

# Correlates of Antiretroviral Utilization Among Hospitalized HIV-Infected Crack Cocaine Users

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## Abstract

Despite the availability of antiretroviral therapy (ART), HIV-infected drug users, particularly crack cocaine users, continue to have high HIV-related morbidity and mortality. We conducted a cross-sectional analysis of the baseline data for hospitalized HIV-infected crack cocaine users recruited for Project HOPE (Hospital Visit Is an Opportunity for Prevention and Engagement with HIV-Positive Crack Users) in Atlanta and Miami who were eligible for ART (reported any lifetime use of ART or CD4 <350 cells/ $\mu$ l). Among 350 eligible participants, whose mean age was 44.9 years (SD 7.0), 49% were male, 90% were black, and 81% were heterosexual. The median CD4 count was 144 cells/ $\mu$ l, and 78 of 350 (22%) were taking ART. We conducted a multivariable logistic regression to examine individual, interpersonal, and structural factors as potential correlates of ART use. Reporting  $\geq 2$  visits to outpatient HIV care in the past 6 months (AOR 7.55, 95% CI 3.80–14.99), drug or alcohol treatment in the past 6 months (AOR 2.29, 95% CI 1.06–4.94), and study site being Miami (AOR 2.99, 95% CI 1.56–5.73) were associated with ART use. Current homelessness (AOR 0.41, 95% CI 0.20–0.84) and CD4 <200 cells/ $\mu$ l (AOR 0.29, 95% CI 0.15–0.55) were negatively associated with ART use. Among those taking ART, 60% had an HIV-1 viral load <400 copies/ml; this represented 9% of the eligible population. For HIV-infected crack cocaine users, structural factors may be as important as individual and interpersonal factors in facilitating ART utilization. Few HIV<sup>+</sup> crack cocaine users had viral suppression, but among those on ART, viral suppression was achievable.

## Introduction

ANTIRETROVIRAL THERAPY (ART) dramatically improves morbidity and mortality among HIV-infected individuals, including substance abusers.<sup>1,2</sup> However, persistent disparities in antiretroviral access and use contribute to unnecessary HIV progression and increased mortality among HIV-infected drug users.<sup>1,3</sup> Some barriers to antiretroviral treatment access and utilization include substance use, mental illness, provider communication, medication side effects, lack of social support, poverty, and homelessness.<sup>4–7</sup> These barriers disproportionately burden the HIV-infected urban poor.<sup>5</sup>

One such group that has been disadvantaged relative to access and use of HIV care are HIV-positive crack cocaine users.<sup>8</sup> Crack cocaine use remains common among HIV-infected persons in some urban settings<sup>9</sup> and is known to contribute to the spread of HIV through high-risk sexual be-

haviors.<sup>10,11</sup> In HIV-infected persons, crack cocaine use is associated with irregular engagement in outpatient care,<sup>9,12</sup> reduced antiretroviral adherence,<sup>13,14</sup> accelerated HIV disease progression,<sup>15–18</sup> and a greater risk of AIDS-related death.<sup>15</sup> Symptoms of mental illness commonly affect HIV-infected crack cocaine users<sup>19</sup> and may additionally compromise access to and retention in HIV primary care as well as medication adherence.<sup>13,20,21</sup> An improved understanding of the barriers to antiretroviral utilization among this population is needed in order to better design interventions to address these poor outcomes.

Prior studies have emphasized individual-level barriers to antiretroviral use. In these studies, ART use has been found to be negatively associated with African-American race,<sup>22</sup> female gender,<sup>23</sup> injection drug use,<sup>4,7,24</sup> and depressive symptoms.<sup>25</sup> Among vulnerable populations, interpersonal-level and structural-level factors are as likely to be predictors

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of ART utilization. For example, among HIV-infected injection drug users in Baltimore, Miami, New York, and San Francisco, better patient-provider communication, higher levels of social support, stable housing, access to drug treatment, and medical coverage were associated with improved access to ART.<sup>26</sup> A broad focus that acknowledges the potential importance of identifying these multilevel factors is likely better suited to the development of interventions that will retain and engage HIV-infected crack cocaine users in HIV primary care and support antiretroviral use.

To gain a better understanding of the multilevel barriers to antiretroviral utilization among HIV-infected crack cocaine users, we conducted a cross-sectional analysis of HIV-infected crack cocaine users recruited from the inpatient wards of Grady Memorial Hospital in Atlanta, GA and Jackson Memorial Hospital in Miami, FL; similar analyses have been conducted in other targeted populations.<sup>26,27</sup> We hypothesized that structural-level and interpersonal-level barriers to antiretroviral utilization would remain relevant after adjustment for known individual-level barriers. Our findings may help to inform policy makers and health care providers in the development of interventions and services to improve access to and utilization of ART among this disadvantaged population.

## Materials and Methods

### *Study population and setting*

Participants were recruited from the inpatient hospital wards at Grady Memorial Hospital (GMH) in Atlanta, GA, and Jackson Memorial Hospital (JMH) in Miami, FL. 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 (Hospital Visit Is an Oppportunity for Prevention and Engagement with HIV-Positive Crack Users). After obtaining informed consent, trained interviewers collected interview data at the participant's bedside using a Handheld-Assisted Personal Interview (HAPI). Collected data from interviews included information on sociodemographics, alcohol and drug use, mental health, sexual practices, and medical care. The cross-sectional interview data presented here were collected between August 2006 and February 2010. In addition, data were abstracted from medical and pharmacy records for study participants. This study was approved by the institutional review boards of the University of Miami and Emory University and the research oversight committees of Jackson Memorial Hospital and Grady Memorial Hospital. Participants provided written consent for study participation and release of medical records. They were reimbursed \$25 for the baseline interview, which took approximately 2 hours.

Of the 413 total Project HOPE participants, 350 participants were deemed to be eligible for ART. This group included those who had CD4 cell count less than 350 cells/ $\mu$ l at the time of study enrollment ( $n = 304$ ), were verified as taking ART by the medical chart (an additional 20 participants), or reported prior use of ART (an additional 26 participants). These criteria determining ART eligibility are consistent with the U.S. Department of Health and Human Services Guidelines for the Use of Antiretroviral Agents in HIV-1-infected Adults and Adolescents.<sup>28</sup> We compared those who currently used ART to those who did not.

### *Measures*

The primary outcome of interest was current antiretroviral utilization among eligible participants. ART utilization was a combination of self-report and medical record abstraction. Participants were asked, "Do you currently take any HIV medications?" Utilization of ART was subsequently confirmed by medical record abstraction. ART utilization determined by medical chart was used as the primary outcome because it was more conservative and assumed to be more accurate than self-report alone. If an individual answered "yes" to taking HIV medications but the medical record did not confirm ART use, the individual was considered as not taking ART.

### *Individual-level variables*

Individual-level variables were categorized into demographic, substance use, and health status categories. Demographic variables included age (continuous), sex (male/female), race/ethnicity (black, non-Hispanic/other), education ( $\geq$  versus  $<$  high school diploma or equivalent), self-reported monthly income ( $<$ \$100, \$100–599, or  $\geq$ \$600), current employment (yes/no), and sexual orientation (heterosexual versus other). Substance use variables included crack use frequency during the previous 6 months (daily, weekly, less than weekly), alcohol use frequency during the previous 6 months (daily, less than daily, none), and history of ever using injection drugs (yes/no). Health status variables included use of HIV primary care in past 6 months ( $<$  versus  $\geq 2$  visits), CD4 cell count ( $< 200$  versus  $\geq 200$  cells/ $\mu$ l), and depression risk (yes/no). We used the methods suggested by the Brief Symptom Index (BSI) developers and reported previously to categorize participants as at risk for depression using gender-specific cutoffs from raw scores of the depression component of the BSI-18.<sup>29,30</sup> Higher scores indicate greater depressive symptoms (Cronbach  $\alpha = 0.87$ ).

### *Interpersonal-level variables*

Social support was measured using the Medical Outcomes Study Social Support Survey that assessed domains of emotional support, tangible support, affectionate support, and positive social interaction.<sup>31</sup> Responses were based on a 5-point scale. Higher scores indicate greater social support (Cronbach  $\alpha = 0.98$ ). Participants' scores were dichotomized with an average score of  $\geq 4$  indicating high social support and  $< 4$  indicating low social support. HIV knowledge was measured through 18 questions about transmission risk, role of antiretroviral therapy, and self-care. Responses were summed and dichotomized into  $\geq 80\%$  correct or  $< 80\%$  correct to reflect high or low knowledge. Patient-provider relationship was assessed using the Engagement with Health Care Provider scale, which has been previously validated.<sup>32</sup> The scale includes questions such as, "How much did you feel you could...ask this doctor any questions about your medical condition, get this doctor to listen to your concerns, feel helped by seeing this doctor." The Cronbach  $\alpha$  was 0.96. Results of factor analysis indicated that all items loaded onto a single factor. Responses were highly skewed, with a median score of 2 of a possible range of 0 to 2. Therefore, the measure was recoded as good (2) or less than good (0–1).

Structural-level variables

Structural-level variables included study site (Miami vs. Atlanta), current homelessness (yes/no), participation in a drug or alcohol treatment program in the past 6 months (yes/no), spent any time in a jail, prison, or correctional facility in the past 6 months (yes/no), insurance coverage (any/none), and traded sex for money in the past 6 months (yes/no).

Statistical analyses

Univariate descriptive statistics were used to describe the sample. Unadjusted logistic regression was used to determine factors associated with ART utilization. To examine the independent association of each variable while controlling for the influence of all other variables, a multivariable logistic regression was used to determine factors associated with ART utilization. As recommended by Hosmer and Lemeshow, each variable with a *p* value ≤ 0.25 in bivariate analysis was entered into the model.<sup>33</sup> Independent variables were deleted from the model using a backward elimination approach. Variables with an adjusted *p* value ≤ 0.05 were retained in the final model. In addition, age, gender, and race were forced into the final model. Regression diagnostics yielded no evidence of collinearity. Data were analyzed using the STATA statistical analysis software, version 9 (StataCorp LP, College Station, TX).

Results

Description of sample

Baseline interviews were completed by 413 study participants. As described above, 350 were eligible for ART and were included in the current analysis. Of the final sample of 350 participants, 108 (31%) were currently taking ART per self-report, and 78 (22%) were currently taking antiretroviral medications as confirmed by the medical chart. Of these 78 participants, 52 individuals had a measurement of HIV-1 viral load within 90 days before or after study enrollment, and 31 of the 52 individuals (60%) had an undetectable HIV viral load, defined as viral load < 400 copies/ml (Table 1). Overall, only 9% of those eligible for ART had documentation of having achieved virologic suppression.

Among the 350 study participants eligible for ART, the mean age was 44.9 years (SD 7.0), 49% were male, 90% were black, and the majority were heterosexual (81%) (Table 2). Only 45% of the participants had completed high school or the equivalent, few were employed (3%), and the self-reported monthly income was less than \$600 for 76% of the group. Over

TABLE 2. CHARACTERISTICS OF RESPONDENTS ELIGIBLE FOR ANTIRETROVIRAL THERAPY AT HOPE BASELINE VISIT (n = 350)

Category	Characteristics	N (%)
Individual-level factors		
Demographic	Age (years): mean (SD)	44.9 (SD 7.0)
	Sex: male	171 (49)
	Race: non-Hispanic black	314 (90)
	Education: ≥ High school	158 (45)
	Income, monthly	
	< \$100	134 (39)
	\$100–599	128 (37)
	≥ \$600	83 (24)
Employed	12 (3)	
Sexual preference:	heterosexual	282 (81)
	Crack use	
Substance use	Daily	127 (36)
	Weekly	125 (36)
	Less than weekly	97 (28)
	Alcohol use	
	Daily	63 (18)
	Less than daily	178 (51)
	None	109 (31)
Injection drug use, ever	HIV primary care, ≥ 2 visits in the past 6 months	73 (21)
	CD4 count < 200	152 (43)
Health status	At risk for depression	220 (64)
	Social support: high	247 (71)
	HIV knowledge: high	197 (56)
Interpersonal factors	HIV knowledge: high	212 (61)
	Patient-provider relationship	164 (51)
Structural factors	Current homelessness	138 (40)
	Drug or alcohol treatment: past 6 months	58 (17)
	Incarceration: past 6 months	96 (28)
	Insurance coverage: any	177 (51)
	Trading sex for money	47 (14)
Site: Miami	158 (45)	

TABLE 1. DISTRIBUTION OF RECENT VIRAL LOAD MEASUREMENTS FOR HOPE PARTICIPANTS UTILIZING ANTIRETROVIRAL THERAPY

HIV viral load (copies/ml)	Total n = 52 (%)
< 400	31 (60)
≥ 400	21 (40)

A total of 52 of 78 participants on ART (67%) had HIV-1 viral load data available in the time period 90 days before or after study enrollment.

ART, antiretroviral therapy.

one-third of the sample reported daily crack use during the past 6 months; however, almost one-third reported no alcohol use in the past 6 months. Twenty-one percent reported ever having used injection drugs. Forty-three percent reported two or more HIV primary care visits in the past 6 months. The median CD4 count was 144 cells/μl (SD 167, range 1–1022), and 64% had a CD4 count < 200 cells/μl. Seventy-one percent were considered at risk for depression. Interpersonal factors included 56% with high social support, 61% with high HIV knowledge, and 51% with a strong provider-patient relationship. Structural factor examination indicated current homelessness was common (40%), 17% had participated in drug or alcohol treatment within 6 months, 28% had been incarcerated within 6 months, 51% had insurance coverage of any kind (including Medicare, Medicaid, and the AIDS Drug Assistance Program), and 14% had traded sex for money in the past 6 months.

TABLE 3. UNADJUSTED AND ADJUSTED ASSOCIATIONS WITH ANTIRETROVIRAL THERAPY UTILIZATION AMONG HOPE COHORT (N=350)

Category	Characteristics	Odds ratio (95% CI)	Adjusted OR <sup>a</sup> (95% CI)
Individual-level factors			
Demographic	Age (per year)	1.01 (0.97–1.04)	
	Sex: male	1.06 (0.64–1.75)	
	Race: non-Hispanic black	0.66 (0.30–1.45)	
	Education: ≥ High school	1.04 (0.63–1.72)	
	Income, monthly		
	< \$100	Reference	
	\$100–599	1.72 (0.93–3.19)	
	≥ \$600	2.45 (1.27–4.74)*	
	Employed	0.31 (0.04–2.41)	
	Sexual preference: heterosexual	1.02 (0.54–1.92)	
Substance use	Crack use		
	Daily	Reference	
	Weekly	0.80 (0.44–1.48)	
	Less than weekly	1.17 (0.63–2.17)	
	Alcohol use		
	Daily	Reference	
Health status	Less than daily	1.00 (0.48–2.09)	
	None	1.77 (0.83–3.75)	
	Injection drug use, ever	0.79 (0.41–1.50)	
	HIV primary care: ≥ 2 visits in the past 6 months	7.84 (4.28–14.35) <sup>†</sup>	7.55 (3.80–14.99) <sup>†</sup>
	CD4 count < 200	0.36 (0.21–0.61) <sup>†</sup>	0.29 (0.15–0.55) <sup>†</sup>
Interpersonal factors	At risk for depression	0.51 (0.30–0.86) <sup>‡</sup>	
	Social support: high	1.32 (0.79–2.21)	
	HIV knowledge: high	1.05 (0.63–1.77)	
Structural factors	Patient-provider relationship: strong	2.74 (1.58–4.75) <sup>†</sup>	
	Current homelessness	0.38 (0.21–0.67) <sup>†</sup>	0.41 (0.20–0.84) <sup>‡</sup>
	Drug or alcohol treatment: past 6 months	3.11 (1.71–5.67) <sup>†</sup>	2.29 (1.06–4.94) <sup>‡</sup>
	Incarceration: past 6 months	1.33 (0.77–2.30)	
	Insurance coverage: any	1.98 (1.17–3.63) <sup>‡</sup>	
	Trading sex for money	0.47 (0.19–1.15)	
Site: Miami	3.63 (2.11–6.23) <sup>†</sup>	2.99 (1.56–5.73) <sup>†</sup>	

<sup>a</sup>Age, race, and gender were forced into the multivariable model but were not significant in the final model.

\* $p \leq 0.01$ .

<sup>†</sup> $p \leq 0.001$ .

<sup>‡</sup> $p \leq 0.05$ .

### Bivariate analysis

In unadjusted logistic regression analyses (Table 3), the characteristics associated with increased odds of currently taking ART were monthly income at least \$600, at least two HIV primary care visits in the past 6 months, strong provider-patient relationship, participation in drug or alcohol treatment in the past 6 months, having any insurance coverage, and study site being Miami. Decreased odds of taking ART were associated with having a CD4 cell count less than 200 cells/ $\mu$ l, presence of depressive symptoms, and being currently homeless.

### Multivariable analysis

Results from multivariable logistic regression (Table 3) demonstrated that reporting at least two HIV primary care visits (AOR 7.55, 95% CI 3.80–14.99), drug or alcohol treatment in the past 6 months (AOR 2.29, 95% CI 1.06–4.94), and study site being Miami (AOR 2.99, 95% CI 1.56–5.73) remained statistically significantly associated with increased odds of current ART utilization. Factors that remained statistically significantly associated with decreased odds of ART

use included a CD4 cell count of less than 200 cells/ $\mu$ l (AOR 0.29, 95% CI 0.15–0.55) and current homelessness (AOR 0.41, 95% CI 0.20–0.84). Other demographic and drug use covariates were not significant in the final model.

### Discussion

The findings from this study provide insight into the correlates of antiretroviral utilization among a unique population, hospitalized HIV-positive crack cocaine users, who have historically had worse health outcomes than others infected with HIV. Nonutilization of ART plays a significant role in the poor health outcomes among this group. In this cross-sectional analysis, only 22% of the eligible participants were taking ART, and only 9% had an undetectable HIV-1 viral load. Importantly, structural, interpersonal, and individual-level factors all played significant roles in determining ART use.

Among the structural factors evaluated, having participated in drug or alcohol treatment in the previous 6 months, having any health insurance coverage, and enrollment in Miami were associated with increased odds of ART utilization in the bivariate analysis. Drug or alcohol treatment and

enrollment in Miami remained significant in multivariable analysis. The significance of drug treatment suggests that despite a lack of pharmacologic replacement for cocaine, participation in drug treatment is strongly correlated with taking ART. We speculate that drug treatment programs may specifically encourage participation in primary health care or individuals who are motivated to enter drug treatment may also be motivated to take ART to improve their health. A growing body of literature supports the integration of substance abuse treatment into HIV primary care,<sup>34-37</sup> and future studies could consider the benefits specifically for cocaine users. Although pharmacologic therapy for cocaine addiction is not currently available, there are promising therapies that need further study, such as the cocaine vaccine (currently in clinical trials), modafinil, disulfiram, dopamine- $\beta$ -hydroxylase inhibitors, selective serotonin reuptake inhibitors (SSRIs), and baclofen.<sup>38</sup> In the future, perhaps HIV providers can consider incorporating use of these therapies into the care of HIV-positive cocaine-dependent patients, in order to improve rates of ART utilization and, ultimately, clinical outcomes.

The low frequency of insurance coverage in the group (51%) is concerning and reflects challenges in establishing ongoing financing for HIV care in this population. Having any insurance coverage was associated with ART use, which is not surprising, given the costs associated with primary health care for HIV-infected individuals. This association highlights that existing health care safety nets, such as those supported by the Ryan White Comprehensive AIDS Resources Emergency (CARE) Act, Medicaid, and AIDS Drug Assistance Programs (ADAP) may not reach enough of the HIV-infected population, particularly crack cocaine users.<sup>39</sup>

Enrollment in Miami was strongly associated with higher odds of ART utilization; the reasons for this may be related to fundamental differences in the culture of prescribing physicians, local beliefs of the HIV-infected populations about ART, transportation, or social services between the two cities. These factors were not measured as part of this study but could be the focus of a future investigation.

Homelessness was correlated with decreased odds of ART utilization in both bivariate and multivariable analyses. This may be due to lack of space to keep medications, lack of personal safety, fear of disclosing HIV status to others, and life priorities that may compete with the activities needed to participate in HIV primary care and take antiretroviral medications. This finding suggests that provision of stable housing for HIV-infected individuals could increase uptake of ART. Stable housing coupled with case management as an intervention for homeless HIV-positive individuals has been shown to be successful in Chicago,<sup>40</sup> but housing alone showed equivocal results in a multicenter trial in Baltimore, Chicago, and Los Angeles.<sup>41</sup> Housing as an intervention to improve ART utilization among HIV-positive crack cocaine users in the Southeast should be explored.

The main interpersonal factor associated with ART utilization in this study was having a strong patient-provider relationship. High levels of trust and open communication between patients and providers are required to encourage patients to begin and maintain ART use. Indeed, trust in physicians has been found to play a role in racial disparities in HIV diagnosis and care.<sup>42</sup> This finding suggests that interventions directed toward the provider and clinic may be important to increase ART utilization. At the present time, the

Accreditation Council for Graduate Medical Education recommends providing substance abuse training for residents in family medicine and obstetrics/gynecology. However, this is not required for programs in internal medicine or infectious diseases, and physicians trained in these areas will undoubtedly be providing the bulk of medical care for HIV<sup>+</sup> individuals in the United States. Intensive training for chief residents in internal medicine has been shown to improve their knowledge and confidence in the ability to diagnose and teach about substance abuse,<sup>43</sup> and similar programs could be implemented for internists broadly as well as for infectious disease physicians. In addition, mid-level providers, nurses, medical assistants, and office staff should also receive training on engaging cocaine users in medical care.

The individual factor correlated with ART utilization in bivariate analyses included monthly income  $\geq$ \$600. This finding suggests that extreme poverty limits an individual's ability to take ART, likely due in part to competing priorities and transportation limitations. Perhaps coordination with income assistance programs could be incorporated into HIV primary care in order to increase the likelihood of ART utilization for the crack cocaine-using population.

Among individual health status factors, having at least two visits to HIV primary care in the previous 6 months was associated with increased odds of ART utilization on bivariate and multivariable analyses. It is difficult to obtain ART without visiting a qualified medical provider. This highlights the importance of engagement and retention in care for HIV-positive crack cocaine users to improve ART utilization rates.

CD4 count less than 200 cells/ $\mu$ l and being at risk for depression were the individual health status factors associated with decreased odds of ART utilization on bivariate analysis; CD4 count less than 200 cells/ $\mu$ l also remained significant on multivariable analysis. These findings demonstrate that without ART, HIV-positive individuals' immune system will show a decline, measured by the CD4 cell count. Endorsement of depressive symptoms has previously been shown to be associated with decreased odds of medication adherence in general populations<sup>44</sup> as well as decreased odds of ART utilization among HIV-positive individuals.<sup>45</sup> Treatment of depression in HIV-positive individuals appears to improve depression symptoms<sup>46</sup> as well as HIV medication adherence,<sup>45,47</sup> and future studies could specifically consider depression therapy as an intervention to improve ART utilization and adherence for crack cocaine users.

Only 9% of the participants eligible for ART in this analysis had an undetectable viral load ( $<$ 400 copies/ml). Given the high frequency of HIV risk transmission behaviors among crack cocaine users,<sup>11,48-52</sup> this figure reinforces the ongoing potential for transmission and the need for prevention interventions, including addressing structural and individual barriers to ART access and adherence. Of those taking ART with a viral load available, 60% had an undetectable viral load, suggesting that once ART is prescribed, virologic suppression is attainable. Despite ongoing crack use, HIV-infected crack cocaine users have the ability to take medication reliably and to achieve virologic suppression, thereby reducing their risk of HIV transmission and improving their HIV-related outcomes. Given the limitations of this cross-sectional study, it was not possible to determine whether those individuals on ART with detectable viral load ( $\geq$ 400 copies/ml) were in the process of responding or failing therapy.

Some of the limitations of this study include the design, context of participant recruitment, generalizability, and missing data. The cross-sectional analysis precludes any conclusions of causality between the examined variables and the outcome. The study enrolled participants when they were hospitalized for medical reasons, and this context could have influenced the results in several ways. The responses to the baseline questionnaire may have been affected by the environment (hospital room), the presence of other medical personnel, concurrent medical illness, and the context of being hospitalized. However, interview staff took all precautions to complete the interview in private and in a manner respectful of ongoing medical care. The findings may not be generalizable to other HIV-infected drug-using populations since this population lived in urban areas of the southeastern United States (Atlanta or Miami) and specifically used crack cocaine. Missing viral load data limits our ability to draw conclusions about correlates of virologic suppression. Viral load data were collected only when available in the laboratory tracking systems and were not routinely collected as part of the study procedure.

Our criteria for determining eligibility may be one more limitation of the study. Part of the eligibility criteria depended on self-report of ART utilization in the past, and previous studies in drug users have used self-report for determining ART use.<sup>26</sup> However, self-reported ART use has been shown to be somewhat unreliable, both in general HIV populations receiving care and community-recruited injection drug users.<sup>53,54</sup> Therefore, it is possible that the group that we considered eligible for ART was an overestimation by 26 participants. If these participants were eliminated from our analysis, the overall prevalence of ART utilization may have increased slightly.

In summary, individual, interpersonal, and structural-level factors influence the utilization of ART for HIV-infected crack cocaine users. Our data suggest that HIV-infected individuals who are active crack cocaine users can engage in HIV primary care, take ART, and ultimately achieve HIV virologic suppression. Knowing that factors influencing the use of ART in this study were having a monthly income  $\geq$  \$600, abstinence from alcohol, depressive symptoms, engagement in HIV primary care, having a strong relationship with a medical provider, homelessness, insurance coverage, and Miami residence could help design interventions to improve antiretroviral use and outcomes in this vulnerable population.

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### Author Disclosure Statement

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