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Factors Related to Past HIV Testing among South African Non-Injection Drug Users

Lauren R. Ropelewski[a,*], **Alicia Hulbert**[b], and **William W. Latimer**[a]

[a]Department of Mental Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland, United States

[b]Department of Oncology, Johns Hopkins University School of Medicine, Baltimore, Maryland, United States

Abstract

South Africa has some of the highest estimates of HIV in the world, with a prevalence of 21.5%. Despite this, based on population-level data, 40% of sexually active South Africans have never been tested for HIV. Non-injection drug users (NIDUs) are a high-risk and increasingly prevalent group in South Africa. However, few studies have examined HIV test utilization among high-risk groups such as drug users in South Africa. The study was conducted in Pretoria, South Africa between 2002 and 2006. Of the 382 individuals surveyed, 31% had been tested for HIV in the past. Results indicate that females and older individuals were significantly more likely to have been tested for HIV at some point in the past, while individuals who did not know someone with HIV/AIDS as well as individuals who are unsure of their risk of HIV infection were significantly less likely to have ever accessed testing. Identification of these subgroups has implications for the development of targeted interventions to promote greater HIV testing among at-risk groups in South Africa.

Keywords

HIV testing; non-injection drug use; South Africa

Introduction

The prevalence of human immunodeficiency virus (HIV) in the Republic of South Africa (RSA) is one of the highest in the world, estimated at 21.5% (Mboup, Musonda, Mhalu, & Essex, 2006). A national survey conducted in 2009 indicates that 61% of sexually active individuals in RSA have been previously tested for HIV (South African Government Information, 2009). Although this represents an improvement from a previous estimate of 47% in 2006, 40% of the sexually active population remains untested (South African Government Information, 2009).

Insufficient HIV testing presents a multifaceted problem. Testing services, and knowledge of one's HIV serostatus, provide an entry point for prevention and treatment of HIV (Peltzer, Matseke, Mzolo, & Majaja, 2009). Factors positively related to HIV testing in RSA include older age, greater education, greater HIV knowledge, higher risk perception, and knowing someone with HIV (Shisana et al., 2005; Hutchinson & Mahlalela, 2006; MacPhail, Pettifor, Moyo, & Rees, 2009; Boulle et al., 2008; MacPhail et al., 2009). These same factors have

*Corresponding author. lropelew@jhsph.edu.

been identified in other countries as being associated with testing (Bond, Lauby, & Batson, 2005; Chen, Erbelding, Yeh, & Page, 2009; Goodman & Berecochea, 1994; Weiser et al., 2006; Stein & Nyamathi, 2000), in addition to factors like drug use and treatment (Bond et al., 2005; Goodman & Berecochea, 1994; Stein & Nyamathi, 2000), female sex (Goodman & Berecochea, 1994; Weiser et al., 2006), increased HIV risk behaviors (Solomon, Moore, Gleghorn, Astemborski, & Vlahov, 1996; Goodman & Berecochea, 1994; Song et al., 2011), and access to testing and healthcare (Weiser et al., 2006; Bond et al., 2005). Furthermore, the decision to utilize HIV testing is complicated by fear (Pettifor, MacPhail, Suchindran, & Delaney-Moretlwe, 2010), stigma (Kalichman & Simbayi, 2003; Peltzer, Nzewi, & Mohan, 2004), healthcare system characteristics (World Health Organization [WHO], 2000; World Health Organization [WHO], 2008; Asante, 2007), and access to treatment (Asante, 2007; WHO, 2008).

Although HIV testing is an important issue for the entire population, certain sub-groups such as drug users are especially high-risk, and should be targeted for testing. Non-injection drug use has been identified as an independent risk factor for HIV (Parry et al., 2008), and is thought to facilitate risky sexual practices via impaired cognition and increased sexual desire (Parry, Carney, Petersen, Dewing, & Needle, 2003; Drumright & Colfax, 2009; Parry & Pithey, 2006). Furthermore, non-injection drug use has become increasingly popular in RSA (Parry et al., 2009). Cannabis is the most commonly used illicit substance (Peltzer & Ramlagan, 2007) with current and lifetime use estimated at 2.1% (Shisana et al., 2005) and 11%–19% (Kalichman et al., 2006), respectively. Lifetime cocaine use is estimated at 2–3% (Kalichman et al., 2006), and heroin, methamphetamine, and crack cocaine use are also on the rise (Parry et al., 2009; Parry & Pithey, 2006). In 2005, 45% of individuals in treatment facilities reported methamphetamine (Plüddemann et al., 2006), 18% reported crack cocaine/powdered cocaine, and 12% reported heroin (Parry & Pithey, 2006) as their primary or secondary substances of abuse.

Despite community-based examinations of HIV testing (Parry et al., 2009; Kalichman & Simbayi, 2003), and knowledge that non-injection drug users (NIDUs) are a high-risk group (Parry et al., 2008; Drumright and Colfax, 2009), there has been little investigation into testing among NIDUs in RSA. One study has examined uptake of testing among individuals with high-risk sexual or substance use behaviors in Pretoria, RSA (Luseno & Wechsberg, 2009), although it was restricted to an all female sample and lacked multivariate analyses. As a result, we aim to identify factors associated with prior HIV testing among a sample of black South African NIDUs. Selection of factors related to testing in this study was guided in part by the information-motivation-behavioral skills model of health behavior (Fisher & Fisher, 1992), which purports that information (knowledge) and motivation (beliefs and attitudes) are important for influencing HIV testing decisions. Knowledge of such factors will enable identification of sub-populations of NIDUs in need of targeted interventions to promote HIV testing.

Methods

Data source

The NEURO-HIV Epidemiologic Study is an epidemiological examination of neuropsychological, social-behavioral risk factors for HIV, hepatitis A, B, and C infections with sites in the United States (US), RSA, and Russia. This manuscript utilizes data from the RSA site, which enrolled participants between 2002 and 2006 in the Pretoria area. The study was funded by the National Institute on Drug Abuse (NIDA) Southern Africa Initiative as a supplement to a parent study (RO1 DA014498). The study and consent forms were approved in the US by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board and in South Africa by the South African Medical Research Ethics

Committee. Informed consent procedures and baseline assessments were conducted at Louis Pasteur Medical Center at the University of Pretoria.

Participants

Participants were recruited from drug treatment programs, bars, emergency rooms, health clinics, and street outreach. Eligibility criteria included age 18–40 years, self-report of cocaine and/or heroin use within the past 6 months, and living in or around Pretoria. Informed consent was obtained prior to baseline assessments. Participants received financial remuneration (200 ZAR, approximately US $25) for a completed visit. A total of 410 participants were recruited. This analysis excludes a small number of individuals (n = 28) who did not identify their race/ethnicity as "black South African" because of substantial socio-economic differences between black and non-black individuals in RSA (May, 1998; Seekings & Nattrass, 2005). Additionally, the number of non-black subjects was too small to allow for analysis of data by race/ethnicity. Thus, the present study is based on cross-sectional data from the baseline assessment for a sample of 382 black South African participants, all of whom reported only non-injection drug use.

Measures

Participants completed an interviewer-administered assessment for the purpose of ascertaining demographic characteristics, as well as an interviewer-administered HIV-risk behavior interview, adapted from tools developed during landmark studies of HIV risk behavior (e.g., Vlahov, Anthony, Celentano, Solomon, & Chowdhury, 1991). The interview was pilot-tested in RSA prior to use in this study. The HIV-risk behavior interview included information on drug-related HIV risk behaviors (e.g., relapse, cessation, etc.), a range of drugs used (e.g., cannabis, heroin, other opiates, cocaine, etc.), route of administration, frequency and quantity used, and information on sexual practices (e.g., number of partners, condom use, etc.). Interviews were conducted in English. Based on discussions with health professionals in RSA, it was anticipated that all participants would be fluent in English.

Blood and urine samples were collected during the baseline assessment visit. Urinalysis assessed the presence of psychoactive substances using gas chromatography-mass spectrometry methods. Blood samples were tested for HIV and viral hepatitis A, B, and C. Urinalysis and HIV testing were conducted at a laboratory operated by a national pathology service. Participants were notified of their HIV status following testing. HIV-positive participants were referred to treatment clinics and provided with counseling to prevent the spread of HIV. HIV-negative participants were offered HIV prevention counseling.

Variables

Demographic variables—Based on the observed distribution, age was categorized into tertiles (age <21, 21–24, ≥25). Education was categorized as less than a high school education, some high school, and a high school diploma or greater.

Drug use, HIV/AIDS-related personal experiences and risk perception, sexual practices, and HIV testing variables—Drug types assessed via urinalysis included cannabiniods, cocaine, and opiates. Participants were also asked whether they know someone with HIV/AIDS (yes or no), and how likely they thought they were to become infected with HIV (no chance, very unlikely, somewhat to very likely, and do not know). Number of lifetime partners was assessed as a categorical variable. Response choices included <3 lifetime partners, 3–5 partners, 6–10 partners, and greater than 10 partners. Ever buying or selling sex (prostitution) was assessed (yes or no). HIV testing prior to study entry (yes or no) was also assessed.

Statistical analyses

Descriptive statistics were used to describe the sample. Chi-square (χ^2) tests were used to assess the statistical significance of relationships between HIV testing prior to study entry and socio-demographic, drug use, HIV/AIDS-related personal experience and HIV risk perception, and sexual practices variables at an alpha level of 0.05. Bivariate and multivariate logistic regressions were used to calculate odds ratios (ORs), adjusted odds ratios (aORs), and 95% confidence intervals (CI). Variable selection for the multivariate model was based on the literature (Chen et al., 2009; Fisher & Fisher, 1992) and χ^2 p-values <0.05 in bivariate models. Variables selected for the adjusted model included: sex, age, education, use of cannabinoids, knowing someone with HIV/AIDS, HIV risk perception, number of lifetime partners, and buying or selling sex.

All 382 participants provided information on prior testing. For each covariate, missing data was less than 4%. A complete case analysis was performed. The percentage of missing data was small and, therefore was not expected to bias the results (Lipsitz, Parzen, & Ewell, 1998). All analyses were performed using STATA statistical software version 10.0 (Statacorp, 2007).

Results

Participant characteristics

Participant characteristics are shown in Table 1. Half (51%) were female and one-third (31%) reported prior testing. One-third (33%) of participants were under the age of 21, 30% were between ages 21 and 24, and 37% were 25 or older. Nearly half of respondents (47.1%) had completed some high school. Eighty-five percent tested positive via urinalysis for cannabinoids, 36% for cocaine, and 56% for opiates. Fifty-nine percent of individuals reported knowing someone with HIV/AIDS, although 51% of participants believed that there was “no chance” they would become infected with HIV. Sixty-seven percent had 3 or more lifetime sexual partners, and 39% had ever bought or sold sex.

Correlates of prior HIV testing

Demographic factors—Female sex (OR= 6.24, 95% CI, 3.74–10.42), older age (OR= 2.27, 95% CI, 1.27–4.03; OR= 2.18, 95% CI, 1.25–3.79), and having a high school education or greater (OR=2.00, 95% CI, 1.11–3.64) were significantly associated with prior HIV testing in the unadjusted model. Female sex (aOR=7.91, 95% CI, 4.04–15.50) and older age (aOR=2.05, 95% CI, 1.06–3.95; aOR= 2.30, 95% CI, 1.17–4.53) remained significantly associated in the adjusted model.

Drug use—A positive urinalysis for cannabinoids was significantly associated with a decreased likelihood of prior HIV testing (OR=0.48, 95% CI, 0.27–0.86) in the unadjusted model. Use of other drugs was not associated with testing in either the unadjusted or adjusted models.

HIV/AIDS-related personal experience and risk perception—In the unadjusted model, knowing someone with HIV/AIDS was associated with prior testing (OR= 2.28, 95% CI, 1.42–3.64), and continued to be significant in the adjusted model (aOR=1.92, 95% CI, 1.12–3.29). Uncertainty of one's risk for becoming infected with HIV was significantly negatively associated with prior HIV testing (aOR= 0.45, 95% CI, 0.23–0.87) in the adjusted model.

Sexual practice factors—Buying or selling sex was associated with past HIV testing in the unadjusted model (OR=2.01, 95% CI, 1.29–3.13). Having 3 to 5 lifetime sexual partners

was significantly associated with prior HIV testing in the unadjusted (OR= 2.69, 95% CI, 1.53–4.75) and adjusted (aOR= 2.23, 95% CI, 1.17–4.23) models.

Discussion

Only 31% of our sample reported prior HIV testing. This contrasts with population-level estimates indicating that 61% (South African Government Information, 2009) of individuals in RSA have ever been tested, as well as with community-based estimates suggesting higher rates of testing (Pettifor et al., 2010; MacPhail et al., 2009; Luseno & Wechsberg, 2009). This finding is troubling when considering the high estimates of HIV in RSA, and that NIDUs are a prevalent and high-risk group (Parry et al., 2008; Parry et al., 2009; Drumright & Colfax, 2009).

Females were much more likely than males to report prior testing. One possible explanation is that HIV testing is often offered at antenatal clinics in RSA (AVERT.org; MacPhail et al., 2009). Regardless, this is encouraging; females bear a disproportionate burden of the HIV epidemic in RSA (13.3% of females versus 8.2% of males in RSA are HIV+; Shisana et al., 2005). Given these findings, the fact that HIV transmission in RSA is primarily driven by heterosexual intercourse (WHO, 2008), and that male-to-female transmission of HIV occurs at a much higher rate than female-to-male transmission (MacPhail, Williams, & Campbell, 2002; Nicolosi et al., 1994), males should be targeted for testing. It is possible that the epidemic is partly driven by males with unknown serostatus, who might otherwise modify behavior in favor of prevention.

Consistent with previous work (Shisana et al., 2005; Hutchinson & Mahlalela, 2006), older individuals were more likely to report prior testing. Younger individuals may be less likely to perceive a need for testing due to an optimistic bias regarding future health, or as a result of misinformation regarding HIV. Another finding, consistent with prior research (Hutchinson & Mahlalela, 2006; MacPhail et al., 2009), shows that participants who know someone with HIV/AIDS were nearly twice as likely to report prior HIV testing. It is possible that people who do not personally know someone with HIV/AIDS may be lacking a salient example of how HIV/AIDS can affect someone's life.

Participants who were unsure of their risk for HIV infection were 55% less likely to report prior testing, as compared to those believing that there was "no chance" that they would become infected with HIV. Efforts to promote awareness of HIV risk and subsequent promotion of HIV testing among this group can possibly be achieved as part of existing HIV and sex education programs in South African schools (IRIN/PlusNews). Due to high rates of school dropout in RSA, and since dropout is associated with early and unsafe sexual behavior (World Bank, 2002; Odum & Drolet, 1997), these prevention efforts should be targeted toward younger children, while many are still enrolled in school and before most have become sexually active (Ahmed, Flisher, Mathews, Mukoma, & Jansen, 2009). Another novel finding is that having 3–5 lifetime sexual partners, as compared to fewer than 3 partners, was associated with a greater likelihood of reporting past testing. One possible explanation is that individuals with 3–5 lifetime sexual partners were significantly more likely to be female (p=0.037; data not shown), and therefore more likely to have been tested.

The decision to seek HIV testing can be complicated. Significant barriers must be dealt with when attempting to increase routine testing, including stigma, healthcare system characteristics, and access to treatment. In addition to being widespread, HIV/AIDS is highly stigmatized in RSA. In a national survey, 26% of respondents indicated that they were unwilling to share a meal with, 18% were unwilling to sleep in the same room with, and 6% would not talk to someone with AIDS (Shisana & Simbayi, 2002). These attitudes

may reduce willingness to undergo testing, and also serve to socially isolate individuals with known HIV-positive status (Kalichman & Simbayi, 2003; Peltzer et al., 2004).

Characteristics inherent to healthcare systems in Africa, and utilization of these services must be considered. For various reasons, healthcare systems in Africa have been considered weak, with an inadequate workforce to serve the population (WHO, 2000). Africans, particularly the poor, tend not to use healthcare unless they are very ill. In the case of HIV/AIDS, waiting until an advanced stage of the disease manifests before seeking treatment has led to early death rates, which has further threatened the credibility of antiretroviral therapy (ART) delivery in RSA (Lawn et al., 2008). Furthermore, research suggests that individuals with substance abuse problems in RSA have a reduced likelihood of accessing healthcare services (Luseno, Wechsberg, Kline, & Middlesteadt Ellerson, 2010). ART uptake is also low among South Africans. At the end of 2007, only 28% of infected persons were receiving treatment for HIV; this rate is below average as compared to other lower- and middle-income countries (WHO, 2008).

Another issue is access to treatment following testing. Access to treatment and medical care is essential to encouraging individuals to utilize testing (Asante, 2007). In fact, research shows that individuals in RSA would be more willing to get tested for HIV if ART was easily available following testing (Pettifor et al., 2010). Although knowledge of one's serostatus, even without treatment, could induce behavior change that may reduce HIV transmission, undergoing testing when there is no access to treatment may seem futile to many (Asante, 2007). RSA has the largest ART program in the world, but given that it also has one of the world's largest HIV epidemics, access to treatment is low (AVERT.org).

Limitations of the study should be acknowledged. First, this study is cross-sectional. Therefore, conclusions cannot be drawn regarding the temporal order of variables examined. This was a non-random sample, focused on a hard-to-reach population. Additionally, all participants self-reported their race to be black African. Due to the substantial socio-economic differences between races in RSA (Seekings & Nattrass, 2005), and the fact that poverty is largely concentrated among blacks (61% of black Africans are poor, compared with 1% of whites; May, 1998), these findings may not generalize to NIDUs of other races. Furthermore, it should be noted that the outcome variable—lifetime HIV testing—is not an optimal measure. A more in-depth assessment of HIV testing should include frequency of testing, how recently testing was accessed, and so on.

Given these limitations, future studies could collect information not available in the present study: access to testing, perceptions of stigma that act as barriers to testing and treatment, awareness of and access to treatment, as well as examine the associations between testing and other key HIV risk determinants among substance users, such as gender differences, sexually transmitted infections, experiences with violence, incarceration, and so on. Additionally, the present sample was largely recruited from treatment and healthcare facilities. Since many of the participants were already accessing healthcare, and only 31% of these individuals were previously tested, these facilities represent important locations for routine testing to be promoted and offered.

Despite the identified limitations, this study fills an important gap in the literature by examining factors associated with prior HIV testing among black South African NIDUs, a relatively understudied hard-to-reach population. The findings have identified several subgroups of NIDUs for whom targeted promotion of HIV testing could be beneficial. Knowledge of one's HIV serostatus can play an important role in curtailing the spread of HIV by allowing individuals to engage in prevention strategies, and by providing an entry

point to HIV treatment. Such knowledge is especially important among high-risk groups and in areas of the world where HIV is endemic.

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Table 1

Characteristics of non-injection drug users in South Africa, 2002–2006 (*n* = 382).

	Total (*n* =382)	No Prior Testing (*n*=264)	Prior Testing (*n*=118)	p-value
Demographics				
Sex - %				
Male	48.9	61.4	20.3	<0.001
Female	51.1	38.6	79.7	
Age in years - %				
<21	33.4	38.5	22.0	0.007
21–24	30.0	27.5	35.6	
≥25	36.6	34.0	42.4	
Highest level of education - %				
<High school	31.6	33.2	28.0	0.029
Some high school	47.1	49.2	42.4	
≥High school	21.3	17.6	29.6	
Drug use				
Cannabinoids - %	85.5	71.4	28.6	0.013
Cocaine - %	35.8	68.4	31.6	0.859
Opiates - %	55.9	72.6	27.4	0.095
HIV/AIDS-related personal experiences and risk perception				
Know someone with HIV/AIDS - %				
No	41.0	47.0	28.0	0.001
Yes	59.0	53.0	72.0	
How likely do you think you are to become infected with HIV? - %				
No chance	51.4	51.5	51.3	0.105
Very unlikely	18.8	16.8	23.4	
Somewhat to very likely	5.9	5.0	8.1	
Do not know	23.9	26.7	17.1	
Sexual practices				
Number of lifetime partners - %				
<3	32.6	37.0	22.9	0.004
3–5	29.5	24.4	40.7	
6–10	18.7	18.0	20.3	
>10	19.2	20.6	16.1	
Engaged in prostitution (buying or selling) - %				
No	60.8	66.0	49.1	0.002
Yes	39.2	34.0	50.9	

Table 2

Simple and multiple logistic regression models for relationship between past HIV testing and characteristics of black South African NIDUs.

	Unadjusted		Adjusted*	
	OR	**95% CI**	**aOR**	**95% CI**
Demographics				
Sex				
Male	1.0		1.0	
Female	6.24	(3.74 – 10.42)	7.91	(4.04 – 15.50)
Age in years				
<21	1.0		1.0	
21–24	2.27	(1.27 – 4.03)	2.05	(1.06 – 3.95)
≥25	2.18	(1.25 – 3.79)	2.30	(1.17 – 4.53)
Highest level of education				
<High school	1.0		1.0	
Some high school	1.02	(0.61 – 1.71)	0.78	(0.42 – 1.43)
≥High school	2.00	(1.11 – 3.64)	1.19	(0.59 – 2.39)
Drug use				
Cannabinoids				
Negative	1.0		1.0	
Positive	0.48	(0.27 – 0.86)	0.79	(0.41 – 1.55)
Cocaine				
Negative	1.0		1.0	
Positive	1.04	(0.66 – 1.64)	0.85	(0.50 – 1.44)
Opiates				
Negative	1.0		1.0	
Positive	0.69	(0.44 – 1.07)	0.64	(0.36 – 1.14)
HIV/AIDS-related personal experience and risk perception				
Know someone with HIV/AIDS				
No	1.0		1.0	
Yes	2.28	(1.42 – 3.64)	1.92	(1.12 – 3.29)
How likely do you think you are to become infected with HIV?				
No chance	1.0		1.0	
Very unlikely	1.40	(0.79 – 2.49)	1.25	(0.64 – 2.44)
Somewhat to very likely	1.64	(0.66 – 4.05)	1.01	(0.36 – 2.82)
Do not know	0.64	(0.35 – 1.16)	0.45	(0.23 – 0.87)
Sexual practices				
Number of lifetime partners				
<3	1.0		1.0	
3–5	2.69	(1.53 – 4.75)	2.23	(1.17 – 4.23)
6–10	1.83	(0.96 – 3.52)	1.55	(0.75 – 3.23)
>10	1.26	(0.64 – 2.48)	1.67	(0.77 – 3.61)

	Unadjusted		Adjusted*	
	OR	**95% CI**	**aOR**	**95% CI**
Engaged in prostitution (buying or selling)				
No	1.0		1.0	
Yes	2.01	(1.29 – 3.13)	0.57	(0.31 – 1.05)

*Model is adjusted for sex, age, education, use of cannabinoids, knowing someone with HIV/AIDS, HIV risk perception, number of lifetime partners, and buying or selling sex.