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## Factors associated with depressive symptoms in African American crack cocaine smokers

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### Abstract

Few studies have examined factors associated with depressive symptoms in crack cocaine smokers, although cocaine use has been linked to depression. The purpose of this study was to identify correlates of depressive symptoms in a sample of 799 HIV-positive and HIV-seronegative African-American crack cocaine smokers. Multiple regression modelling revealed that anxiety was strongly and positively associated with depressive symptoms. In addition, being female and more frequent crack smoking were also found to be associated. Higher self-esteem and decision-making confidence were found to be associated with less often experiencing depressive symptoms. The model accounted for 64% of the variance in the data. It was noteworthy that HIV infection, as such, was not associated with depressive symptoms. The study has important implication for mental health and health promotion interventions targeting crack cocaine smokers.

### Keywords

*Depressive symptoms; crack cocaine; African-American; HIV serostatus*

### Background

Depressive symptomatology is more prevalent among illicit drug users (Basu, Chwastiak, & Bruce, 2005; Charney, Palacios-Boix, Negrette, Dobkin, & Gill, 2005) than in the general population (Williams & Latkin, 2005). A number of factors have been found to be associated with depressive symptoms in drug users, including frequency of drug use, psychosocial functioning (anxiety symptoms, self-esteem, decision-making confidence, risk-taking), gender, and high-risk sex (Knight, Holcomb, & Simpson, 1994; Friedman, Terras, Zhu, & McCallum, 2004). In the general population, as well as in drug users, women are more likely than men to report depressive symptoms and to be diagnosed as clinically depressed (Piccinelli & Wilkinson, 2000). Depressive symptoms have been found to be correlated with sexual risk behaviours, including sex with multiple partners (Johnson, Cunningham-Williams, & Cottler, 2003; Roberts, Wechsberg, Zule, & Burroughs, 2003; Williams & Latkin, 2005) and trading sex for drugs and/or money (Risser, Timpson, McCurdy, Ross, & Williams, 2006). On the other hand, Crepaz & Marks (2001) concluded, based upon a meta-analytic review of 32 studies

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(of which nine used samples of drug users), that there was little evidence to support an association between depressive symptoms and sexual risk-taking.

Another factor that could contribute to depression in drug users is HIV infection. A systematic review conducted by Ciesla & Roberts (2001) found that people with HIV infection, regardless of HIV transmission route, were nearly twice as likely to be diagnosed with major depression as HIV-seronegative persons. However, research is inconclusive, finding evidence of both an association (Rabkin, Johnson, Lin, Lipsitz, Remien, Williams, & Gorman, 1997; Turrina, Fiorazzo, Turano, Cacciani, Regini, Castelli, & Sacchetti, 2001; Morrison, Petitto, Ten Have, Gettes, Chiappini, Weber, Brinker-Spence, Bauer, Douglas, & Evans, 2002) and no evidence (Lipsitz, Williams, Rabkin, Remien, Bradbury, el Sadr, Goetz, Sorrell, & Gorman, 1994; Malbergier & Guerra De Andrade, 2001; Knowlton, Latkin, C.A., Chung, S.E., Hoover, D.R., Ensminger M. & Celentano, 2000). However, there is evidence that disease progression in HIV-seropositive persons may be associated with depression. Studies have found an association between declining CD4 cell counts and depressive symptoms (Ichovics, Hamburger, Vlahov, Schoenbaum, Schuman, Boland, & Moore, 2001; Boarts, Sledjeski, Bogart, & Delahanty, 2006, Chander, Himelhoch, & Moore, 2006).

Although epidemiological data demonstrate a high prevalence of depressive symptoms in HIV-seropositive women (Ichovics et al, 2001; Jones, Beach, Forehand, & Family Health Project Research Group, 2001; Richardson, Barkan, Cohen, Back, FitzGerald, Feldman, Young, & Palacio, 2001; Morrison et al, 2002; Cook, Grey, Burke-Miller, Cohen, Anastos, Gandhi, Richardson, Wilson, & Young, 2006), the association between gender and depressive symptoms is unclear. Some have found higher levels of depression/depressive symptoms in women with HIV than in men (Lipsitz et al, 1994; Rabkin, Johnson, Lin, Lipsitz, Remien, Williams, & Gorman, 1997; Ichovics et al, 2001; Turrina et al, 2001, Charney et al, 2005; Wisniewski, Apel, Selnes, Nath, McArthur, & Dobs, 2005). Other studies show no gender differences (Knowlton, Latkin, Schroedern, Hoover, Ensminger, & Celentano, 2000, 2001; Bing, Burnam, Longshore, Fleishman, Sherbourne, London, Turner, Eggan, Beckman, Vitiello, Morton, Orlando, Bozzette, Ortiz-Barron, & Shapiro, 2001; Mizuno, Purcell, Dawson-Rose, Parsons, & the SUDIS Team, 2003; Williams, Narciso, Browne, Roberts, Weir, & Gafni, 2005; Isreaelski, Prentiss, Lubega, Balmas, Garcia, Muhammad, Cummings, & Koopman, 2007). The reason for unclear findings may be related to behaviours that drug using women are more likely to engage in.

Almost all studies that have examined factors associated with depressive symptoms in drug users analysed data from samples of injection drug users. However, cocaine is often cited as having depressive effects (Friedman et al, 2004), and a commonly used form of cocaine is crack cocaine. Smoking crack produces a brief highly euphoric state followed by strong feelings of depression once the high has dissipated (McCoy, 1995). Yet little study of depression/depressive symptoms in crack cocaine smokers, many of whom are African American, has been undertaken (Knowlton et al, 2000). The purpose of this exploratory study was to identify factors associated with depressive symptoms in a sample of not-in-treatment African-American crack cocaine smokers. Given that previous research has shown that being infected with HIV might contribute to feelings of depression or depressive symptoms, the sample included both HIV-seronegative and HIV-seropositive crack smokers.

## Methods

The sample used in this study was drawn from two studies focusing on the efficacy of a brief intervention to increase condom use in sexually active HIV-seropositive and HIV-seronegative African-American crack users, respectively.

Screening to determine eligibility for both studies was conducted by trained research assistants. Responses to screening questions were directly entered into a computer program and responses matched to an eligibility algorithm. The computer was programmed to notify the research assistant if an individual was eligible. Eligible participants of both studies were African Americans, were at least 18 years old, had smoked crack cocaine in the 48 h before being interviewed, had had vaginal sex in the previous 7 days, and could provide sufficient contact information for follow-up interviews. Recent use of cocaine was confirmed by urinalysis using OnTrak test kits (Varian, Inc., Ca.). Participants were offered \$25 for their time and travel expenses to complete a baseline interview.

## Participants

The HIV-seropositive sample was comprised of African-American crack cocaine smokers with HIV infection participating in a longitudinal study of the efficacy of a brief intervention to increase condom use in sexually active HIV-seropositive African-American crack users. Baseline-data were collected between April 2004 and October 2005. Participants were recruited using modified snowball sampling. Initial contacts with potential participants were made through HIV service agencies, which agreed to post fliers describing the study in their waiting rooms. If an individual was interested in participating, they called a number provided on the flier for an initial telephone screening. If an individual passed the brief telephone screening, s/he was asked to come into the study office for more in-depth screening to determine eligibility. In addition to recruiting from service agencies, individuals could be referred by study participants. After completing the baseline interview, all participants were asked to refer others who might be qualified to participate. Crack cocaine smokers screening for a hepatitis B vaccine study who had tested HIV-seropositive were also referred.

Among those individuals who were screened for the study ( $n=673$ ), 439 were ineligible and 234 were eligible. The most common reasons for disqualification were: did not report having had vaginal sex in the past 7 days (33%) and did not report having smoked crack cocaine (33%) in the past month. Ineligible individuals were compared with those who were eligible by gender, age, alcohol, and drug use. The only significant difference was by gender. A higher proportion of women (55%) than men (25%) were eligible ( $p>0.001$ ). Among the 234 eligible individuals, 183 persons (78%) had complete and consistent data, and were thus included in this study.

The HIV-seronegative sample consisted of HIV-seronegative African-American crack cocaine smokers, who participated in a longitudinal peer-delivered condom use intervention study. Data for the analyses reported here were from baseline interviews conducted between June 2002 and March 2005. Participants were recruited using targeted sampling in neighbourhoods with high rates of drug use and participant referral. Of 2023 individuals screened, 781 met eligibility criteria. The most common reasons for being ineligible were: not having had vaginal sex in the 7 days before screening (30%); no tracking information (18%); having a negative urine screen for cocaine (8%).

Comparison between the ineligible and the eligible participants showed that a higher proportion of women (48%) were eligible than were men (36%;  $p<0.001$ ). A higher proportion of the ineligible (29%) than the eligible individuals (24%) had used powder cocaine in the previous week ( $p<0.05$ ). There were no significant differences between eligible and ineligible individuals by age, alcohol, or other illicit drugs. Six-hundred-and-sixteen persons (79%) of those who met the eligible criteria had complete and consistent data and were included in this study.

All procedures and forms used in this study were reviewed and approved by a university institutional review board for the protection of human subjects.

## Measures

Sociodemographic, current drug use, sexual risk behaviour, and HIV-related data were collected from both samples using similar questionnaires. Depressive symptoms and other psychosocial factors in both samples were measured using the Texas Christian University Short Assessment Self-Rating Form (SRF, Knight et al, 1994). The SRF was developed to collect data on psychosocial functioning from substance users. All data were collected in private by trained research assistants using a computer-assisted (CAPI) program.

## Dependent variable

Depressive symptoms were assessed by a six-item depression scale (TCU/SRF, Knight et al, 1994). The SRF depression scale score is strongly correlated with the SCL-90 depression scale ( $r=50.81$ ; Myers, Knight, Simpson, & Stevens, 1991) and the Beck Depression Inventory ( $r=50.75$ ; Simpson, 1991). In this study, Cronbach's alpha in the HIV-seropositive sample was 0.72 and for the HIV-seronegative sample was 0.71. The scale consists of six statements, each reflecting a problem/concern. The statements are: 'You feel sad or depressed'; 'You have thoughts about committing suicide'; 'You feel lonely'; 'You feel interested in your life @'; 'You feel extra tired or run down'; and 'You worry or brood a lot.' Participants were asked how often they felt like what was described in each statement and response choices ranged from '1=never' to '5=almost always'. The scale score is the mean of items included in the scale. The symbol, '@,' indicates that items are reverse scored before adding them into scale totals. Higher scores on the depression scale reflect more often experiencing depressive symptoms.

## Independent variables

Sociodemographic characteristics measured were gender, age, marital status (married/living as married versus single), education (high school versus less than high school), and employment status (employed versus unemployed).

Drug use was assessed using four measures. Frequency of crack cocaine use was measured by asking how many times the respondent had smoked crack in the 30 days prior to the interview. Total number of different non-injected drugs used (methamphetamine, marijuana, 'fry' [joints or cigarettes dipped in PCP and/or embalming fluid], and codeine cough syrup) in the past 30 days was also examined. The use of injected drugs and needle use behaviour was measured by asking: 'Have you ever injected drugs with a needle?' If a respondent said that they had injected drugs in their lifetimes, s/he was asked how frequently they had injected in the last 30 days.

Sexual risk behaviours were measured by three questions: 'How many different people have you had sex with in the last 30 days?', 'Have you ever traded sex for money?'(yes/no response), and 'How many times have you traded sex for money in the last 30 days.'

Four measures of psychosocial functioning found to be correlated with depressive symptoms in drug using populations were used (Knight et al, 1994). The composite scales consisted of items asking the respondent how often s/he felt like what was described in the item. Response choices ranged from '1=never' to '5=almost always'. The composite score was the mean of items included in each scale.

Anxiety symptoms were measured by the seven-item anxiety scale ( $\alpha=0.77$  in both samples). The anxiety scale score has been found to be correlated with the SCL-90 anxiety scale score ( $r=0.74$ ; Myers et al, 1991). Items used to measure anxiety were: 'You have trouble sitting still for long,' 'You have trouble sleeping,' 'You feel anxious or nervous,' 'You have trouble concentrating or remembering things,' 'You feel afraid of certain things, like elevators, crowds, or going out alone,' 'You feel tense or keyed-up,' and 'You feel tightness or tension in your muscles.' Higher scores reflect more often experiencing anxiety symptoms.

Self-esteem was measured by the six-item self-esteem scale. The scale had good internal reliability in both samples (Cronbach's  $\alpha=0.73$  for the HIV-seropositive sample and 0.71 for the HIV-seronegative sample). The items were: 'You have much to be proud of;', 'In general, you are satisfied with yourself,' 'You feel like a failure,' 'You feel you are basically no good,' 'You wish you had more respect for yourself,' and 'You feel you are unimportant to others.' Higher scores on the self-esteem scale are indicative of higher self-esteem.

Decision-making confidence was measured by the nine-item decision-making confidence scale. Cronbach's  $\alpha$  in the HIV-seronegative sample was 0.74 and in the HIV-seropositive sample was 0.70. The measures of decision-making confidence were: 'You consider how your actions will affect others,' 'You plan ahead,' 'You think about probable results of your actions,' 'You have trouble making decisions,' 'You think about several different ways to solve a problem,' 'You analyze problems by looking at all the choices,' 'You make decisions without thinking about consequences,' 'You make good decisions,' and 'You think about what causes your current problems.' Higher scores on the scale indicate higher decision-making confidence.

Risk-taking was measured by the four-item risk-taking scale ( $\alpha=0.67$  in the HIV-seronegative sample and 0.70 in the HIV-seropositive sample). The items used to calculate the scale score were: 'You like to take chances,' 'You like the "fast" life,' 'You like friends who are wild,' 'You like to do things that are strange or exciting.' Higher scores on the scale are indicative of higher risk-taking.

### HIV-related factors

HIV status was measured by self-report. Individuals who reported that they had HIV infection confirmed the report by showing an HIV test result or medication bottles if they were receiving medical care for HIV infection. Participants in the HIV-seronegative sample were asked 'Have you been told by a doctor, nurse, or other health care professional that you currently have HIV/AIDS?'

HIV-related health status was measured by asking HIV-seropositive participants about their physical health in terms of three measures. Immunological status was measured by asking 'What was your CD4 count the last time you received results from blood work?' CD4 cell counts were divided into three groups: less than 200, 200–500, and more than 500. Virological status was assessed by the question 'What was your viral load the last time you received results from blood work?' HIV1 RNA (viral load) was categorized as less than 500, 500–9999, or 10,000 or more copies/ $\mu\text{L}$ . HIV medication taking was measured by the question: 'Are you now receiving treatment for HIV infection from a physician?' Response alternatives were 'yes' or 'no'.

### Analysis

The two samples were combined ( $n=799$ ). The first step in the data analysis was a comparison of HIV-seropositive and seronegative participants by sociodemographic, drug use, sexual behaviour, and psychosocial factors. Chi-squared and *t*-tests were used to assess differences.

The second step in the analysis was an assessment of the correlation between measures of sociodemographic, drug use, sexual behaviour, psychosocial factors, HIV-related health status, and depressive symptoms. For these analyses, an interaction term between HIV and those statistically significant variables that differed between HIV-seropositive and HIV-seronegative participants were included. Analyses were conducted using Pearson correlation coefficients.

In the third step, factors found to be significantly correlated with depressive symptoms at the 0.05 level were simultaneously entered into a multiple linear regression model with depressive symptoms as the dependent variable.



Data were analysed using SPSS version 14.0 for Windows.

## Results

### Descriptive statistics

Almost two-thirds (65%) of the sample were male. Over half of the participants were 35 years or older (56%), were single (67%, an additional 16% were divorced, widowed, or separated), had less than a high school education (53%) and were unemployed (59%). All participants smoked crack at the time of the interview. Frequency of crack smoking ranged from once to 300 times in the past 30 days. The median was 30.0 times (mean=67.8, SD=79.0). In addition to smoking crack, participants used, on average, three additional non-injected drugs. The vast majority of participants (84%) had no lifetime history of injected drugs. However, 19 had injected in the past month. For these 19, the median number of injections was 2.0 (range=1–20, mean 5.4, SD=6.2).

The median number of sex partners reported by participants in the 30 days before the interview was 4.0 (range=1–200, mean=8.2, SD=14.5). About one-half (51%) had a history of trading sex for money, and a third (34%) had traded sex for money in the past 30 days. The median number of money for sex partners of those trading was 7 (range=1–300, mean=14.3, SD=29.2).

Almost one-quarter (23%) of the sample were HIV-seropositive. A higher proportion of the women (36%) were HIV-seropositive than men (16%; chi-square=39.49, df=1,  $p<0.001$ ). Of those who were HIV-seropositive, the majority (84%) were receiving antiretroviral therapy at the time of the interview. The average time since diagnosis was 9 years (range=<1–23 years, median=9.0, SD=5.7). Mean CD4 cell count was 586.8 (range 0–10,000, median=363.5, SD=1348.3) and mean HIV1 RNA was 113,706 (range=0–7,750,000, median=688.0, SD=882,326).

The average scores on the psychosocial measures were in the middle of the scoring range and fairly tightly distributed. The mean depressive symptoms score was 3.01 (range=1–5, median=3.0, SD=0.72). Twelve per cent of the participants reported that they 'often' or 'almost always' experienced depressive symptoms. On the four independent measures, the average scores were: self-esteem 2.91 (range=1–5, SD=0.76), anxiety 3.05 (range=1–5, SD=0.75), decision-making confidence 3.15 (range=1–5, SD=0.61), and risk-taking 3.22 (range=1–5, SD=0.80).

As shown in Table I, there were significant differences between HIV-seropositive and HIV-seronegative participants. HIV-seropositive participants were more likely to be older, unemployed, and married or living with a sex partner than HIV-seronegative participants. HIV-seronegative participants had used crack more frequently in the last 30 days, while HIV-seropositive participants used more other non-injected drugs. HIV-seropositive participants were more likely to have injected drugs. HIV-seronegative participants were more likely to have had more sexual partners than the HIV-seropositive subjects and also to have had more sex for money partners. With regard to psychosocial factors, participants with HIV infection had higher anxiety symptoms scores, while HIV-seronegative participants had significantly higher risk-taking scores.

### Correlation analyses

Three of 10 sociodemographic and HIV status measures were found to be significantly correlated with depressive symptoms. As shown in Table IIa, gender and gender by HIV status were found to be positively correlated with depressive symptoms. Years of schooling was negatively correlated. Except for gender, the correlations were weak. The correlation between gender and depressive symptoms was moderately strong.

Nine drug use and sexual behaviour measures produced significant correlation coefficients, as shown in Table IIb. Daily crack smoking, daily crack smoking by HIV status, other non-injected drug use by HIV status, ever injected drugs, the number of sex partners in the last 30 days, the number of sex partners in the last 30 days by HIV status, ever trading sex for money, number of trading sex for money partners in the last 30 days, and the number of trading sex for money partners in the last 30 days by HIV status were found to be positively correlated with depressive symptoms. The correlations between ever injected, daily crack smoking by HIV status, and depressive symptoms were weak. The remaining correlations were moderately strong.

As shown in Table IIc, all six measures of psychosocial functioning were found to be significantly correlated with depressive symptoms. Anxiety and risk-taking were positively and strongly correlated with depressive symptoms, although the strength of the correlation between anxiety and depressive symptoms was more than twice as great as that of risk-taking. Similarly, self-esteem and decision-making confidence were negatively and strongly correlated, and the correlation with self-esteem was almost twice that of decision-making confidence. Anxiety symptoms by HIV status and risk-taking by HIV status correlated moderately strong with depressive symptoms.

There were no significant associations between HIV-related health status measures and depressive symptoms.

### Multiple regression analysis

The results of the multiple regression analysis are presented in Table III. The model accounted for 64% of the variance in depressive symptoms ( $F=79.79$ ,  $df.=18$ ,  $p<0.001$ ). Controlling for all other variables entered into the model, the only sociodemographic factor that remained significant in the regression analysis was gender. Among the drugs use factors, daily crack use was found to be significant, but the independent correlation with depressive symptoms was weak. None of the measures of sexual behaviours were found to be significant. Four of the measures of psychosocial functioning were found to be independently associated with depressive symptoms. Anxiety symptoms had a positive and strong independent correlation. Self-esteem was negative and strongly correlated. Risk-taking by HIV status correlated moderately. Decision-making confidence had a negative, but weak correlation with depressive symptoms.

### Discussion

This study contributes to the research literature on correlates of depressive symptoms among people using illicit drugs as it focuses exclusively on not-in-treatment African American crack cocaine smokers including individuals with and without HIV infection. The mean score of the depression scale indicated that participants sometimes experienced depressive symptoms and 12% of the sample often or almost always experienced depressive symptoms.

The strongest factors associated with depressive symptoms were found among psychosocial factors. Our data show that anxiety and depressive symptoms were highly correlated. The finding is consistent with clinical studies (Gorman, 1996–1997; Lecrubier, Dolberg, Andersen, & Weiller, 2007). On the other hand, high self-esteem or high decision-making confidence were associated with less often experiencing depressive symptoms. Clinical experiences and research literature show that low self-esteem and impaired decision-making are markers of depressive symptoms and clinical depression [Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), 2000].

Among sociodemographic factors, only gender was found to have an independent effect on depressive symptoms. Consistent with other studies (Lipsitz et al, 1994; Rabkin et al, 1997; Ickovics et al, 2001; Turrina et al, 2001; Charney et al, 2005; Wisniewski et al, 2006) our findings showed that being a women, regardless of HIV status, increased the risk of experiencing depressive symptoms. One interpretation of this finding is that women who use drugs are more likely to have experienced traumatic events in their lives that may activate traumatic stress manifested in depressive symptoms or depression than men (Isrealski et al, 2007). As women smoking crack cocaine often trade sex for drugs/money more than men (Baseman, Ross, & Williams, 1999; Risser et al, 2006), their life in general may be stressful and chaotic. Depression may thus be a reaction to such a life style. Gender issued research is thus warranted in which women's life conditions, in its broadest sense, including frequency and severity of traumatic life events, are being acknowledged.

Use of crack cocaine was independently associated with depressive symptoms, but the association was weak. More than just using crack, intensity of use appears to be the most important component; higher intensity of smoking crack correlated with more often experiencing depressive symptoms. Our findings support other studies (Friedman et al, 2004). As our data are of a cross-sectional character, it is, however, not possible to make any inferences about whether depressive symptoms are secondary to drug use or if drug use is a form of self-medication to ease depression/ depressive symptoms. Thus, longitudinal studies are needed and as Basu et al (2005, p. 2065) point out, it is also important to develop '... reliable instruments able to distinguish true depression and/or anxiety in the setting of substance use from substance induced mood disorders.'

Consistent with other studies (Lipsitz et al, 1994; Knowlton et al, 2000; Malbergier et al, 2001) having HIV infection as such was not found to be associated with depressive symptoms in this sample. However, among HIV-seronegative participants, the interaction between HIV status and risk-taking was found to be associated with depressive symptoms. Contrary to other studies (Ickovics et al, 2001; Boarts et al, 2006; Chander et al, 2006), our data did not show an association between HIV disease progression (i.e. CD4 cell counts) and depressive symptoms. It is possible that HIV diagnosis, as such, is conceptually too broad and that more precisely defined concepts will need to be developed. Future research should address whether HIV-related physical and/or psychological stressors are associated with increased depressive symptoms.

Although injected drug use history and HIV sexual risk behavioural measures correlated with depressive symptoms in bivariate correlational analysis, they were not any longer significant when other variables were controlled for.

This study has limitations. As the samples consist of African American crack cocaine smokers, we cannot generalize our findings to other ethnic groups and/or substance use behaviour. Thus, the results should be replicated in other drug using populations. Conversely, African-Americans are disproportionately affected by HIV infection in the United States and the number of new cases among blacks is increasing due to heterosexual sexual transmission, injected drug use and other illicit drugs. Thus, HIV, drug use, and mental health intervention efforts within this population need to be scaled up and intensified.

Another limitation is related to measurement. Consistent with other studies, our self-reported measure of depressive symptoms is not designed for a diagnostic classification, but to ascertain the presence of depressive symptoms (Knowlton et al, 2000). However, studies show a strong consistency between measures of depressive symptoms and unipolar depressive disorder, indicating a possible continuity between these two conditions (Hirschfeld & Cross, 1982). Moreover, the depression scale of the TCU/SRF does not have a clear cut-off point that



indicates 'high degree of depressive symptoms' or probable clinical depression. Common self-report measures of depressive symptoms include items tapping somatic symptoms, including appetite, sleep disturbance, and fatigue. These symptoms, however, may overlap with the HIV disease process or HIV medications (Knowlton et al, 2000). The depression measurement being used in this study includes one of these physical symptoms, namely fatigue ('You feel extra tired or run down'). As HIV status did not have an effect on depressive symptoms, we can assume that the depression scale measures depressive symptoms and not measuring symptoms of HIV-related symptoms/diseases.

Despite these limitations, our study has important implications for mental health intervention for people using crack cocaine. First, interventions targeting crack cocaine smokers need to encompass psychiatric/psychological treatment services in order to alleviate anxiety symptoms and depressive symptoms/depression. Secondly, there is a need to offer programmes in which negative conditions influencing self-esteem and decision-making confidence are identified and strategies to enhance or repair self-esteem or decision-making confidence are provided. Thirdly, the fact that women compared to men suffered more of depressive symptoms – regardless of HIV status – highlights the necessity to acknowledge specific gender issues in developing mental health, drug use, and HIV interventions. Four, data also suggest that intensified harm reduction programs for people smoking crack cocaine need to be scaled up and improved, as it is the intensity of crack cocaine use that appears to matter as to depressive symptoms. Although HIV status did not correlate with depressive symptoms, clinicians need to be observant of depressive symptoms in crack cocaine smokers with HIV infection as depressive symptoms may have a negative effect on immunological parameters (Alciati, Gallo, Monforte, Brambilla, & Mellado, 2007) and may compromise adherence with ART (Ingersoll, 2004; Chander et al, 2006). In addition, depressive symptoms may increase crack cocaine use, which in turn may enhance the HIV replication process (Roth, Tashkin, Choi, Jamieson, Zack, & Baldwin, 2002), thus increasing viral load and the risk of HIV transmission.

In conclusion, mitigation of anxiety symptoms, enhancement of self-esteem and decision-making confidence, sensitivity of gender issues, and reduction of crack cocaine smoking by means of effective intervention programs may contribute to alleviate depressive symptoms. It is also likely that reducing depressive symptoms may decrease crack cocaine smoking.

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**Table I**

HIV status comparisons by sociodemographic, drug use, sexual behavioral, and psychosocial factors

	HIV STATUS		TESTS	
	HIV-positive N = 183	HIV-negative N = 616	Chi-square	Student's <i>t</i> -test
Gender			39.49***	
Female	55 %	29 %		
Male	45 %	71 %		
Age, mean (SD)	43.47 (7.54)	32.68 (5.80)		-20.53***
Average years of schooling	11.16 (SD=2.13)	11.25 (SD=1.69)		0.54
Employment (proportion)			63.34***	
Employed	15 %	48 %		
Unemployed	85%	52 %		
Marital status (proportion)			5.40*	
Married	22 %	15 %		
Single	78 %	85 %		
Average times used crack in the last 30 days	55.16 (SD=77.14)	71.53 (SD=79.19)		2.47***
Average times used other non-injected drugs in the last 30 days	3.38 (SD=0.85)	3.00 (SD=0.93)		-4.97***
Ever injected drugs (proportion)			98.22***	
Yes	40 %	9 %		
No	60 %	91 %		
Average number of sex partners in the last 30 days	4.54 (SD=7.25)	9.26 (SD=15.88)		3.90***
Ever traded sex for money (proportion)			0.71	
Yes	54 %	50 %		
No	46 %	50 %		
Average number of trading sex for money partners in the last 30 days	6.22 (SD=7.94)	16.97 (SD=33.02)		2.66**
Average self-esteem score	2.99 (SD=0.75)	2.88 (SD=0.76)		-1.66
Average anxiety symptoms score	3.16 (SD=0.74)	3.02 (SD=0.76)		-2.10*
Average decision-making confidence score	3.22 (SD=0.55)	3.13 (SD=0.62)		-1.81
Average risk-taking score	2.96 (SD=0.78)	3.29 (SD=0.79)		4.99***
Average depressive symptoms score	3.10 (SD=0.72)	2.98 (SD=0.72)		-1.92

\*  
p<.05\*\*  
p<.01\*\*\*  
p<.001

Table II a

Correlation matrix of depressive symptoms by sociodemographic factors

	1	2	3	4	5	6	7	8	9	10
1. Depressive symptoms										
2. Gender	.18***									
3. Age	.01	.04								
4. Years of schooling	-.09*	-.07*	.14***							
5. Employment	-.06	-.26***	-.09*	.12***						
6. Marital status	.02	.09*	.05	.02	-.03					
7. HIV status	.07	.22***	.59***	-.02	-.28***	.08*				
8. Gender by HIV status	.10**	.38***	.53***	-.004	-.27***	.09*	.94***			
9. Age by HIV status	.05	.20***	.67***	-.004	-.27***	.08*	.98***	.91***		
10. Employment by HIV status	.05	.20***	.57***	.01	-.15***	.08*	.94***	.88***	.93***	
11. Marital status by HIV status	.07	.22***	.55***	-.01	-.26***	.27***	.93***	.88***	.92***	.88***

\* p≤.05  
 \*\* p≤.01  
 \*\*\* p≤.001



**Table II b**

Correlation matrix of depressive symptoms by drug use and sexual behavioral factors in last 30 days

	1	2	3	4	5	6	7	8	9	10	11
1. Depressive symptoms											
2. Number of times used crack	.15***										
3. Number of other non-injected drugs	-.03	-.08*									
4. Ever injected drugs	.08*	.10**	-.05								
5. Ever traded sex for money	.22***	.11***	.02	.10**							
6. Number of trading sex for money partners	.16***	.25***	.04	-.02	.26***						
7. Number of sex partners	.11**	.29***	-.07	.01	.18***	.54***					
8. Number of times used crack by HIV status	.08*	.35***	.05	.29***	.05	-.01	-.03				
9. Ever injected drugs by HIV status	.06	.03	.03	.72***	.04	-.05	-.06	.45***			
10. Number of other non-injected drugs by HIV status	.08*	-.10**	.29***	.30***	.03	-.07*	-.13***	.49***	.52***		
11. Number of trading sex for money partners by HIV status	.15***	.07	.07	.07*	.18***	.11***	.11**	.36***	.14***	.33***	
12. Number of sex partners by HIV status	.14***	.05	.07	.23***	.12**	.05	.14***	.43***	.35***	.46***	.72***

\* p≤.05  
 \*\* p≤.01  
 \*\*\* p≤.001

Table II c

Correlation matrix of depressive symptoms by psychosocial factors

	1	2	3	4	5	6
1. Depressive symptoms						
2. Anxiety symptoms	.71***					
3. Self-esteem	-.67***	-.52***				
4. Risk-taking	.30***	.33***	-.28***			
5. Decision-making confidence	-.35***	-.25***	.33***	-.22***		
6. Anxiety symptoms by HIV status	.15***	.19***	-.002	-.15***	.04	
7. Risk-taking by HIV status	.11***	.10**	.02	-.03	.02	.94***

\*  
p≤.05\*\*  
p≤.01\*\*\*  
p≤.001

Table III

Multivariate logistic regression analysis predicting depressive symptoms among African-American crack cocaine smokers (n=799)

Variables	Unstandardized Coefficient	Standard Error	Standardized Coefficient	t	p
Constant	2.86	.19	-	14.93	<.001
Female gender	.11	.04	.07	2.45	.02
Years of school	.01	.01	.03	1.47	.14
Gender by HIV status	.01	.08	.01	.14	.89
Frequency of crack use	.001	<.001	.06	2.35	.02
Ever injected drugs	-.08	.05	-.04	-1.79	.07
Ever traded sex for money	.03	.04	.02	.93	.35
Number of trading sex for money partners	<.001	.001	-.02	-.59	.55
Number of sex partners	<.001	.001	.004	.16	.88
Frequency of crack use by HIV status	<.001	<.001	-.03	-.82	.41
Number of other non-injecting drugs by HIV status	-.03	.04	-.07	-.97	.36
Number of trading sex for money partners by HIV status	.01	.01	.05	1.56	.12
Number of sex partners by HIV status	-.005	.01	-.03	-.73	.47
Anxiety symptoms	.43	.03	.45	14.75	<.001
Self-esteem	-.37	.03	-.39	-14.77	<.001
Risk-taking	.01	.02	.01	.45	.65
Decision-making confidence	-.12	.03	-.10	-4.16	<.001
Anxiety symptoms by HIV status	-.01	.05	-.02	-.19	.87
Risk-taking by HIV status	.09	.05	.16	1.98	.05