HIV-Positive Men Sexually Active with Women: Sexual Behaviors and Sexual Risks

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ABSTRACT *This study examines patterns of sexual behavior, sexual relating, and sexual risk among HIV-positive men sexually active with women. A total of 278 HIV-positive men were interviewed every 6–12 months between 1994 and 2002 and reported considerable variability in sexual behaviors over time. Many were not sexually active at all for months at a time; many continued to have multiple female and at times male partners. Over one-third of the cohort had one or more periods when they had engaged in unprotected sex with a female partner who was HIV-negative or status unknown (unsafe sex). Periods of unsafe sex alternated with periods of safer sex. Contextual factors such as partner relations, housing status, active drug use, and recently exchanging sex showed the strongest association with increased odds of unsafe sex. A number of predictors of unsafe sex among African American men were not significant among the Latino sub-population, suggesting race/ethnic differences in factors contributing to heterosexual transmission. Implications for prevention interventions are discussed.*

KEYWORDS *Contextual factors, Heterosexual men, Persons living with HIV/AIDS, Prevention planning, Sexual behavior, Sexual risk.*

INTRODUCTION

Heterosexual transmission of HIV has become increasingly significant within the continuing epidemic in the United States, especially among women. In an analysis of incident cases reported to the CDC from 2000 to 2003, heterosexually acquired infections represented 78% of all new HIV cases among women.¹ To respond effectively to heterosexually acquired HIV infection, it is important to understand sexual behaviors of persons infected with HIV that facilitate or protect against transmission. However, the vast majority of research that addresses heterosexual transmission has focused on women rather than male sexual decision making and sexual behaviors that put women at risk.^{2–5}

Understanding patterns of sexual behavior and sexual relationships among HIV-positive men who have sex with women is essential to inform the design and

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implementation of targeted prevention and risk reduction programs to address heterosexual transmission, as well as to provide appropriate care to men living with HIV/AIDS. However, existing research has limitations. Studies of sexual risk behavior among people who are HIV positive tend to focus on samples representing risk exposure groups—men who have sex with men (MSM)^{1,6} or injecting drug users (IDUs)^{7,8}—although current behaviors contributing to transmission (e.g., unprotected sex with women) may be unrelated to initial exposure to infection. Probability samples are rare. More often studies have relied upon convenience samples of volunteers recruited from clinic or service settings^{9–11} or from venues such as bars where sexually active, HIV-positive persons were expected to be found.^{6,12} Studies have been cross-sectional or covered short time spans.^{13–15} Study differences in definitions of ‘heterosexuality’ and indicators of unsafe sexual behavior limit comparisons across studies (for reviews see Crepaz and Marks,¹⁶ Kalichman,¹⁷ and Schiltz and Sandfort¹⁸).

We investigate sexual behaviors, patterns of sexual relating, sexual orientation and sexual risk among a cohort of HIV-positive adult men, followed over an extended time period and drawn from a larger study of a representative sample of persons living with HIV/AIDS in New York City. Our study addresses the following questions: What are the lifetime and current patterns of sexual behavior among HIV-positive adult men who are sexually active with women? What predicts unprotected sex with women among this cohort of HIV-positive men? Are there race/ethnic differences in patterns of sexual behavior and sexual risk?

Our analytical approach and selection of variables is informed by a theoretical perspective that emphasizes the importance of contextual or situational factors that influence sexuality and sexual risk behaviors—which interact with and can shape individual-level behaviors. It is increasingly recognized that broader structural or contextual factors can facilitate or pose barriers to an individual’s ability to avoid exposure to HIV or for HIV-positive individuals to avoid exposing others to infection.^{19–25} As contexts and situations may change over time, we use a repeated measures approach to examine social and service contexts, as well as individual attributes, as correlates of unsafe sex.

METHODS

Study Sample and Recruitment

Data for this study were collected as part of the Community Health Advisory & Information Network (CHAIN) Project, an ongoing prospective cohort study of a representative sample of persons living with AIDS in New York City. The initial CHAIN sample was selected using a two stage stratified design, selecting a random sample of 43 HIV medical and social service agencies as the first stage unit from a sampling frame of known providers and clients within agencies as the second-stage unit. Agency staff assisted with recruitment of a random sample of adult (age 20+ years) clients, proportional to total client enrollment, drawn from agency rosters or using sequential enrollment procedures; 90% of sampled clients invited to participate completed baseline interviews. The agency-based sample of 648 persons living with HIV/AIDS (PLWH/A) who completed baseline interviews was supplemented with 52 interviews conducted with HIV-positive individuals unconnected to care recruited at outreach sites and through acquaintance sampling from among enrolled CHAIN participants.²⁶ Confidential in-person interviews were conducted

by trained interviewers in respondents' homes or in community settings. Baseline interviews were completed in 1994–1995, with follow-up interviews conducted at 6 month intervals for the first three study waves and at 12 month intervals after that. A refresher cohort of 268 PLWH/A was added in 1998 to address cohort attrition due primarily to mortality and to include persons more recently diagnosed. Detailed information on sampling and recruitment methods have been previously published.^{27–30}

Although it is not possible to assign precise sampling probabilities to study respondents, the large number of randomly selected recruitment sites dispersed throughout the city and adherence to random selection strategies for client recruitment resulted in a sample that, by all available data, was representative of New York City residents who are aware of their HIV infection and had some level of contact with the service system. Higher income PLWH/As with few agency encounters who received medical care in a private doctor's office are underrepresented (although not absent) in the sample. The CHAIN sample at enrollment closely matched the demographic characteristics of persons living with AIDS in New York City.³⁰ Cohort attrition for reasons other than death has remained relatively low. At each interview period, 80–90% of eligible participants completing a prior interview were located and re-interviewed. Death is the biggest source of cumulative sample attrition (24%), followed by failure to locate (19%), relocation outside of New York City (10%) and refusal (7%).

A total of 579 HIV-positive men were enrolled in the study. One-quarter were not sexually active during the study period, 27% had only male partners, 43% had only female partners, and 5% reported sex with both men and women. For the present analysis, we focus on the subset of 278 male PLWH/A who were sexually active with women during the study period, 1994–2002. Men sexually active with women (MSW) were operationally defined as men reporting one or more female sexual partners during the 6 months prior to interview at one or more interview periods, regardless of whether or not they also reported same-sex experiences.

Eighty-five percent (85%) of MSW in the sample completed at least one follow-up interview, and 64% completed four or more interviews. Men who entered the cohort during the initial recruitment completed an average of 5.2 interviews (SD 2.5; range 1–8) and those who were part of the refresher cohort, an average of 2.8 (SD 1.4, range 1–4). Excluding individuals who had died or had moved away from New York City, at the eighth wave of interviews in 2002, 54% of MSW continued as active participants in the study. There were no statistically significant differences between individuals lost to follow-up and those who continued to participate except that attrition was higher among men with lower CD4 counts at baseline, predictive of mortality in the years prior to widespread use of antiretrovirals.

Measures

The survey instrument defined sex to include vaginal, anal or oral sex. The baseline survey collected information about lifetime history of sex with opposite and same-sex partners. At each interview, participants were asked about sexual behaviors in the past 6 months, including number of partners (same and opposite sex); sexual behaviors with “regular” and “casual or one-time” partners; exchanging sex for money or drugs; and condom use with male and female partners. Each survey also asked about sexual orientation with the question: “Which of these terms would you say best describes how you think of yourself—straight/heterosexual, gay/homosexual, bisexual (attracted to both men and women), or other.”

The outcome of interest, heterosexual *unsafe sex*, was indicated by reports of any experience of sex without a condom in the 6 months prior to interview with a "...woman who was not HIV-positive, or whose status you did not know." A number of covariates were included in the multivariate analyses, selected from analytical domains that prior research has shown to influence sex behaviors: client sociodemographics, social networks, sexual orientation, health and mental health, substance use, and service utilization.^{16–18,21,22} The multi-wave nature of our data allows us to include in our analysis both individual characteristics and contextual factors that may change over time. *Demographic* variables included age and race/ethnicity. *Economic resources* are indicated by educational attainment and income at the time of interview. Indicators of social *networks and patterns of social interaction* included marriage/partner status, lack of disclosure of HIV status, and religious involvement indicated by consistently answering that religion or spirituality is 'very important' and attending at church or other religious services monthly or more often for at least half of all interview periods, recognizing residential instability as well illness symptoms may pose barriers to more regular attendance.³¹ Lifetime *MSM experience* (ever sex with another male) and *sexual orientation* (self-description as bisexual, gay, or giving a changing orientation versus consistently describing oneself as 'heterosexual') were included in the model. History of MSM experience was selected as an indicator of sexuality profile to distinguish sexual histories and as potentially influencing networks and social contexts for sexual behavior. Very few individuals in the current sample were consistently sexually active with both men and women, but many were on occasion. *Health status* measures at each interview included self-reported most recent CD4 T-cell count (92% within 6 months), a single item physical health functioning question, and the *mental health* summary score (MCS) of the MOS-SF36³² and a five-item standardized measure of *self-efficacy*.^{33,34}

Another variable included to address potential contextual or situational influences on sexual behaviors was *housing status*, which was coded based on descriptions of living arrangements at the time of interview. Those who described themselves as homeless or who reported sleeping in the street, a shelter, a single-night or limited stay single room occupancy (SRO) or welfare hotel, abandoned building, or public or private place not intended for sleeping were classified as homeless. *Recent incarceration* was indicated by spending any time in jail or prison in the past 6 months. *Actively using drugs* was indicated by use of heroin, cocaine/crack, or methamphetamine or any use of a needle to inject drugs in the 6 months prior to interview. *Problem drinking* was indicated by a positive score on the CAGE³⁵ measure of problem drinking past 6 months or usual drinking pattern of five or more drinks weekly or more often. *Recently exchanged sex* was based on reports of giving or getting sex with any partner during the past 6 months in exchange for money or drugs. *HIV services*, as potential sources of risk reduction resources,^{36,37} were also included in the model. Medical care, receipt of case management and other social services were assessed at each interview. A dichotomous variable indicated any *antiretroviral combination therapy* (ARV) at the time of interview.

Statistical Analysis

For descriptive analyses we constructed lifetime and recent prevalence measures for a range of sexual behavior and sexual relationship variables. Chi-square tests were

TABLE 1. Baseline Characteristics of Sample of HIV-positive Men Sexually Active with Women

	Total ^a (n = 278)	White (n = 25)	Black (n = 165)	Latino (n = 84)	
Sociodemographics					
Age					
20–34	20%	16%	15%	31%	*
35–49	70	80	72	63	
50+	10	4	13	6	*
Mean age (sd)	40.7 (7.4)	40.2 (5.8)	42.0 (7.4)	38.3 (7.2)	
Education					
Less than high school (0–11 year)	40%	32%	39%	43%	
High school graduate	43	44	43	46	
Post secondary	17	24	18	11	
Household income					
Less than \$7,500 a year	55%	60%	58%	48%	
Housing status					
Homeless	27%	24%	28%	24%	
Unstably housed	19	16	19	21	
Stably housed	54	60	52	55	
Social networks					
Church/religious involvement	34%	40%	32%	33%	*
No family or friends aware of HIV status	12%	0	17%	7%	
Health status					
Self-reported health “excellent/very good”	31%	32%	35%	24%	
T-cell >500 cells/μl	23%	32%	23%	21%	
Mental health					
Low mental health functioning	32%	36%	27%	44%	*
Self-efficacy: mean (SD)	62 (15)	61 (15)	63 (14)	59 (16)	*
Substance use					
Drug use					
Currently using drugs	34%	36%	32%	40%	
Problem drug use: lifetime, not current	53	56	56	46	
Never problem drug use	13	8	12	13	
Alcohol use					
Current problem drinking	27%	32%	24%	30%	
Risk exposure					
MSM—sex with another man, ever	10%	20%	9%	10%	*
IDU—injecting drug use ever	55	56	52	62	
MSM & IDU	10	16	8	12	
Heterosexual/other	25	8	30	17	
Incarceration					
In jail or prison past 6 months	21%	24%	20%	23%	
Service utilization					
Comprehensive primary care	46%	48%	46%	46%	
ARV combination therapy	22%	32%	23%	17%	
Receipt of case management	63%	56%	61%	70%	
Substance abuse treatment	38%	36%	40%	25%	

*p value <0.05.

^aTotal sample includes four men with “other” ethnicity.

performed to test for significant race/ethnic differences. The risk behavior analyses were based upon a single dependent variable, unprotected sex with a female partner who was HIV-negative or status unknown (unsafe sex). Each interview with each CHAIN participant was treated as a separate observation. This permitted us to examine time-varying covariates related to participant characteristics, contextual factors, and service use variables. To adjust standard errors because of dependencies

among multiple observations for the same individual, we estimated both bivariate and multi-variate relationships using a random effects model.³⁸ STATA version 9.0³⁹ was used for all statistical analysis.

RESULTS

At baseline, most participants were between the ages of 35 and 49 (mean age at baseline, 40.7 years) and predominantly non-White: 59% Black, 30% Hispanic (Table 1). Most MSW were economically disadvantaged; more than half had annual incomes of less than \$7,500, and 27% were homeless at baseline interview. One in five (20%) had been in jail or prison during the 6 months prior to baseline interview. Only 31% described their health as very good or excellent, and even fewer had CD4 counts above 500 cells/ μ l. One-third had scores below 37.0 on the mental health summary measure indicating clinically relevant symptoms.³² Rates of substance use were high; almost all (87%) of the sample reported lifetime history of heroin, crack/cocaine, or methamphetamine use and/or problem drinking, and 34% were actively using drugs at baseline interview. Injecting drug use (IDU) was the most common risk exposure for HIV although 20% had experienced sex with another man. Slightly less than half (46%) had comprehensive primary medical care, and 22% were on any antiretroviral medications. Sixty-three (63%) were receiving case management services.

There were few race/ethnic differences. Latino participants were younger. African American MSW had higher mental health scores and Latinos lower scores compared to non-Hispanic Whites. Black and Latino men were more likely than White to report that none of their family or friends were aware of their HIV status (Table 1). Note that there were too few men of 'other' ethnicity for meaningful consideration so they were excluded from comparative analysis.

Patterns of Sexual Behavior

Table 2 presents lifetime and recent patterns of opposite-sex and same-sex experience for men sexually active with women. Prior to baseline interview, 37% of all MSW had had 50 or more female sex partners; there was no difference in lifetime numbers of female partners by race/ethnicity. Nineteen percent (19%) reported some lifetime sexual experience with other men, but only 4% had had 50 or more same-sex partners. At any interview period, a sizeable proportion of respondents was not sexually active: 46% of men in the sample had at least one 6 month period with no sexual experiences. On the other hand, 38% reported recent sexual activity with three or more female partners during at least one 6 month period. Multiple same-sex partners was relatively rare. White men sexually active with women were more likely than others to report lifetime MSM experience, recent same-sex partners, and multiple same-sex partners during the study period (Table 2).

As Table 2 shows, among the sub-sample of HIV-positive men sexually active with women during the study period, the rate of lifetime sexual experience with another man is higher among Whites (36%) than among Blacks (15%). However, if we select men with lifetime MSM experience from among the entire CHAIN sample, rates of sex with women show a different pattern by race/ethnicity. Black men who have ever had sex with a man are twice as likely as white men with lifetime MSM experience to report recent sex with a female partner (27% compared to 10%) (data not shown).

TABLE 2. Sexual Behaviors and Sexual Orientation among HIV-Positive Men Sexually Active with Women

	Total ^a (n = 278)	White (n = 25)	Black (n = 165)	Latino (n = 84)	
Lifetime female sex partners at baseline					
Total number of female sex partners					
1–5	9%	4%	8%	11%	
6–20	28	36	27	26	
21–50	26	32	25	27	
50 or more	37	28	40	37	
Lifetime male sex partners at baseline					
Total number of male sex partners					
none	81%	64%	85%	80%	*
1–5	9	20	9	6	
6–20	3	0	4	4	
21–50	2	4	1	4	
50 or more	4	12	1	7	
Recent sexual experience ^b					
One or more 6 month periods not sexually active	46%	56%	46%	42%	
One or more 6 month periods with three or more female partners	38%	20%	45%	33%	*
One or more 6 month period with any male partners	10%	24%	8%	11%	*
One or more 6 month periods with three or more male partners	5%	16%	3%	6%	*
Self-described sexual orientation ^c					
Consistently heterosexual	81%	74%	83%	77%	*
Consistently gay or homosexual	1	0	1	0	
Consistently bisexual or other	3	16	2	2	
Changing identification	16	11	14	21	
Unsafe sex ever during study period ^d					
Unsafe sex with any HIV negative or status unknown partner	37%	44%	41%	29%	
Unsafe sex with neg/unknown regular partner ^e	25%	28%	28%	19%	
Unsafe sex with neg/unknown casual partner	19%	28%	22%	12%	
Multiple periods of unsafe sex ^c					
Recent unsafe sex reported at two or more interviews	19%	20%	11%	8%	
Unsafe sex among sexually active					
Unsafe sex with female partners	34%	40%	38%	26%	
Unsafe sex with female after period of consistently safe sex ^c	25%	24%	27%	20%	
Unsafe sex with male partner among those with male partners ^f	52%	67%	54%	44%	

*p value<0.05.
^aTotal sample includes four men with “other” ethnicity.
^b“Recent” refers to during the entire study period or where indicated, 6 months prior to each interview.
^cAnalysis restricted to participants interviewed two or more times: total sample n = 237, Black = 142, Latino = 71.
^d“During study period” refers to experience reported at any interview. Prior experience unknown.
^eDistinction between regular and casual partner available for W1–W7: total sample n = 215, Black = 125, Latino = 68.
^fAmong MSW who also had sex with a male partner during study period: total n = 29, Black = 13, Latino = 9.

Sexual Orientation

At each CHAIN interview, respondents were asked to describe how they saw themselves with regard to sexual orientation; these responses were recorded separately from any consideration of reported sexual behaviors. As Table 2 shows, 81% of men consistently described themselves as straight or heterosexual; 1%

consistently described themselves as gay or homosexual; 3% consistently chose the bisexual or 'other' category; and a sizeable proportion, 16%, gave different self-descriptions of their sexual orientation at different interviews. The least stable self-designations were found among persons who reported both opposite-sex and same-sex partners during the study period.⁴⁰ White men in the sample were the most likely to describe themselves as bisexual, and Latinos were those most likely to give a changing self-description.

Sexual Risk Behaviors

Overall, 37% of all MSW reported one or more episodes of unprotected sex with an HIV-negative or status unknown male or female partner during the study period (Table 2). About half as many reported unsafe sex at two or more interviews. Almost all of these were reporting unsafe sex with female partners; only 3% had unsafe sex only with men. However, although numbers are small ($n = 29$), among males sexually active with women who also had sex with a male partner during the study period, more than half (52%) reported unprotected MSM sex. Latino men were somewhat less likely to report unsafe sex with either female or male partners; however, differences were not statistically significant.

Considerable fluidity in unsafe behavior was evident. Only one-quarter to one-third of persons who had reported unsafe sex at any interview continued to report unsafe sex at their following interview 6–12 months later. On the other hand, 25% of MSW initiated unsafe sex after a period of consistently safe sex experiences (Table 2). The movement into and out of periods of unsafe behavior is also apparent when we examine rates over time of unsafe sex with a woman partner for the continuing cohort of MSW who were interviewed all eight or seven of eight times from Wave 1 to Wave 8 (2002). Rates of unsafe sex for this subset of long term participants ($n = 89$) were 18% at baseline (1994), fluctuated up and down during the late 1990s (11, 15, 14, and 9%), with a dip to 5% at Wave 6 (1999), followed by an increase to 10% at Wave 7(2000–2001) and again to 13% at Wave 8 (2002) (data not shown, see also Aidala et al.⁴¹).

Relationships and Sexual Partnering

Partner relationships were quite varied among the cohort, as shown in Table 3. Only a fraction of men sexually active with women (17%) were legally married and living with spouse at any time during the study period. Considering partner relations not restricted to legal marriage, 43% of MSW had at least one live-in partner. A much higher percentage, 79%, lived with other adults for at least some time during the study period, suggesting a variety of living arrangements other than living with an intimate partner. More than 60% of the sample had at least one "casual" or "one-time" partner during the course of the study, almost always with women partners. Over one-third (35%) reported recently exchanging sex for money or drugs; 14% of the sample had multiple periods when they reported exchanging sex.

The overlap of substance abuse and sexual behaviors among HIV-positive men sexually active with women is seen in the high rates (58%) who report sex with an IDU partner. About one-third had had one or more sexual partners whom they knew to be HIV positive. African American MSW are more likely than others to have had an HIV-positive sexual partner.

TABLE 3. Sexual relationships and living arrangements among HIV-positive men sexually active with women

	Total ^a (<i>n</i> = 278)	White (<i>n</i> = 25)	Black (<i>n</i> = 165)	Latino (<i>n</i> = 84)
Legal marriage				
Married during study period	17%	16%	17%	15%
Formerly married	47	52	45	51
Single, never married	36	32	38	33
Partner relationships				
Live-in partner during study period ^b	43%	44%	39%	49%
Non-live-in partner only	35	36	40	26
No partner during study period	22	20	21	25
Living arrangements				
Lived with other adults during study period	79%	63%	81%	84%
Always lived alone or alone in group housing	21	37	19	16
Risk status of partners				
Ever had sex with IDU at baseline interview	58%	64%	55%	62%
Having HIV+ partner during study period	32%	16%	41%	20% *
Casual relationships				
Sex with casual partner during study period ^c	62%	60%	68%	55%
With female casual partners	60%	52%	67%	52%
With male casual partners	8%	24%	5%	10%
Exchange relationships				
Exchanged sex for money or drugs during study period ^d	35%	24%	40%	30%
Multiple periods of exchanging sex ^e	14%	8%	18%	8%

**p* value <0.05.

^aTotal sample includes four men with “other” ethnicity.

^bRespondent reported currently living with spouse or “living with someone as though married.”

^cCasual or one-time partners reported at one or more interview periods, regardless of other types of sexual relationships.

^dSexual exchange during the past 6 months with female or male partner reported at one or more interview periods

^eAnalysis restricted to participants interviewed two or more times: total sample *n* = 237, Black = 142, Latino = 71.

Factors Associated with Sexual Risk Behaviors

Random effects logistic regression was used to examine if unsafe sex was affected by client demographics, economic and social resources, health and mental health, MSM experience and sexual orientation, or contextual factors, including housing status, current substance use, recent jail experience and receipt of HIV services. Models tested whether factors increased or decreased the likelihood that the individual recently (past 6 months) engaged in unprotected sex with an HIV negative or status unknown female partner. Analysis was restricted to the 278 male study participants who were sexually active with women during the study period and were interviewed up to eight times each, a total of *n* = 1,291 observation points. Analyses were also conducted separately for African American (*n* = 165) and Latino (*n* = 84) MSW. The results of these analyses are presented in Table 4.

In the bivariate analysis, the context of risk variables—active drug use, problem drinking, homeless at the time of interview, and recently exchanging sex—showed the strongest association with increased odds of unsafe sex, along with having a spouse/

TABLE 4. Unadjusted and adjusted logistic regression analyses of unprotected sex among HIV-positive men sexually active with women^a

	Total MSW sample	
	OR (95% CI)	AOR (95% CI)
Demographics		
Black	1.23 (0.72, 2.10)	0.84 (0.37, 1.89)
Latino	0.66 (0.36, 1.19)	0.48 (0.19, 1.18)
Age ^b	0.95 (0.92, 0.98)*	0.95 (0.92, 0.99)*
Economic resources		
Less than high school education	0.85 (0.50, 1.42)	0.73 (0.43, 1.24)
Household income <\$7,500 a year	1.35 (0.88, 2.07)	1.20 (0.77, 1.88)
Social networks		
Has spouse/partner	1.57 (1.01, 2.46)*	1.98 (1.25, 3.15)*
No family or friends aware of HIV status	1.51 (0.75, 3.03)	1.25 (0.59, 2.64)
Religious involvement ^c	0.69 (0.40, 1.17)	0.73 (0.43, 1.23)
Health status		
Health "excellent/very good"	0.84 (0.53, 1.33)	0.94 (0.58, 1.54)
T-cell >500 cells/μl	1.23 (0.75, 2.02)	1.13 (0.68, 1.89)
Mental health		
Low mental health functioning ^d	1.45 (0.91, 2.31)	1.15 (0.70, 1.89)
Self-efficacy ^e	0.98 (0.96, 1.00)*	0.98 (0.97, 1.00)†
MSM experience/orientation		
Ever sex with men	2.11 (1.19, 3.76)*	2.53 (1.15, 5.57)*
Bisexual, gay, or changing orientation ^f	1.38 (0.73, 2.60)	0.50 (0.21, 1.17)
Context of risk		
Homeless ^g	2.15 (1.29, 3.59)*	1.63 (0.94, 2.82)†
Actively using drugs ^h	1.83 (1.18, 2.85)*	1.21 (0.75, 1.98)
Problem drinking ⁱ	1.86 (1.07, 3.23)*	1.28 (0.71, 2.30)
Recently gave or got sex for money/drugs	3.91 (2.41, 6.35)*	3.14 (1.87, 5.27)*
Recently in jail or prison	1.64 (0.91, 2.95)	1.44 (0.80, 2.61)
Service utilization		
Comprehensive primary care ^j	0.81 (0.54, 1.22)	1.03 (0.67, 1.59)
ARV combination therapy ^k	0.46 (0.30, 0.72)*	0.68 (0.43, 1.09)
Receipt of case management services	0.92 (0.60, 1.42)	1.14 (0.72, 1.81)
Substance abuse treatment	0.87 (0.55, 1.37)	0.76 (0.47, 1.23)

**p* value <0.05 (bold), †*p* value <0.10.

^aModels test the relationship between client characteristics, health status indicators, and resources and risks at each interview period as these factors increase or decrease the likelihood that the individual will report recent (past 6 months) unprotected sex with an HIV negative or status unknown female partner. Logistic regression equations using random effect procedure to adjust standard errors of the estimates of the regression coefficients to account for the dependency among multiple observations contributed by the same individual. Analysis restricted to *n* = 278 persons living with HIV/AIDS who were sexually active with women during the study period (1994–2002) who were interviewed up to eight times each, a total of *n* = 1,291 observation points. Sub-analyses are based on 165 Black men with 783 observations, and 84 Latino men with 368 observations.

^bContinuous variable.

^cReligion consistently described as 'very important' and attendance at church or other religious services monthly or more often for at least half of all interview periods.

^dMOS-SF36³² mental health summary score < 37.0, mean score seen in psychiatric inpatient populations.

partner, and lifetime same sex experience. Older age, higher self-efficacy, and being on antiretroviral medications reduced the likelihood. Controlling for other variables in the model, the associations between drug use, problem drinking and housing status

TABLE 4 (Continued)

Black MSW		Latino MSW	
OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
—	—	—	—
0.95 (0.91, 0.99)*	0.96 (0.93, 1.01)†	0.91 (0.85, 0.98)*	0.91 (0.84, 0.99)*
0.60 (0.32, 1.19)	0.49 (0.26, 0.92)*	1.77 (0.61, 5.16)	1.03 (0.31, 3.37)
1.07 (0.64, 1.80)	0.98 (0.56, 1.70)	1.28 (0.53, 3.10)	1.01 (0.39, 2.59)
2.26 (1.28, 3.99)*	2.97 (1.64, 5.38)*	0.80 (0.33, 1.96)	0.85 (0.34, 2.17)
1.56 (0.73, 3.32)	1.75 (0.77, 4.01)	0.60 (0.06, 6.33)	0.28 (0.02, 3.26)
0.55 (0.28, 1.08)†	0.54 (0.28, 1.06)†	0.67 (0.23, 1.93)	0.65 (0.22, 1.93)
1.05 (0.61, 1.82)	1.28 (0.71, 2.28)	0.48 (0.17, 1.40)	0.59 (0.18, 1.93)
0.90 (0.49, 1.64)	0.74 (0.39, 1.38)	1.61 (0.54, 4.79)	2.17 (0.72, 6.55)
1.08 (0.58, 2.02)	0.97 (0.50, 1.88)	2.12 (0.88, 5.11)†	1.32 (0.50, 3.52)
0.99 (0.97, 1.01)	0.99 (0.97, 1.02)	0.96 (0.93, 0.99)*	0.98 (0.95, 1.01)
2.24 (1.10, 4.57)*	3.13 (1.20, 8.15)*	1.55 (0.47, 5.16)	1.50 (0.24, 9.57)
1.29 (0.57, 2.91)	0.42 (0.14, 1.24)	1.65 (0.50, 5.49)	0.49 (0.07, 3.37)
2.43 (1.34, 4.41)*	2.27 (1.18, 4.35)*	1.51 (0.45, 5.04)	1.03 (0.27, 3.90)
1.76 (1.02, 3.04)*	1.36 (0.74, 2.52)	1.98 (0.82, 4.76)	0.76 (0.27, 2.14)
1.34 (0.64, 2.83)	0.88 (0.39, 1.96)	2.21 (0.84, 5.84)	2.06 (0.71, 6.00)
2.68 (1.48, 4.87)*	2.39 (1.26, 4.55)*	6.72 (2.55, 17.68)*	4.84 (1.60, 14.62)*
1.84 (0.90, 3.74)†	1.93 (0.94, 3.94)†	2.97 (1.06, 8.35)*	1.93 (0.59, 6.35)
0.86 (0.52, 1.42)	1.08 (0.63, 1.84)	0.72 (0.31, 1.68)	0.85 (0.35, 2.07)
0.43 (0.25, 0.73)*	0.55 (0.31, 0.97)*	0.49 (0.20, 1.21)	0.97 (0.35, 2.67)
1.03 (0.60, 1.76)	1.45 (0.81, 2.59)	0.82 (0.33, 2.04)	0.84 (0.32, 2.21)
0.74 (0.42, 1.33)	0.60 (0.32, 1.11)	1.80 (0.72, 4.49)	1.48 (0.58, 3.80)

*Self-efficacy scale adapted from [Pearlin et al. ³⁴]. Continuous variable with high scores indicating higher self-efficacy.

†Compared to men who consistently describe themselves as 'heterosexual' at every interview period.

*Persons who report themselves as homeless, or describe sleeping on the street, in a shelter, an SRO or welfare hotel, or in an abandoned building, a public or private place (e.g., subway station) not intended for sleeping.

^hCurrent or past 6 month use of heroin, cocaine/crack, or methamphetamine.

ⁱFive or more drinks weekly or more often, or positive on CAGE³⁵ measure of problem drinking during 6 months prior to interview.

^jReports HIV medical care that is coordinated (one provider in charge), comprehensive (access to preventive care and regular source of medical information or advice), and accessible (24 h emergency access) at time of interview.

^kReports taking any combination antiretroviral therapy at time of interview.

were reduced. The strongest predictor of unsafe sex in the multivariate model was recent sex exchange. MSW who engaged in sex exchanges had odds of unsafe sex over three times as high as MSW not involved in sexual exchanges (AOR 3.12, CI 1.86–5.24). In the adjusted model, lifetime MSM experience predicted recent

unprotected sex with women (AOR 2.55, CI 1.16–5.61) as well as reporting a spouse or regular partner at the time of interview (AOR 1.95, CI 1.23–3.10). The odds of unsafe sex were lower for older MSW (AOR 0.95, CI 0.92–0.99).

Although there were relatively few differences by race/ethnicity in rates of unsafe sex and race/ethnicity is not a significant predictor in either the simple or adjusted regression models, a number of predictors of unsafe sex among African American men were not significant among the Latino sub-population. Among African American men, the odds ratios of unprotected sex with an HIV negative or status unknown women were about three times as high for those who had a spouse or partner, as well as for those with any history of male–male sex (AOR 2.93, CI 1.62–5.31 and AOR 3.21, CI 1.24–8.28, respectively), and over twice as high for men who were homeless at the time of interview (AOR 2.25, CI 1.18–4.29), patterns not seen among Latino MSW. Recent incarceration doubled the odds of unsafe sex (AOR 2.07, CI 1.02–4.21), and recent sex exchange was also a strong predictor (AOR 2.32, CI 1.22–4.39) compared to those who had not been in these situations. The odds of unprotected sex for African American men on ARV regimens were about half the odds for those not receiving treatments. Lower education was also associated with lower odds of heterosexual sex without a condom (Table 4).

Similar to findings for the African American subsample, among Latino MSW, those who had exchanged sex had odds of unsafe sex over five times as high as those not involved in exchanges (AOR 5.16, CI 1.68–15.8). The only other significant predictor for the Latino subgroup was age. Older men were less likely to report unprotected sex with an HIV negative or status unknown female partner (AOR 0.91, CI 0.84–0.99). Bivariate analysis showed high self-efficacy was associated with lower odds and recent incarceration with higher odds of unsafe sex among the Latino MSW although not reaching statistical significance in the adjusted model.

The sub-sample of non-Hispanic White men sexually active with women was too small to generate stable adjusted odds ratios for unprotected sex. We can however examine bivariate relationships that may suggest areas for future investigation. Consistent with MSW from other race/ethnic groups, recent exchange of sex for money or drugs is strongly associated with unsafe sex with a female partner among White men. Problem alcohol use also increased the likelihood of unsafe sex, as did lower income. Better health, as indicated by CD4 T-cell count above 500 cells/ μ l, was also associated with increased odds of unsafe sex among the white MSW in the sample (data not shown).

DISCUSSION

This study revealed a complexity and fluidity of sexual behavior among HIV-positive men sexually active with women not seen in prior studies based on non-probability samples and cross-sectional designs. Repeated observations over time suggest considerable variability in sexual behaviors and sexual risk. Many men were not sexually active at all for months at a time; whereas others continued to have multiple partners. Over one-third of the cohort had one or more periods when they had engaged in unprotected sex with a female partner who was HIV-negative or status unknown (Figure 1). Very few participants stayed in a single category throughout the study. Periods of risky sex alternated with periods of safer sex.

Patterns of sexual relating were also quite varied. Although marriage rates were low, the great majority of men in the sample were in a partner relationship at some

point during the study period. Most also reported one-time or casual female partners. Rates of concurrent relationships were high. Over one-third of the sample had exchanged sex for money or drugs during the study period. One in five (19%) MSW of the sample reported lifetime experience with another man.

Race/ethnic differences with regard to MSM experience and risk warrant further investigation. Although the numbers are small, White men sexually active with women were *more likely* than African American or Latino men to report bisexual experience, had more lifetime MSM partners, and were more likely to have multiple MSM partners at any interview period. This directs our attention to a study design issue. If we select a sub-sample of HIV-positive men sexually active with women during the study period from the larger CHAIN sample, the rate of lifetime sexual experience with another man among Blacks is about half as high as among Whites. However, if we select men with lifetime MSM experience, Black men are more likely than White men to report recent sex with a female partner, similar to what has been seen in other studies.⁴³⁻⁴⁵ Relying on samples of men with any MSM experience may overemphasize the role of male bisexuality as an explanation of increasing rates of HIV within the African American community, the so-called ‘down low’ phenomena.⁴² Non-gay identified men who have sex both with men and women may be a significant bridge for HIV infection to women, but the behavior happens across all races and ethnicities.⁴⁶ Much research has established that self-reported sexual orientation does not consistently relate to sexual behavior, and for some individuals, sexual orientation remains in flux or changes over time with changes in sexual partners or sexual networks.⁴⁷⁻⁵⁰

Unsafe sex with an HIV negative or status unknown female partner in this cohort of HIV-positive men was influenced by age, patterns of sexual partnering, and a number of contextual factors. Younger persons living with HIV/AIDS were more likely to report unsafe sex, as were men with a spouse or steady partner. Men with a history of MSM experience were more likely than others to have unprotected sex with their current female partners. Homelessness, active drug use or problem drinking, and recent incarceration were associated with increased odds of unsafe sex, and receipt of combination ARV regimens reduced the odds. Effects, however, were reduced in the adjusted models, especially when considering African American and Latino men separately. Recently exchanging sex for money or drugs was the

Note: Rates of unsafe sex at each interview period for continuing cohort of MSW, n=90

FIGURE 1. Rates of unprotected sex with HIV-negative or status unknown female partner among HIV-positive men sexually active with women, continuing cohort only.

only factor associated with unsafe sex with a female partner in the total sample as well as in the race/ethnic subpopulations analyzed.

We examined a number of alternative specifications to test the sensitivity of results. Findings were robust to changes in specification of CD4 T-cell count or educational level (using continuous measure) or use of lagged variables for service utilization and homeless and jail experience, although lagged jail experience raised the AOR for the Latino subsample to statistical significance. Including HAART as well as ARV in the models shows HAART to be more strongly associated with reduced odds of unsafe sex than ARV as such. We found no difference in findings when chronological time or a term to indicate refresher cohort were added to models. We examined interaction effects of variables showing significance in only one ethnic subsample. Among African Americans, odds ratios are significantly reduced except for having a spouse or partner. Lower education and homeless experience continue to suggest a strong relation.

This present study has several limitations. Because oral sex as well as anal and vaginal insertive and receptive sex could be included in our definition of unsafe sex, those engaging only in oral sex, a behavior less likely to transmit HIV, could not be excluded. Unfortunately, available measures do not allow separate reporting of these different sexual activities. The examination of individual and contextual factors associated with unsafe sex during a particular 6 month period does not allow us to determine the temporal ordering of events during this time. Further, sexual behavior patterns may vary on a shorter time scale than can be examined in this data set. Another consideration is that self-report measures may be prone to self-report bias. The prevalence of unsafe sex may have been underestimated since some CHAIN participants, who were all HIV positive at baseline, may have been reluctant to reveal high-risk sexual behaviors. Likewise, some persons who freely reported same-sex experiences may have been less comfortable in consistently describing themselves as gay or homosexual. However, assessments by research participants, feedback from PWA advocacy groups collaborating on the CHAIN project, and inter-wave consistency checks indicate that respondents were comfortable answering questions about sexuality in the context of a survey designed to determine service need.

Despite these limitations, the observed variations in risk behaviors among men sexually active with women suggest some behaviorally specific strategies for HIV prevention for positives. Our findings suggest that both HIV researchers and service delivery personnel should exercise caution in using risk exposure categories and/or self-described sexual orientation as fixed characteristics. Categorization of sexual orientation as if it was an enduring trait may underestimate important changes in behavior and self-identification, thereby biasing explanations of behavioral risk and HIV transmission among specific communities.^{61–63}

The variability we observed in sexual risk behavior reported over time provides new insight into the importance of engaging persons living with HIV in ongoing prevention programs. Our study findings underline the importance of conducting risk screening—a cornerstone of evidence-based HIV prevention recommendations—*on an ongoing basis*, not just at entry into care. Using interview data collected over a period of 8 years, our study indicates that HIV sexual and drug-related risk behaviors, sexual partnering, sexual orientation, and contextual factors like housing status and service utilization change over time. For prevention messages to be effective they must be relevant to the patient's behaviors and circumstances at the time they are delivered.^{51,52} Given the fluidity of the factors that have been

shown to be significant predictors of unsafe sex among HIV-positive men sexually active with women, regular and repeated risk screening is essential.

Current recommendations for incorporating HIV prevention messages into primary medical care settings include a brief sexual risk behavior checklist that can be administered by a clinician.⁵³ The battery of questions asks about five sexual risk behaviors contingent upon a patient answering that he has been sexually active “with a partner.” Given the findings of our research regarding the range, fluidity, and overlap of partner relations within which specific behaviors occur, it would seem important to understand something about the nature of those relationships. For example, given the potential effect of recent exchange of sex for money or drugs, consideration should be given to amending the checklist to include directed questions about sex exchange and other relational contexts. In our sample there were clearly underlying decisions about when and with whom safer sex practice would or would not occur, often within concurrent multiple sexual relationships (see also Gorbach and Holmes⁵⁴).

Contextual factors as well as individual psychological dispositions, motivations, and behaviors need to be considered in order to design effective interventions.²⁰ Our findings lend support to the increasing recognition that broader structural or contextual factors can act as barriers to, or facilitators of, an individual’s HIV risk behaviors.^{21–25,55–58} More research is needed to understand race/ethnic differences in sexual behaviors and contexts of risk. African American men as well as Latinos appear to have a risk profile that differs from that of non-Hispanic Whites. As an example: several studies as well as ours have shown that having a spouse or steady partner is associated with increased risk for unsafe sex among persons living with HIV/AIDS.^{59,10} However, in the current study, we did not find a significant relationship between having a spouse/steady partner and unprotected sex among Latinos. Other research has also shown that among men from some Latino cultural groups the prevalence of condom use is higher with a secondary partner than with a primary partner.⁶⁰ Only by developing health promotion programs directed toward HIV-positive men that are responsive to their patterns of sexual behavior over the lifecourse and the social and cultural contexts that guide their heterosexual interactions will we see any significant reduction in the growing increase in heterosexually acquired HIV infection among women in minority communities.^{61–63}

ACKNOWLEDGEMENTS

This research was made possible by grant number H89 HA 0015-15 from the U.S. Health Resources and Services Administration (HRSA) HIV/AIDS Bureau. The CHAIN study is supported by the HIV Health and Human Services Planning Council of New York under a Title I grant of the Ryan White Comprehensive AIDS Resource Emergency Act of 1990 through the New York City Department of Health.

A Technical Review Team (TRT) provides oversight for the Community Health Advisory & Information Network (CHAIN) Project. In addition to Peter Messeri, PhD, Angela Aidala, PhD, and David Abramson, PhD, of Columbia University’s Mailman School of Public Health, TRT members include Mary Ann Chiasson, DrPH, MHRA (Chair); Grace Moon, New York City Department of Health and Mental Hygiene (NYCDOHMH) Office of AIDS Policy; Judy Sackoff, PhD, NYCDOHMH; JoAnn Hilger, NYCDOHMH; Julie Lehane, PhD, Westchester

County DOH; Jennifer Nelson, MHRA, and a revolving member of the HIV Health and Human Services, PWA Advisory Group.

Contents of this report are solely the responsibility of the researchers and do not necessarily represent the official views of the U.S. Health Resources and Services Administration, the City of New York, or the Medical and Health Research Association of New York. This research has received approval for research on human subjects from the Institutional Review Boards of the health sciences campus of Columbia University, the New York City Department of Health and Mental Hygiene, and the Medical and Health Research Association of New York, Inc.

We are especially grateful to all the persons living with HIV who have shared their time and experiences with us as CHAIN Project participants.

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