-

Assisted Personal Interview (HAPI). Collected data included information on socio-demographics, alcohol, drug use and mental health. The cross-sectional interview data presented here were collected between August 2006 and January 2009. This study was approved by the University of Miami and Emory University Institutional Review Boards and the Jackson Memorial Hospital and Grady Memorial Hospital Research Oversight Committees.

Measurements

Depression Symptom Severity—The primary outcome for this study was depression symptom severity, as measured by the six-item depression subscale of the Brief Symptom Inventory-18 (BSI-18) [36]. Respondents were asked to rate their level of discomfort for the following six symptoms over the past week: “feeling lonely”, “feeling blue”, “feeling no interest in things”, “feeling hopeless about the future”, “feeling worthless” and “thoughts of ending your life”. Responses on a 5-point Likert scale ranged from 1 (not at all) to 5 (extremely). We used the methods suggested by the BSI developers and reported previously by Valverde et al. to categorize depression risk [36,37]. Participants were considered at high risk for depression with raw scores ≥ 9 for women and ≥ 7 for men. The higher raw score cutoff for women than for men takes into account the higher levels of depression reported by women in the normative sample used in developing the BSI-18. Given the relationship between raw scores and standardized T scores in the BSI normative sample, the gender-specific raw score cutoffs represent the same level of depression risk. Reliability of the scale in this study was good (Cronbach $\alpha = 0.83$).

Assessment of Food Insufficiency—Our primary independent variable of interest was food insufficiency. Food insufficiency was measured with a single item, and respondents were asked, “In the last 30 days was there any time when you didn’t get anything, or barely anything, to eat for two or more days?” Although there is substantial debate in the literature over how to best measure food insecurity [28], several studies have shown that single-item measures of food insufficiency and hunger have high face-validity and are predictive of dietary, mental and physical health outcomes [38–42]. Food insufficiency, hunger and severe food insecurity are encompassed within the construct of food insecurity but refer to periods of time when individuals have involuntarily experienced reductions in dietary intake because they do not have the resources to access enough food or access to culturally appropriate or desired foods. Although recognized as a potential limitation of this study, our use of a single-item measure of food insufficiency was chosen initially to reduce respondent burden.

Additional Covariates—Additional socio-demographic covariates were chosen for evaluation based on known association or epidemiologic plausibility of association with depression in HIV-positive drug using populations [6,22,23,37]. These covariates included age (continuous), gender (male/female), race/ethnicity (black, non-Hispanic; white, non-Hispanic; Hispanic), self-reported yearly income, ($< \$5,000$ or $\geq \$5,000$), self-reported monthly income ($\leq \$600$, $> \$600$), current employment (yes/no), education (\geq versus $<$ high school diploma or equivalent), history of homelessness (yes/no), current homelessness (yes/no), incarceration within the previous 6 months (yes/no), sexual orientation (straight, heterosexual versus other), marital status (single, never married versus other), having ever used injection drugs, daily alcohol use (yes/no), and crack use intensity (daily, weekly, less than weekly).

Analysis

Univariate descriptive statistics were used to describe the sample. Bivariate tests (chi-square and *t*-test) were used to test for differences in variables between respondents categorized as

depressed and not depressed. To examine the independent association of each variable while controlling for the influence of all other variables, multiple logistic regression was used to determine factors associated with the BSI depression subscale score gender-specific cutoffs. As recommended by Homer and Lemeshow [43], each variable with a P value ≤ 0.25 in bivariate analysis was entered into the model. Due to collinearity between current homelessness and ever homeless, we opted to enter ever homeless rather than current homelessness into the model to avoid missing data associated with being currently homeless. Whether current homelessness or ever homeless was selected for entry, the adjusted estimates for these variables were not significant. Independent variables were deleted from the model using a backward stepwise approach. Variables with an adjusted P value ≤ 0.10 were retained in the final model. The 0.05 level was chosen as the criterion for statistical significance and P -values less than 0.10 were considered marginally significant.

Results

Complete Brief Symptom Inventory depression subscale results were available for 291 of 292 Project HOPE participants. The one participant with missing data was removed from further analysis. Among the 291 study participants, the mean age was 42.9 years (SD 6.9), 46% were male, and 91% were black (see Table 1). Only 47% of the participants had completed high school or the equivalent, and the self-reported monthly income was less than \$600 for over 75% of the participants. Homelessness was also common, with 80.8% reporting having ever been homeless and 54.9% reporting being currently homeless.

Of the 291 participants, using the gender-specific cutoffs (raw score ≥ 9 for women and raw score ≥ 7 for men), 214 (73.5%) were identified as being depressed. The mean raw score on the BSI-18 for food insecure individuals was 14.5 (SD = 6.0) and for food secure individuals was 11.3 (SD = 5.3; $P < 0.001$). The mean raw score for men was 12.0 (SD = 5.8) and for women was 12.6 (SD = 5.6).

In unadjusted analysis (see Table 2), the odds of screening positive for depression were over one-and-a-half times as likely for males ($P = 0.048$) and those respondents living in Atlanta ($P = 0.051$). The odds of depressive symptoms were over twice as high for participants with a monthly income less than \$600 ($P = 0.006$) and those who were currently homeless ($P = 0.008$). Individuals with less than a high school diploma or the equivalent had half the odds of screening positive for depression ($P = 0.007$). Finally, the experience of being food insufficient was associated with almost three times the odds of screening positive for depression ($P = 0.002$). In adjusted analyses, food insufficiency (AOR 2.73, 95% CI = 1.40–5.32), self-reported monthly income less than or equal to \$600 (AOR 2.27, 95% CI = 1.22–4.21) and lower educational achievement (AOR 0.51, 95% CI = 0.28–0.90) were associated with screening in for depression. Being single and never married approached a significant association (AOR 0.53, 95% CI = 0.28–1.01). These associations did not change whether current homelessness or history of homelessness was included in the model. Measures of alcohol and crack use frequency were not associated with screening in for depression (see Table 2).

Discussion

Among a sample of HIV-infected crack users in Atlanta and Miami, we found that almost two-thirds screened positive for depressive symptoms as measured by the BSI-18 depression subscale. This prevalence is substantially higher than the depression prevalence estimates of approximately 36% in nationally representative samples of adult HIV-infected individuals and higher than the 35% of participants at high risk for depression reported in a cohort of HIV-infected injecting drug users [37,44,45]. However, our estimates were based on data

from individuals receiving inpatient care and many of the current participants were not participating in routine HIV care. The current estimates are, however, comparable to the 80% of participants in a community-sample of crack cocaine users who reported more than minimal depression as measured by the Beck Depression Inventory [22].

The profound co-existence of poverty, homelessness, food insufficiency and depressive symptoms are perhaps not surprising given the nature of our study sample, and are probably appropriately labeled a syndemic [46,47]. The term “syndemic” was first coined by anthropologist Merrill Singer to describe the interaction among multiple diseases or health problems under conditions of poverty, health disparities, and structural violence resulting in an amplification of negative health outcomes. First postulated to examine the mutually reinforcing interaction among substance abuse, violence, and AIDS in inner city settings in the United States, the syndemic approach offers a useful framework for understanding the complexities of the spread of AIDS. The Centers for Disease Control states: “the conceptualization of a syndemic is significant because it expands the boundaries of public health science and action. . . . This perspective complements single-issue prevention strategies that may be effective in controlling discrete problems but often are mismatched to the goal of protecting the public’s health in its widest sense” [48]. Understanding the complex interacting challenges facing the HIV-infected crack cocaine user as a syndemic will improve our approach to developing services that address their unique challenges. This paper’s findings suggest that programs which simultaneously focus on alleviation of poverty, food insufficiency and homelessness among HIV-infected crack cocaine users will be essential to addressing their mental health needs.

Poverty, defined as low income, has a well-established relationship with depression [24,49], and in this study, low self-reported income was strongly associated with screening in for depression. Interestingly, the associations between gender, educational achievement and marital status and screening in for depression in this study were opposite of those commonly reported in the literature [50,51]. Male participants were more likely to report depressive symptoms. Single participants who were never married and those with less education were less likely to report depressive symptoms. These unexpected findings suggest that the predisposing factors for depression in HIV-infected crack cocaine users may differ from those in other HIV positive and HIV-negative drug using populations. Additional exploration of the socio-demographic correlates of depression in HIV-infected crack users is necessary to further explore and confirm these findings.

The experience of food insufficiency was significantly associated with screening in for depression, both on bivariate analysis and after controlling for other sociodemographic characteristics known to be associated with food insufficiency. The directionality of the association between food insufficiency and depression cannot be determined in this cross-sectional study. However, studies in HIV-negative households suggest food insecurity may influence health outcomes through depression [25,26]. The longitudinal impact of food insecurity on the health behaviors and health outcomes of HIV-infected individuals and their households and depression’s role in this relationship has not been evaluated in the United States. Additional studies could provide valuable insight into the mechanism of food insecurity’s influence and the causal pathways linking food insecurity, depression and health outcomes in HIV-infected individuals.

Both food insecurity and depression have been linked to increased high-risk sexual behavior and decreased adherence to antiretroviral therapy [33,35,52–54]. The coexistence of these potentially reinforcing conditions may make escape from either less likely. Programs and services directed towards alleviating food insecurity may improve HIV-infected patients’ mental and physical health, and in turn make it more likely that they will engage in care.

Proactively assessing for and addressing food insecurity in HIV-infected crack cocaine users should be an essential component of care, especially given the limited social and economic resources at their disposal and the remarkably elevated prevalence in this group.

Our study has several limitations. First, the cross-sectional nature of the study precludes causal links between the presence of food insecurity and depressive symptoms. Second, because we analyzed responses from a sample being recruited from an inpatient hospital setting, our findings cannot be generalized to other HIV-infected drug users. Hospitalization may be a marker for inadequate coping skills that place these individuals at higher risk for depression than those HIV-infected crack users who are less likely to be hospitalized. In addition, we were unable to control for condition or severity of disease for which participants were hospitalized. If men were more ill when they were admitted to the hospital, that possibility may impact the observed gender difference in depression symptomatology. Third, the single-item measure of food insecurity does not reflect the full range or severity of food insecurity that may be experienced. Given survey constraints in this difficult to assess population, we initially opted to use a measure that was quick to assess. When compared to longer food security assessment tools, our single item indicates a rather severe stage of food insufficiency. Therefore, we may have underestimated the occurrence of food insufficiency by not using a more common scaled measure, which would have given respondents more opportunity to identify the presence of food insecurity. In addition, because we did not utilize a more commonly used scaled measure, our estimates are not directly comparable to other studies or national estimates. Despite the limitations of the single question measure, it is worth noting that several studies have noted high correlation between single-item measures of food insufficiency and scaled measures [38–42]. Fourth, the analysis is based on self-reports and may be biased because of socially desirable reporting. Lastly, although we used a standard measure of depressive symptoms, we did not have data available on HIV somatic symptoms which may have lead to an over reporting of depressive symptomatology. In addition, the use of the BSI depression subscale instead of a clinician-administered measure of depressive symptoms may have improperly identified some individuals.

Our study findings provide insight into the complexity of factors associated with screening in for depression among HIV-infected crack users and reinforce the appropriateness of the term syndemic as a description of the mutually reinforcing social and clinical pathologies of this population. Food insufficiency and depression commonly co-exist among HIV-infected crack users. Because of the high prevalence of depressive symptoms and the association with food insufficiency, we recommend that caregivers screen all HIV-positive crack users for depression and food insecurity risk. The development of more widely available and accessible community-based and clinical services to alleviate food insecurity in HIV-infected populations has the potential to improve depressive symptoms and ultimately enhance the ability of HIV-infected crack users to engage in prevention and treatment services.

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Table 1

Characteristics of HIV-infected crack users^a

Characteristic	All, N = 291 (%)	BSI subscale score interpretation	
		Depressed ^b , N = 214 (74)	Nondepressed ^c , N = 77 (26)
Age (mean, SD)	42.9 (6.9)	42.9 (7.3)	42.9 (5.9)
Men	134 (46)	106 (79)*	28 (21)*
Black, non-Hispanic ^d	265 (91)	193 (72)	72 (27)
City (Atlanta)	171 (59)	133 (78)*	38 (22)*
Food insufficient ^e	97 (34)	83 (86)**	14 (14)**
Yearly income (\leq \$5,000) ^f	189 (66)	144 (76)	45 (24)
Monthly income (\leq \$600) ^g	220 (76)	170 (77)**	50 (23)**
Current unemployment	282 (97)	208 (74)	74 (26)
< High-school education	154 (53)	103 (67)**	51 (33)**
Current homelessness ^h	129 (55)	105 (81)**	24 (19)**
Ever homeless ⁱ	235 (81)	175 (74)	60 (26)
Recent incarceration ^j	80 (30)	59 (74)	21 (26)
Single, never married	191 (66)	135 (71)	56 (29)
Straight, heterosexual	229 (79)	163 (71)	66 (29)
History of IVDU	64 (22)	52 (81)	12 (19)
Daily alcohol use	63 (22)	46 (73)	17 (27)
Daily crack use ^k	97 (36)	70 (72)	27 (28)

* $P \leq 0.05$;** $P \leq 0.01$ ^a P values compare depressed and nondepressed participants for each characteristic^b Defined as BSI ≥ 9 for women and ≥ 7 for men^c Defined as BSI < 9 for women and < 7 for men^d Missing responses = 1^e Missing responses = 5^f Missing responses = 3^g Missing responses = 3^h Missing responses = 56ⁱ Missing responses = 1^j Missing responses = 27^k Missing responses = 31

Table 2Factors associated with depressive symptoms among HIV-infected crack users^a

Characteristic	OR (95% CI)	Adjusted OR ^b (95% CI)
Age	1.00 (0.96–1.04)	0.99 (0.95–1.03)
Male	1.72 (1.00–2.94)	1.76 (0.98–3.18)
Black, non-hispanic	0.57 (0.16–4.89)	–
City (Atlanta)	1.69 (1.00–2.85)	–
Food insufficient	2.82 (1.49–5.38)	2.73 (1.40–5.32)
Yearly income (≤\$5,000)	1.39 (0.81–2.40)	–
Monthly income (≤\$600)	2.24 (1.25–4.00)	2.27 (1.22–4.21)
< High-school education	0.47 (0.27–0.81)	0.51 (0.28–0.90)
Current homelessness	2.25 (1.24–4.09)	–
Ever homeless	0.83 (0.54–1.28)	–
Recent incarceration	0.99 (0.55–1.80)	–
Single, never married	0.64 (0.36–1.14)	0.53 (0.28–1.01)
Straight, heterosexual	0.53 (0.26–1.09)	–
History of injection drug use	1.74 (0.87–3.47)	–
Daily alcohol use	0.97 (0.51–1.81)	–
Daily crack use	1.13 (0.55–2.33)	–

^aThe multivariate regression model was derived using stepwise regression and trimming non-significant predictors

^bHosmer and Lemeshow goodness-of-fit test $\chi^2 = 6.37$, $\text{Pr} > \chi^2 = 0.6054$