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Correlates of HIV Testing among Rural African American Cocaine Users

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Abstract

Andersen's Revised Behavioral Model of Health Services Use (RBM) was used as a framework in this correlational cross-sectional study to examine factors associated with HIV testing among a sample of 251 rural African American cocaine users. All participants reported using cocaine and being sexually active within the past 30 days. Independent variables were categorized according to the RBM as predisposing, enabling, need, or health behavior factors. Number of times tested for HIV (never, one time, two to four times, five or more times) was the outcome of interest. In ordered logistic regression analyses, HIV testing was strongly associated with being female, of younger age (predisposing factors); having been tested for sexually transmitted diseases or hepatitis, ever having been incarcerated in jail or prison (enabling factors); and having had one sex partner the past 30 days (health behavior factor). Other sexual risk behaviors, drug use, health status, and perception of risk were not associated with HIV testing. Our findings confirm the importance of routine testing in all healthcare settings rather than risk-based testing.

Keywords

HIV; AIDS; HIV testing; HIV risk; cocaine; drug use; substance use; rural; African-American

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In the rural South of the United States (US), there are wide disparities in human immunodeficiency virus/autoimmune disease syndrome (HIV/AIDS) infection rates in African Americans as compared to Whites. The Centers for Disease Control and Prevention (CDC) reported that in 2010, 44.6% of all diagnosed cases of AIDS and 46% of all newly

diagnosed cases of HIV among adolescents and adults were in the South (CDC, 2012). Rural persons are diagnosed with HIV at a later stage of infection than urban residents, rural men are diagnosed later than rural women, and African Americans are diagnosed later than Whites (Weis, Liese, Hussey, Gibson, & Duffus, 2010).

African Americans bear the greatest burden of HIV/AIDS in the South, which is the only region in which AIDS cases among African Americans outnumber cases among all other groups (Prejean, Tang, & Hall, 2012). African American men in Southern states comprise 71.4% of newly diagnosed rural men, while African American women in Southern states comprise 75.7% of newly diagnosed rural women (Prejean et al., 2012). Yet, African Americans with HIV in the South initiate antiretroviral treatment later than other regions and have substantially more HIV-related morbidity (Armstrong & del Rio, 2011).

Non-injection crack cocaine use is an independent correlate of HIV, after adjusting for sociodemographic factors (Khan et al., 2013). Crack cocaine users consistently report higher levels of sexual risk behaviors, such as multiple and concurrent sexual partnerships and transactional sex (any instance of trading or receiving sex for drugs, money, food, or other commodities) compared with non-drug users and other drug users, including injection drug users whose primary drug is heroin (CDC, 2013; Khan et al., 2013). In our earlier work among rural substance users, although African American drug users were more likely than Whites to use condoms, they also were more likely to have sex when using drugs, to have multiple partners, and to engage in transactional sex (Wright et al., 2007; Wright, McSweeney, Frith, Stewart, & Booth, 2009).

High-risk behavior is not the sole reason for increased risk of HIV among rural African American cocaine users. In rural communities, the closeness of social relationships and limited pool of available sex partners can restrict social and sexual networks to other high-risk partners (Chu & Selwyn, 2008; Draus & Carlson, 2009; Wright, Stewart, Curran, & Booth, 2013). Considering the disproportionately high incidence of HIV and AIDS and late diagnoses among African Americans, especially in the rural South, identification of factors that influence HIV testing among this population is critical. The purpose of this study was to identify factors associated with HIV testing in rural African American cocaine users.

Correlates of HIV Testing

As the essential entry point for HIV prevention and treatment, HIV testing is a key strategy for reducing both transmission and progression of HIV. Since 2006, the CDC has recommended routine testing for HIV for persons between the ages of 13-64 years of age in all healthcare settings. Yet in 2010, only 45% of adults participating in a national survey reported ever being tested (CDC, 2013). Annual testing is recommended for persons who are at higher risk due to their own risk behaviors or because they live in high-prevalence areas (CDC, 2006). Persons considered at higher risk include men who engage in sex with other men, men or women with concurrent sex partners, those having unprotected sex, past and present injection drug users, sex partners of injection drug users, substance users (especially of crack cocaine), and persons with a history of sexually-transmitted disease (USPSTF, 2012). Repeat testing allows those who continue to engage in risk behaviors such as drug

use to become aware of their status early so they can begin necessary medical treatment and adopt HIV- preventive behaviors to protect themselves and others (CDC, 2006).

In one of the earliest studies of repeat HIV testing, repeat testing was associated with high-risk behaviors, history of sexually-transmitted diseases (STD), knowing others who were HIV-positive, and considering testing as part of a regular check-up (Norton, Elford, Sherr, Miller, & Johnson, 1997). More recently, Kalichman and Cain (2008) found that among patients of a sexually-transmitted disease clinic, those who had never been tested for HIV and repeat testers both reported significantly greater risks for HIV than patients who had been tested only once. In a nationally representative, population-based study of self-reported HIV test frequencies in the US, testing rates were lower among rural than among urban residents, and rural residents were less likely to report they had been tested in the past year (Ohl & Perencevich, 2011). African Americans are more likely than other racial/ethnic groups to report being tested for HIV (64.5%), compared to 46.4% of Hispanics and 41.4% of Whites (CDC, 2013). However, compared to Whites, African Americans are diagnosed later in the course of the disease, progressing to AIDS within three years of receipt of an HIV positive test (CDC, 2010). The CDC estimates that approximately 21% of African Americans with HIV/AIDS are unaware of being infected (CDC, 2012). This is a driving force in the spread of HIV for two reasons: 1) the majority of new HIV infections are transmitted by persons who are unaware they are infected, and 2) undiagnosed persons do not benefit from the availability of effective antiretroviral therapy and advances in treatment that extend lifespan and reduce infectivity (CDC, 2009).

Among African Americans, testing rates are higher among younger women compared to younger men but lower among older women than older men (Du, Camacho, Zurlo, & Lengerich, 2011). Many younger African American women reported they received testing for HIV as part of prenatal care and/or reproductive services (Wright, Stewart, Curran, & Booth, 2013), which could contribute to their higher rates of testing. African American men, however, reported they were tested in settings where testing is mandatory or incentives were given, such as prison or substance abuse programs (Doshi, Malebranche, Bowleg, & Sangaramoorthy, 2013).

Self-report of HIV testing among African American drug users may be less than accurate. In a qualitative study among rural African American cocaine users, both men and women said they knew they had been tested for HIV because their blood was taken for lab tests by their health care providers, or because they had been treated in emergency departments for accidents or injuries (Wright et al., 2013). Young women reported they had been tested for HIV because they had a Pap test every year (Wright et al.).

Although many researchers have focused on HIV risk and prevalence among African Americans in the South, few have focused specifically on HIV testing behaviors of rural African American cocaine users. In this study, we systematically examined factors associated with the use of HIV testing services to answer our research question: Which predisposing, enabling, need, and health behavior factors are significantly associated with the outcome of HIV testing among rural African American cocaine users?

Methods

Study Design

This correlational descriptive study was a secondary analysis of baseline data from a behavioral clinical trial designed to test the effectiveness of a sexual risk reduction intervention for rural African American cocaine users. HIV testing was not part of the intervention.

Setting

Arkansas is a Southern state with a large percentage of rural residents and no large metropolitan statistical area. The total population of Arkansas is 2.6 million, and according to the Office of Management and Budget (OMB) definition of rural, 48% of the population of Arkansas lives in rural areas (USDA, 2012). Farming/agriculture is a major component of the Arkansas economy, accounting for one out of six jobs and 15% of state labor income. Participants were recruited from two contiguous rural counties in the Mississippi River Delta region of southeast Arkansas that are predominantly African American and poverty-ridden, and which have higher rates of HIV and sexually transmitted diseases (STIs) than other areas of the state (Arkansas Department of Health, 2010; US Census Bureau, 2012).

Inclusion and Exclusion Criteria

Persons were eligible for the study if they (a) were age 18 or older; (b) were self-described as African American, Black, or mixed race of African American ancestry; (c) reported using either powder or crack cocaine at least once in the last 30 days; (d) reported engaging in oral, vaginal, or anal sex at least once in the last 30 days; (e) reported not participating in a drug treatment program at the time of study entry; and (f) resided in one of the two study counties. Persons were excluded from the study if they were incarcerated or could not provide contact information. Of 324 persons screened, 73 did not meet the inclusion criteria, leaving a total sample of 251. Reasons for exclusion included underage (n = 1), no drug use (n = 18), current substance use treatment (n = 2), no sexual activity (n = 13), refusal (n = 23), and other (n = 16).

Power calculations were conducted post hoc. Results ranged from 85-90% power to detect a difference of 20%. We indicate power as a range rather than a specific number because it is for the collection of bivariate tests conducted in our secondary analysis, not for one specific bivariate test.

Behavioral Model of Health Services Use

The revised behavioral model of health services use (RBM) developed by Andersen (1995) has been used in similar studies (Borders & Booth, 2007; French, Fang, & Balsa, 2011) and was used to organize the variables proposed to influence HIV testing among rural African American cocaine users. The model categorizes predictors of health services use as a) population characteristics, which include predisposing characteristics, enabling resources, and need; b) environment, which includes the health care system and external environment; c) health behavior, which includes personal health practices and use of health services; and

d) outcomes, which can include perceived health status, evaluated health status, and consumer satisfaction.

Measures

Outcome variable: HIVtesting—The outcome or dependent variable of interest in this study was the number of times the participant reported he or she had ever been tested for HIV. For statistical analyses, we recoded lifetime number of HIV tests as three dummy variables, with *never tested* as the referent, in comparison to one test (*yes/no*), 2-4 tests (*yes/no*), and 5 or more tests (*yes/no*) using break points determined by frequency data. They also were asked, "Have you ever been told by a healthcare provider that you had HIV, the AIDS virus (*yes/no*)?"

These items are from the HIV infection and testing section of the Risk Behavior Assessment (RBA), a structured-interview questionnaire developed by the National Institute on Drug Abuse (NIDA) in 1991, in collaboration with AIDS Cooperative Agreement grantees. The RBA was designed for use with multiracial populations of injecting and non-injecting drug users across the United States and covers HIV infection and HIV testing history, drug use history, and sexual behaviors States (Needle et al., 1995). Although we did not conduct test-retest reliability studies with our sample, other investigators working with street-based drug users have reported test-retest reliability for number of times ever tested for HIV as $r = .82$ (Fisher, Reynolds, Jaffe, & Johnson, 2007).

Predisposing factors—We operationalized predisposing factors as four items: age, gender, education, and annual income. Age was a continuous variable. We dichotomized gender as male or female and scored *yes* if the person self-identified as male. We dichotomized (*yes/no*) education and scored *yes* if the person reported having completed high school, general equivalency diploma (GED), or more. Annual income was dichotomized (*yes/no*) and scored *yes* if the person reported an annual income of less than $10,000.

Enabling factors—According to Andersen (1995), in order for health services to be used, the services must be available, and persons must have the means to make use of them. Six items were operationalized as enabling factors: history of drug treatment (*yes/no*) was scored *yes* if the participant reported ever receiving treatment for drug use. History of mental health treatment (*yes/no*) was scored *yes* if the participant reported ever using mental health services. Ever tested for hepatitis B (*yes/no*) was scored *yes* if a participant reported ever getting tested for hepatitis B. Ever tested for sexually-transmitted disease (STD) (*yes/no*) was scored *yes* if a participant reported ever being tested for gonorrhea or syphilis. Having routine health care visit in the past 12 months (*yes/no*) was a proxy for having a usual source of healthcare, and was scored *yes* if the participant reported that blood pressure, diabetes, or cholesterol had been checked by a health care provider within the past 12 months. Previous use of any of these health services may have provided potential opportunities for HIV testing or recommendations for testing and/or provided a gateway to identification of and meeting other kinds of needs. History of incarceration (*yes/no*) was included as an enabling factor because it provided potential opportunities to be tested and was scored *yes* if the

patient reported ever being incarcerated in local/county jail or state/federal prison. Arkansas regulations mandate that state inmates be tested for HIV when discharged from state prisons (Arkansas Code Annotated (ACA) 20-15-901). Participants were not asked whether they were incarcerated in a local jail, state, or federal prison, or if they had been tested while incarcerated.

Need factors—We operationalized need factors as measures of self-reported physical and mental health status in the past month, severity of drug use in the past 30 days, and perceived chance of acquiring HIV. We used the Standard Form (SF-12) version 2.0 (SF-12v2) as our measure of physical and mental health status. The SF-12v2 consists of 12 questions that measure eight domains of perceived functional health and well-being (Ware, Kosinski et al., 1996). Among our sample, Cronbach alpha for internal consistency reliability of the 12 items that compose the SF-12v2 was 0.87 and was 0.85 for the eight domains.

The measure can be analyzed as a physical health component summary scale (PCS12) and a mental health component summary scale (MCS12). To score the two summary scales, a norm-based method was used that was neither age- nor gender-biased (Ware, Kosinski, Turner-Bowker, & Gandek, 2002). Using this method, scores are transformed to be comparable to a mean of 50 and a standard deviation of 10 in the 1998 general US population (Saris-Baglama et al., 2004). The possible range is 0 to 100, with a score of 0 indicating worst and 100 indicating best health (Saris-Baglama et al., 2004). Given that both the physical and mental health composites make use of the same 8 *z*-scores, although with different factor coefficients (Ware, Kosinski et al., 1996), we did not produce Cronbach alphas for PCS12 and MCS12 separately. In a large sample of low-income African Americans in the South, Larson et al. (2008) reported the PCS12 and the MCS12 demonstrated internal consistency reliability, with alpha coefficients of 0.80 and 0.78, respectively. Results of multi-trait analysis showed that both PCS12 and MCS12 had item-convergent and discriminant validity, with item-scale correlations ≥0.40 (Larson et al., 2008). In the same study, concurrent validity for PCS12 and MCS12 scores was also demonstrated, in that scores were correlated with participant-reported number of days of poor physical and mental health during the past month (Larson et al., 2008).

The drug use composite score from the Addiction Severity Inventory (ASI) was used to measure problem severity related to drug use in the past 30 days (McLellan, Cacciola, Alterman, Rikoon, & Carise, 2006). The ASI is one of the most widely-used addiction assessments, allowing extensive comparison with more well-researched populations (McClellan et al., 1985; McClellan et al., 1992). The ASI composite score for drug use consists of 13 items, including a checklist of substances, excluding alcohol and nicotine, used over the past 30 days, and the number, duration, and intensity of problematic symptoms related to drug use. Possible scores range from 0 (*no problem*) to 1.0 (*extremely serious*), with higher scores indicating greater problem severity (McLellan et al., 2006); this score is generally viewed as an indicator of need for treatment.

Psychometric performance of the ASI has varied widely depending on the population and the assessment strategy. In a systematic review of the psychometrics of the ASI across 10

studies, Cronbach alpha for the drug use section ranged from 0.58 to 0.79 (Mäkelä, 2004). Cronbach alpha for the drug use component composite score of the ASI was 0.69 in a field study when administered under non-ideal conditions in inner-city drug abuse clinics (Leonhard, Mulvey, Gastfriend, & Shwartz, 2000). The ASI has been shown to be associated with HIV-risk behaviors among substance abusers across numerous studies, in which Cronbach alpha coefficients were 0.54 to 0.79 (Mäkelä, 2004; McClellan et al., 2006). Among our sample of not-in-treatment cocaine users, the Cronbach alpha coefficient was 0.56.

To measure perception of being at risk for HIV, we collapsed a five-category measure (0% chance, 25% chance, 50% chance, 75% chance, 100% chance) from the RBA Sexual Activity Scale (Needle et al., 1995) into a dichotomous variable (*yes/no*). If the person reported any chance greater than 0%, perceived chance of acquiring HIV was scored *yes*. In previous studies of out-of-treatment drug users, investigators reported a Cronbach alpha coefficient of .81 (Fisher, Reynolds, Jaffe, & Johnson, 2007).

Health behavior factors—We categorized sexual risk behaviors and number of drug use days as behavioral health factors. Unlike observable health risk behaviors, sexual risk behaviors are inherently private, situation-specific, and difficult to assess, therefore, as pointed out by Weinhardt and colleagues (1998), there is no gold standard with which to compare self-reported sexual behavior (Weinhardt, Forsyth, Carey, Jaworski, & Durant, 1998). Measures of sexual risk behavior were taken from the RBA Sexual Activity Scale (Needle et al., 1995) of self-reported sexual behaviors during the previous 30 days. The scale includes items related to number and gender of sex partners, types of sex (oral, vaginal, and anal), condom use, and transactional sex.

Four items were used to calculate the number of times the participant had vaginal sex, eight items were used to calculate the number of times the participant had anal sex with either a male or female partner, and eight items were used to calculate the number of times the participant had oral sex with either a male or female partner. The number of oral, anal, and vaginal sexual encounters reported in the past 30 days was summed to produce the total number of sexual encounters.

Four items were used to calculate the number of times the participant used a condom or latex barrier with vaginal sex, eight items were used to calculate the number of times the participant used a condom or latex barrier with anal sex with either their male or female partner, and eight items were used to calculate the number of times the participant used a condom or latex barrier with oral sex with either their male or female partner. The number of times the participant reported using a condom or latex barrier during oral, anal, and vaginal sex in the past 30 days was summed to produce the total number of times condoms or latex barriers were used during sexual encounters.

We used the RBA to create the dichotomous variable unprotected sex (*yes/no*) by calculating the difference between the number of times the participant reported that he or she had anal, vaginal, or oral sex in the past 30 days and the number of times he or she reported using latex or other barrier protection during anal, vaginal, or oral sex in the past 30 days. We

scored unprotected sex *yes* if the participant never used condoms, or used condoms less than 100% of the time with anal, vaginal, or oral sex during the past 30 days. We defined more than one sex partner as a dichotomous variable (*yes/no*), which we scored *yes* if the participant reported having more than one sex partner in the past 30 days.

We collapsed three items from the RBA-- number of times gave sex for drugs, number of times gave drugs for sex, and number of times gave sex for money in the past 30 days-- to create a dichotomous variable of transactional sex (*yes/no*). Recent transactional sex was scored *yes* if a respondent reported that in the past 30 days they engaged in any instance of trading or receiving sex for drugs, money, food, or other commodities. Lifetime transactional sex was scored *yes* if the respondent reported ever having traded or received sex for drugs, money, food, or other commodities.

Although the RBA had not been validated among rural African American drug users, test-retest reliability was r =.83 among urban African American drug users (Fisher, Reynolds, Jaffe, & Johnson, 2007), and test-retest reliability was .82 using Spearman correlation among injection and smoking crack cocaine users (Johnson, Fisher, & Reynolds,2000). The RBA uses different items for men and women, as well as different items depending on the gender of the participant's sexual partners. Cronbach alphas were calculated for each subset of items because half of the questions are only relevant to men or women but not both. For the males and having sex with males only, almost all the data were missing, and no alpha was computed. Cronbach alpha was 0.73 for men having sex with women only, 0.86 for men having sex with both men and women, 0.66 for women having sex with men only, 0.99 for women having sex with both men and women, and 0.88 for women having sex with only women. Cronbach alpha for the three transactional sex items was 0.84.

Two continuous variables were used to measure drug use: number of days used marijuana in the past 30 days, and number of days used powder and/or crack cocaine in the past 30 days. In other studies among drug users not in treatment, reliability coefficients for self-reported drug use ranged from r = .80 to r = .90 (Dowling-Guyer et al, 1994; Johnson et al., 2000).

Procedures

Recruitment strategy—Street-based respondent driven sampling (RDS) (Heckathorn, Semaan, Broadhead, & Hughes, 2002; Salganik & Heckathorn, 2004;), a variant of snowball sampling, was used to recruit 251 participants for the parent study, a clinical behavioral trial of a sexual risk reduction intervention, between February 2009 and February 2011. RDS has been used successfully to recruit rural drug users in other studies (Booth et al., 2010; Wang, Falk, Rahman, & Carlson, 2007). Using RDS, outreach workers recruited 5-10 initial participants, known as seeds, in each county. These seeds began the RDS recruitment process.

Identified seeds provided informed consent and completed a screening form. Those who were eligible completed the baseline survey instrument and were given five coupons and instructed to give them to “people like you” and to ask recruits to call the number on the card if they were interested in being in the study. Each coupon had a distinct code that linked the coupon to the referring participant, contact information for the study staff, and

instructions for making an appointment to check their eligibility for the parent study. Upon completion of that screening process, if the individual referred was in fact eligible, the referent received $10. The referent received a payment of $10 for each eligible referral he or she made. They were allowed up to five referrals, due to the rural setting and small target population. However, participants were only reimbursed for their first three eligible referrals, to ensure that a range of social networks in the study population were represented in the sample and to minimize potential bias towards a particular social network in the sample (Heckathorn et al., 2002). Each new recruit also received five referral cards to distribute to others, thus creating recruitment waves to reach more widely into social networks within the community (Heckathorn et al., 2002).

Interviewer training and data collection—Interviewers received extensive training by the investigative team over two weeks. They were trained in encouraging episodic memory recall, protecting confidentiality, crisis management, cultural sensitivity, and promoting a supportive and non-judgmental atmosphere during the assessment. Training included practice interviews and role-play scenarios. Before they were allowed to interview participants, interviewers were required to pass a “check-off” of interview skills administered by investigators.

The University of Arkansas for Medical Sciences Institutional Review Board approved this secondary analysis of the behavioral clinical trial. Written informed consent was obtained from each participant. The baseline assessment for the clinical trial lasted about 2 hours, with one 10-minute break. Participants received $20 after completing the assessment interview along with other incentives such as condoms, personal care items, and t-shirts.

Data collected during the interviews were monitored for integrity and completeness on an ongoing basis by the study data manager and investigators. Investigators made site visits throughout the study to observe data collection procedures and debrief interviewers.

Statistical Analysis

We used SAS 9.1 software to conduct all analyses. Descriptive statistics for all variables included distributions, frequencies, means, and ranges. We used ordered logistic regression to examine the relationships between multiple levels of HIV testing and the predisposing, enabling, need, and health behavior variables. The ordered logistic regression model estimates one equation over all levels, and the proportion odds number is used to determine if the assumption that ordered logistic coefficients are equal across all levels (University of California at Los Angeles, n.d.). The ordered logistic regression model assumes that change in the level of the dependent variable is cumulative; that is, in moving through the different levels of the dependent variable, the regression coefficients (slopes) remain the same, and only the intercepts change. A positive coefficient corresponds to a positive relationship with HIV testing level. Change in level of testing was viewed as cumulative; persons in each level were compared to those in groups with less than or equal to that level of HIV testing.

Results

Characteristics of Sample

Descriptive characteristics of the sample of 251 are shown in Table 1. The sample was composed of an almost equal number of men and women (129 males, 122 females) with a mean age of 38 years. Almost 50% did not have a high school education, and three-quarters were unemployed, with almost all reporting an annual income of less than $10,000. Few had ever injected drugs. Because of the low variance, injection drug use and income were excluded from further analyses.

Only 38% had ever received treatment for substance abuse, and an even smaller percentage had ever received treatment services for mental health. Most reported they had been tested for a sexually transmitted disease (STD) other than HIV, while about half had been tested for hepatitis. Most had visited a health care provider for routine care within the past 12 months. The majority had been incarcerated in local, state, or federal criminal justice facilities during their lifetimes.

The mean scores for both the physical health and mental health components of the SF-12v2 fell within one standard deviation of the norm of the US standard population norm of 50, indicating some physical and health problems but not impaired functioning. ASI drug composite scores varied widely from .01 to .52, with a mean score of .17, which is higher than among the general population but lower than among in-treatment samples in other studies (Saffier, Colombo, Brown, Mundt, & Fleming, 2007; Weisner, McLellan, & Hunkeler, 2000).

Less than 25% reported they had never been tested for HIV. Of those who had been tested for HIV, 70% were first tested between the years 2000-2010, and most (81%) reported their last test was between 2006 and 2011 (data not shown in Table 1). Only one participant reported being positive for HIV/AIDS.

Bivariate Analyses

Ordered levels of HIV testing was the outcome variable in bivariate analyses. Chi square analyses for categorical independent variables are shown in Table 2, while ANOVAs for continuous independent variables are shown in Table 3. None of the predisposing factors (gender, age, or education) was related to HIV testing in bivariate analyses. All enabling factors (history of drug treatment, history of mental health treatment, history of incarceration in jail or prison, ever getting tested for sexually transmitted disease other than HIV or ever getting tested for hepatitis, routine health care visit within the past 12 months) were positively associated with HIV testing. Persons were more likely to report they had been tested for HIV if they had ever received drug treatment or mental health services, ever been incarcerated, or had received routine health care the past year.

Among need factors, only the Addiction Severity Index drug use composite score for the past 30 days was significant, with higher scores positively associated with HIV testing. The mean ASI drug composite score was 0.14 among persons who had never been tested, as compared to 0.20 among those who had been tested five or more times. Neither self-reported

physical and mental health status for the past four weeks nor perceived risk of acquiring HIV were significantly linked to testing. No health behavior factors were associated with testing.

Multivariate Analysis

We then conducted a multivariate ordered logistic regression entering all independent variables simultaneously as shown in Table 4. The proportion odds number for the model was $p = .29$, supporting validity of a one-equation model. Male gender and older age were negatively associated with testing. Three enabling factors were strongly and positively associated with testing: Those ever being incarcerated in jail or prison, who had ever been tested for sexually-transmitted disease, and who had ever been tested for hepatitis were three times as likely to have been tested as those without those factors. Previous drug and mental health treatment were no longer significantly associated with testing, and no need factors were associated with HIV testing. The only health behavior significantly associated with testing was having more than one sex partner the past 30 days; persons with more than one sex partner were less likely to be tested than those with one partner.

Discussion

HIV testing among rural African American cocaine users was strongly associated with age, gender, and the enabling factors of prior testing for sexually-transmitted disease and hepatitis B, as well as with a history of incarceration in jail or prison. These findings suggest that among rural African American drug users, HIV testing is more likely to occur as part of testing for other communicable diseases, rather than as stand-alone testing in sites specifically identified with HIV testing. Other services may provide a more socially acceptable cover for testing or a gateway or prompting for testing (Young & Zhu, 2012), and this could be especially important to rural residents.

We were told repeatedly that “everybody knows everybody in a small town” in qualitative data from the larger study, and many voiced concerns about getting tested for fear of others knowing they had been tested (Wright, Stewart, Curran, and Booth, 2013). The community connectedness of health care in rural settings and its impact on use of health services were also reported by Baernholdt, Jennings, Merwin, and Thornlow (2010). However, not all service use predicted HIV testing. Substance abuse or mental health treatment services was not independently associated with testing after adjusting for other more powerful variables; nor was receiving routine health care the past 12 months.

Male gender and older age, both predisposing factors, were associated with lower odds of testing, as reported by others (Nearns, Baldwin, & Clayton, 2009; Rizza, MacGowan, Purcell, Branson, & Temesgen, 2012; Weis, Liese, Hussey, Gibson, & Duffus, 2010). This may be attributed in part to the fact that younger women receive HIV testing as a part of routine prenatal care, a testing opportunity not available to men or older women. Younger women may also have additional opportunities for testing as part of contraception health care services. Krawczyk, Funkhouser, Kilby, and Vermund (2006) suggested that community, family, and faith-based stigma could help explain why African American men who have sex with men (MSM) are reluctant to be tested. Doshi, Malebranche, Bowleg, and

Sangaramoorthy (2013) reported poverty, lack of health insurance, confidentiality concerns, fear of a positive test result, low perceived risk, and overall lower health care utilization as reasons African American men did not get tested. There may be potential value in linking male-specific screenings to HIV testing, such as promoting HIV testing in settings where men are likely to be receiving free blood pressure checks or prostate cancer screenings. Collaborations between agencies promoting health screenings of various types, either in the public health unit or health fair setting, would be an important strategy to consider, if set up to make it easy for people to participate in HIV screening without walking into a van/office/cubicle marked “HIV testing.” Incarceration was associated with testing. In Arkansas, state prison inmates are tested for HIV upon discharge from prison, but testing is not mandated or routinely offered in local or county jails. Our data did not differentiate among incarceration types or include where participants had been tested.

More than half our sample believed that they were not at risk of acquiring HIV, even though they used cocaine and engaged in behaviors that put them at increased risk (e.g., inconsistent condom use, multiple partners). This low perception of risk while engaging in high-risk behaviors is troubling and is supported in other studies (Nunn et al., 2011; Wright, Stewart, Curran, & Booth, 2013). For example, among predominantly African American men and women in Philadelphia, perceived risk for acquiring HIV was not associated with either receiving an HIV test or with engaging in sexual risk behaviors (Bond, Lauby, & Batson, 2005). The United States Preventive Services Task Force (USPSTF) recommends routine screening for all adolescents and adults at risk for HIV (Martin & Schackman, 2013), but evidence of a discrepancy between perceived risk and risk behaviors emphasizes the importance of routine rather than risk-based testing.

Not only do our findings indicate missed opportunities for testing, but they also lend support to the CDC's recommendation of routine, opt-out testing in all healthcare settings for all persons between the ages of 13 and 64 (CDC, 2006). Providers should be encouraged to increase routine testing and integrate testing with primary care, specialized care, and substance use treatment, to reach a much wider group of at-risk individuals.

Additional implications of these results include the need for research on whether routine, opt-out testing can changes perceptions of the stigma of HIV testing, and whether routine testing is more acceptable to urban versus rural residents or more acceptable to men versus women (given that our results suggest that there might be such differences). From a behavioral science standpoint, this research underscores the need to enhance the accuracy of individuals’ risk perception. This may be facilitated by interventions grounded in the Health Belief Model (Rosenstock, Strecher, & Becker, 1994), to increase the accuracy of individuals' perceptions of their personal susceptibility to health consequences such as HIV and STD, or Prochaska and Diclemente's (1986) transtheoretical model, to increase individuals' awareness of the consequences of their risky behaviors.

Limitations

The generalizability of the results is limited by the use of respondent-driven sampling rather than random sampling in the larger behavioral clinical trial from which these data were used. Random sampling is not feasible with hidden populations such as illicit drug users.

Similarly, the sample was limited to non-injecting cocaine users, and findings may not be transferable to rural African Americans who are injectors or use drugs other than cocaine, or to other rural or ethnic groups. A third limitation is that our data did not include historical measures of risk behaviors (except for a lifetime measure of ever trading sex), so we were unable to construct a life history of risk or determine whether lifetime risk behaviors were associated with testing. Heavy use of dichotomous variables was another limitation, as was the lack of test-retest reliability evidence specific to rural African American cocaine users. As our study was a secondary analysis, we were constrained by available data, but stability and construct validity of the measures has been well-documented among other populations. Finally, all data were self-reported by active drug users with no verification of accuracy by clinical measures. Indeed, we cannot verify the actual extent of HIV testing. Self-reported testing for HIV may have been based on participants' assumption that they had been tested as part of other health services when, in fact, they may not have been tested.

The unique community-based sample of a rarely-investigated and vulnerable population arguably outweighs the limitations. The data on which this secondary analysis are based were obtained directly from rural African American cocaine users living in the community, rather than the more common data sources of service providers or cocaine users in clinics, treatment programs, or jails. Community-based sampling is important if we are to understand factors in the rural environment that hinder or facilitate HIV testing among the large proportion of African American cocaine users who are not in drug treatment.

Conclusion

Our findings confirm the importance of routine testing in all healthcare settings rather than risk-based testing. Although risk reduction and risk awareness interventions targeting individual risk behaviors are critical elements of HIV prevention, they are not sufficient to increase testing and slow the spread of HIV among high-risk populations. Public health campaigns are urgently needed to frame testing as taking care of oneself and one's health, rather than only relevant for those with self-identified risky behaviors. Interventions also are needed to encourage clinicians to implement routine testing in primary care and other health settings such as substance abuse treatment, local health units, and STD clinics.

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Table 1

Sample Description (N=251)

	Variables	*n*	%	Range	Mean	*SD*
Tested for HIV	Never	60	23.90			
	One time	53	21.12			
	2-4 times	85	33.86			
	5 or more times	53	21.12			
Predisposing factors	Male	129	51.39			
	Age			18-65	37.97	12.70
	High school education or more	125	49.08			
	Employed for wages	61	24.30			
	Annual income < $10,000	168	90.87			
Enabling factors	History substance use treatment	96	38.25			
	History mental health treatment	58	23.11			
	History incarceration (prison or jail)	186	74.10			
	History sexually transmitted disease test	182	72.51			
	History hepatitis B test	142	57.03			
	Routine physical health care visit past 12 months	203	80.88			
Need factors	Perceived at risk for HIV	112	44.62			
	SF-12 physical component summary score			19.58 - 68.11	45.56	10.84
	SF-12 mental component summary score			6.97 - 75.34	45.30	11.83
	Addiction Severity Index drug composite score			0.01 - 0.52	0.17	0.11
Health behavior factors: Lifetime risk	Ever engaged in transactional sex	98	39.04			
	Ever injected drugs	8	3.19			
Past 30 day risk	Engaged in transactional sex	49	19.52			
	Unprotected oral, vaginal, or anal sex	189	75.30			
	More than one sex partner	80	31.87			
	Days used marijuana			0-30	12.53	12.47
	Days used cocaine			1-30	10.15	12.19

Note. SD = standard deviation. SF-12 = Short-Form Health Survey (Ware et al., 2002).

Table 2

Factors Associated with Number of Self-Reported HIV Tests in Chi Square Analyses of Dichotomous Variables (N = 251)

Factor Type	Factor	No Test	One Test	Two-Four Tests	Five or More Tests		
		n (%)	*n (%)*	*n (%)*	*n (%)*	Chi Square (DF=3)	*p*
Predisposing	Gender					1.77	.62
	Male	31 (24.03)	29 (22.48)	40 (31.01)	29 (22.48)		
	Female	23 (18.85)	24 (19.67)	45 (36.89)	30 (24.49)		
	High School Education or more					2.57	.46
	Yes	28 (22.40)	25 (20.00)	47 (37.60)	23 (20.00)		
	No	26 (20.63)	28 (22.22)	38 (30.16)	34 (26.98)		
Enabling	History substance use treatment					8.34	.04
	Yes	12 (14.58)	22 (22.92)	34 (35.42)	28 (29.17)		
	No	42 (27.10)	31 (20.00)	51 (32.90)	31 (20.00)		
	History mental health treatment					19.08	.02
	Yes	10 (17.24)	6 (10.34)	21 (36.21)	21 (36.21)		
	No	44 (22.80)	47 (24.35)	64 (33.16)	38 (19.69)		
	History incarceration (prison or jail)					14.93	.002
	Yes	34 (16.92)	46 (22.89)	68 (33.83)	53 (26.37)		
	No	20 (40.00)	7 (14.00)	17 (34.00)	6 (12.00)		
	History sexually transmitted disease test					43.05	<.0001
	Yes	21 (11.54)	38 (20.88)	71 (39.01)	52 (28.57)		
	No	33 (47.83)	15 (21.74)	14 (20.29)	7 (10.14)		
	History hepatitis B test					42.49	<.0001
	Yes	12 (8.33)	30 (20.83)	54 (37.50)	48 (33.33)		
	No	42 (39.35)	23 (21.50)	31 (28.97)	11 (10.28)		
	Routine physical health care visit past 12 months					9.19	.03
	Yes	36 (17.73)	44 (21.67)	72 (35.47)	51 (25.21)		
	No	18 (37.50)	9 (18.75)	13 (27.08)	8 (16.67)		
Need	Perceived HIV risk					4.08	.25
	Yes	21 (18.75)	19 (16.96)	43 (38.39)	29 (25.89)		
	No	33 (23.74)	34 (24.46)	42 (30.22)	30 (21.58)		

Factor Type	Factor	No Test	One Test	Two-Four Tests	Five or More Tests		
		n (%)	*n (%)*	*n (%)*	*n (%)*	Chi Square (DF=3)	*p*
Health Behavior	Lifetime transactional sex					1.96	.58
	Yes	41 (21.69)	30 (20.11)	51 (37.01)	31 (21.16)		
	No	19 (30.65)	15 (24.19)	15 (24.19)	13 (20.97		
	Transactional sex past 30 days					3.21	.36
	Yes	10 (20.41)	12 (24.49)	13 (26.53)	14 (28.57)		
	No	50 (24.75)	41 (20.30)	72 (35.64)	39 (19.31)		
	Unprotected oral, vaginal or anal sex past 30 days					3.99	.26
	Yes	37 (19.58)	38 (20.11)	70 (37.04)	44 (23.28)		
	No	17 (27.42)	15 (24.19)	15 (24.19)	15 (24.19)		
	More than one sex partner past 30 days					2.48	.48
	Yes	18 (22.50)	21 (26.25)	23 (28.75)	18 (22.50)		
	No	36 (21.05)	32 (18.71)	62 (36.26)	41 (23.98)		

Note: DF= degrees of freedom

Table 3

Factors Associated with Number of Self-Reported HIV Tests in GLM One-way ANOVA of Continuous Variables (N=251)

Factor Type	Factor	Never tested (*n*=60)		One test (*n*=53)		Two - four tests (*n*=85)		Five or more tests (*n*=53)			
		M	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***F***	***p***
Predisposing Need	Age	41.11	13.78	39.66	13.98	36.38	11.37	35.88	11.79	2.43	.07
	SF-12 physical component summary score	44.68	10.49	44.24	12.08	45.63	10.70	47.46	10.17	0.97	.41
	SF-12 mental component summary score	43.52	10.16	46.45	10.58	46.25	12.73	44.52	12.96	0.84	.47
	Addiction Severity Index drug composite score	.14	.10	.16	.11	.18	.10	.19	.11	2.75	.04
Health Risk Behavior Past 30 Days	Days used marijuana	10.06	11.97	11.74	12.11	12.29	12.26	18.86	13.14	2.23	.09
	Days used cocaine	10.42	10.04	12.49	9.98	12.18	9.85	13.54	10.83	0.91	.44

Note. GLM = generalized linear model; *ANOVA* = analysis of variance; *M* = mean; *SD* = standard deviation; *p* = probability; *F* = distribution, Fischer's *F* ratio.

Table 4

Factors Influencing Probability of Testing for HIV in Full Model Multivariate Ordered Logistic Regression (N = 250)

		Adjusted Odds Ratio	95% CI		*p*
Factor Type	**Factor**		**LL**	**UL**	
Predisposing	Male	0.56	0.32	0.99	.04
	Age	0.97	0.95	0.99	.02
	High school education or more	0.98	0.60	1.61	.93
Enabling	History substance use treatment	1.68	0.92	3.05	.09
	History mental health treatment	1.83	0.99	3.38	.06
	History incarceration (prison or jail)	3.37	1.75	6.50	.0003
	History sexually transmitted disease test	3.69	2.03	6.71	<.0001
	History hepatitis B test	3.62	2.13	6.14	<.0001
	Routine physical health care visit past12 months	1.48	0.78	2.81	.24
Need	Perceived at risk for HIV	1.36	0.80	2.29	.26
	SF-12 physical component summary score	1.01	0.99	1.03	.43
	SF-12 mental component summary score	1.01	0.99	1.03	.41
	Addiction Severity Index drug composite score	5.52	0.12	250.97	.38
Health behavior:Lifetime	Engaged in transactional sex	0.98	0.50	1.89	.94
Health behavior: Past 30 Days	Engaged in transactional sex	1.40	0.63	3.14	.41
	Unprotected oral, vaginal or anal sex	1.10	0.62	1.95	.75
	More than one sex partner	0.48	0.27	0.85	.01
	Days used marijuana	1.01	0.99	1.04	.34
	Days used cocaine	1.00	0.97	1.03	.97

Note: Test for proportional odds assumption p= 0.299, which indicated validity requirements for the one-equation model were satisfied. Levels of HIV testing: never, one time, 2-4 times, 5 or more times. One observation of 251 dropped due to missing data. CI = confidence interval: *LL* = lower limit; *UL* = upper limit; *p* = probability.