

# HIV Prevalence and Associated Risks in Young Men Who Have Sex With Men

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**B**Y THE LATE 1980S, THE HUMAN immunodeficiency virus (HIV) epidemic among men who have sex with men (MSM) in the United States appeared to have peaked.<sup>1-6</sup> However, studies in the 1980s mainly sampled men 30 years of age and older; analyses of the small subsamples of men younger than 30 years suggested higher HIV incidence<sup>3,4</sup> and more sexual risks<sup>2,3,5,7</sup> than among older men. In the 1990s, 6 cross-sectional surveys that focused on small samples of young MSM found high prevalence of HIV and sexual risk behaviors.<sup>8-13</sup> These and other findings involving sexually transmitted diseases (STDs) and unsafe sex,<sup>14,15</sup> and HIV seroincidence<sup>16-18</sup> signal a significant and continuing HIV epidemic among MSM.

The 1992 through 1993 Young Men's Survey (YMS), conducted in San Francisco and Berkeley, Calif, was 1 of the 6

**Context** Studies conducted in the late 1980s on human immunodeficiency virus (HIV) infection among older men who have sex with men (MSM) suggested the epidemic had peaked; however, more recent studies in younger MSM have suggested continued high HIV incidence.

**Objective** To investigate the current state of the HIV epidemic among adolescent and young adult MSM in the United States by assessing the prevalence of HIV infection and associated risks in this population in metropolitan areas.

**Design** The Young Men's Survey, a cross-sectional, multisite, venue-based survey conducted from 1994 through 1998.

**Setting** One hundred ninety-four public venues frequented by young MSM in Baltimore, Md; Dallas, Tex; Los Angeles, Calif; Miami, Fla; New York, NY; the San Francisco (Calif) Bay Area; and Seattle, Wash.

**Subjects** A total of 3492 15- to 22-year-old MSM who consented to an interview and HIV testing.

**Main Outcome Measures** Prevalence of HIV infection and associated characteristics and risk behaviors.

**Results** Prevalence of HIV infection was high (overall, 7.2%; range for the 7 areas, 2.2%-12.1%) and increased with age, from 0% among 15-year-olds to 9.7% among 22-year-olds. Multivariate-adjusted HIV infection prevalence was higher among blacks (odds ratio [OR], 6.3; 95% confidence interval [CI], 4.1-9.8), young men of mixed or other race (OR, 4.8; 95% CI, 3.0-7.6), and Hispanics (OR, 2.3; 95% CI, 1.5-3.4), compared with whites (referent) and Asian Americans and Pacific Islanders (OR, 1.1; 95% CI, 0.5-2.8). Factors most strongly associated with HIV infection were being black, mixed, or other race; having ever had anal sex with a man (OR, 5.0; 95% CI, 1.8-13.8); or having had sex with 20 or more men (OR, 3.0; 95% CI, 2.0-4.7). Only 46 (18%) of the 249 HIV-positive men knew they were infected before this testing; 37 (15%) were receiving medical care for HIV, and 19 (8%) were receiving medical drug therapy for HIV. Prevalence of unprotected anal sex during the past 6 months was high (overall, 41%; range, 33%-49%).

**Conclusions** Among these young MSM, HIV prevalence was high, underscoring the need to evaluate and intensify prevention efforts for young MSM, particularly blacks, men of mixed race or ethnicity, Hispanics, and adolescents.

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cross-sectional surveys focusing on young MSM in the 1990s.<sup>10</sup> Of the 425 participants aged 17 to 22 years, 9.4% were HIV positive, and 32.7% reported having unprotected anal sex in the past 6 months. To determine whether this public health problem was widespread, the Centers for Disease Control and Prevention (CDC) and local public health officials adapted and expanded the YMS conducted in the years 1994 through 1998 to include the San

Francisco Bay Area (San Francisco, Oakland, and San Jose, Calif), Baltimore, Md; Dallas, Tex; Los Angeles, Calif; Miami,

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Fla; New York, NY; and Seattle, Wash. In this first multisite report of the 1994 through 1998 YMS, we confirm that the 1992 through 1993 YMS findings held true not only in the San Francisco Bay Area<sup>19</sup> but also in the 6 other areas.

## METHODS

### Sampling and Recruitment

The 1994 through 1998 YMS was a cross-sectional, multisite, venue-based survey.<sup>20</sup> Our goal was to estimate the prevalence of HIV and associated risk behaviors in adolescent and young adult MSM. Young MSM are hard to reach with traditional household-oriented sampling methods, and findings from surveys using convenience samples are not generalizable to broader populations of young MSM. Thus, we developed a venue-based survey method in which we sampled public venues frequented by young MSM and young men attending these venues.

Throughout the survey, we tried to identify all venues frequented by young MSM and the days of the week and times of day when young MSM frequented the venues (times). During the study's start-up, we conducted formative research to identify all potential venues and times by reviewing local gay publications, interviewing key public health officials and community informants, and meeting with focus groups of young men. Staff then visited these potential venues during potential times, carrying out standardized counts and brief interviews with young men. Thus, we established a sampling frame of all venues, along with 4-hour periods, of where and when we might enroll at least 7 eligible young men during those 4 hours. The minimum of 7 was selected for logistical and cost efficiency.

We identified an array of venues, ranging from urban shopping blocks, to dance clubs, to young gay organizations, ie, not just places where men find sex partners. These venues can be categorized as street locations, dance clubs, bars, businesses, social organizations, bathhouses, health clubs, and other public places (eg, parks, beaches). Street locations were stretches of sidewalk with

considerable foot traffic near businesses and socializing places. We did not include in the sampling frame venues attended primarily by men with high HIV-related risks, eg, needle exchange programs, commercial sex locations.

The sampling plan had 3 stages. First, each month, in each area, we randomly selected (without replacement) 12 to 16 venues from the sampling frame. Second, for each venue, we randomly selected 1 of the 4-hour periods associated with that venue. We then scheduled sampled venues and times on a monthly calendar. Third, we sampled young men during sampling events, ie, times when team members would enroll young men at venues. In a van outfitted for interviewing and phlebotomy, 4 to 5 team members arrived at a venue and sampled young men passing through the venue intercept area (ie, a defined area at each venue). Young men were approached and asked to give their age in years and their county of residence. Respondents were eligible if they were aged 15 to 22 years and residents of specified counties in that area. Young men were ineligible if they approached team members for enrollment or had enrolled previously. Sexual experience and orientation were not eligibility criteria. During the brief interview, team members explained survey procedures. We collected limited demographic data on men who did not enroll and counted all young men passing through the venue intercept area during the sampling event.

The men who enrolled were then interviewed in the survey van. The survey was anonymous: names were never linked to questionnaires, specimens, or test results. After obtaining informed consent, an interviewer administered a 45-minute standardized questionnaire and then conducted an HIV/AIDS (acquired immunodeficiency syndrome) counseling session and performed phlebotomy. After the interview, counseling session, and blood draw, participants were paid \$40 to \$50 for their time, given a survey identification number, and were scheduled to return in 2 weeks for test results, post-test counseling, and service referrals.

To prevent duplicate enrollees, we used several methods, beginning at the eligibility interview and continuing through final data management procedures. At the eligibility interview, for example, men who enrolled were introduced to all available team members. The final method was the Miragen Assay,<sup>21,22</sup> an antibody-profile assay used to distinguish persons. If 2 or more participants from an area had identical birth dates and race or ethnicity, we used the Miragen Assay to test their blood specimens. When antibody profiles matched, we assumed the participant had enrolled more than once and analyzed data from his first enrollment.

The YMS protocol was approved by the CDC institutional review board and by institutional review boards in each of the areas.

### Measures

The questionnaire was used to obtain information on demographic characteristics, frequency of attendance at the venues, HIV-related risk behaviors, and factors potentially associated with these risk behaviors. For many behavioral questions, a 6-month recall period was used. Human immunodeficiency virus-related risk behavior questions were used to measure sexual behavior; condom use; and the use of alcohol, drugs, and needles or syringes. Other questions concerned factors potentially associated with HIV-related risk behaviors: personal history, medical history, and psychosocial factors.

In our analysis, we focused on age, race and ethnicity, sexual identity, and lifetime behaviors and experiences as potential factors associated with HIV infection. Lifetime behaviors and experiences included having only male or both male and female sex partners, the number of male sex partners, having anal sex with a man, using illicit "party" drugs, injecting drugs, having had an STD, having run away or removed from home, and having been forced to have sexual contact. Participants were asked if they were black; Asian, Asian American, or Pacific Islander; Hispanic; American Indian; white; or from multiple racial back-

grounds (mixed). Participants were asked if they considered their sexual identity to be straight (heterosexual), bisexual, gay (homosexual), or transgender. Men who identified with the feminine gender defined themselves as transgender. For those who had male or female sex partners, sex was defined as oral, vaginal, or anal. Illicit party drugs selected for analysis were amphetamines, cocaine, lysergic acid diethylamide (LSD), methylenedioxymethamphetamine (ecstasy), and nitrites. For run away or removed from home, participants were asked whether they had ever run away from home or been removed from their parents' or guardians' home. For forced sexual contact, they were asked if anyone had ever forced them to have sexual contact as defined by themselves. There were no commercial sex-related questions. However, there were questions about exchange of sex for food, shelter, drugs, or money in the past 6 months (L.A.V., unpublished data, 1999).

We also compared sexual risk behaviors during the past 6 months of men who were HIV negative and men who were HIV positive. Sexual risk behaviors selected for analysis were having male sex partners for oral or anal sex and not always using condoms during anal sex with male partners. Serostatus for HIV was assessed as described below. Knowledge of HIV serostatus was assessed by asking participants if they had ever been tested for HIV, and, if so, what their last test results were.

We used assays licensed by the US Food and Drug Administration to test all specimens for HIV antibody, and for evidence of past or current hepatitis B virus infection (antibody to hepatitis B core antigen and hepatitis B surface antigen) and syphilis (VDRL test or rapid plasma reagin and microhemagglutination assay for *Treponema pallidum*). We used an enzyme immunoassay to screen blood specimens for the HIV antibody. Repeatedly reactive specimens were confirmed by Western blot or indirect immunofluorescence.<sup>23</sup> Past or current hepatitis B infection was defined as the presence of antibody to hepatitis B core antigen or hepatitis B surface antigen.

### Data Analysis

We designed the survey as a venue-based survey, intending to weight each participant's data according to his probability of being sampled.<sup>20</sup> If frequency of venue attendance had been positively associated with HIV prevalence, weights would have been needed to adjust for the fact that men who went out frequently had a greater chance of being sampled; their higher prevalence would have inflated our prevalence estimates. Because we found no association between frequency of venue attendance and HIV prevalence, we did not weight the data.

We used logistic regression and likelihood ratio tests to determine whether there was significant variation in the prevalence of HIV and hepatitis B virus, and in syphilis among the areas. We used the Breslow-Day test<sup>24</sup> to test the homogeneity of the association between HIV status and each of the variables involving age, race or ethnicity, sexual identity, and lifetime behavior and experience across the 7 areas. Because the test results showed homogeneity, we combined the data over the 7 areas.

We examined the association between HIV prevalence and individual factors using the Mantel-Haenszel  $\chi^2$  test.<sup>25</sup> We assessed the association between HIV prevalence and demographic and risk behavior variables via logistic regression analysis, entering into the model all variables identified by other studies as significant factors. Variables with more than 2 levels were coded as a group of dichotomous indicator variables. We derived the final model by removing insignificant variables as determined by the likelihood ratio test. All indicator variables in a group were removed together. We calculated adjusted odds ratios (ORs) and confidence intervals (CIs) for the demographic and sexual risk behavior variables that remained in the final model.

We examined the association between sexual risk behaviors and HIV serostatus and knowledge thereof using risk prevalence ratios. We analyzed all data using SAS version 6.12 (SAS Institute, Cary, NC).

## RESULTS

### Participants

In the 7 areas, 38622 men (who appeared to be young) entered our venue intercept areas during 1592 sampling events at 194 venues. Of the 23881 men (62%) who were approached for eligibility interviews, 21096 (88%) completed the interviews and 6866 (33%) were eligible, of whom 4272 (62%) enrolled. The eligibility percentage was low (33%) because many men who appeared to be young were older than 22 years, and some men were nonresident visitors to these metropolitan areas. Enrollment rates differed by area (TABLE 1) and by age, race or ethnicity, and venue. More of those aged 15 to 19 years enrolled than did those aged 20 to 22 years (69% vs 57%;  $P = .001$ ). Compared with men of all other races or ethnicities, more men of mixed race enrolled (77% vs 61%;  $P = .001$ ) and fewer Asians enrolled (52% vs 63%;  $P = .001$ ). Compared with men recruited from all other venues, more men at social organizations enrolled (79% vs 61%;  $P = .001$ ), and fewer men at dance clubs enrolled (53% vs 66%;  $P = .001$ ).

After removing duplicate enrollments from the database, we found that 3% of the 4111 enrolled men had never had sex, and another 11% had never had sex with a man. We limited our analyses to the 3492 men who reported ever having had sex with a man. Of these men, 30% enrolled at street locations, 29% at dance clubs, 12% at bars, 10% at social organizations, 9% at businesses, 4% at parks, 4% at bathhouses or health clubs, and 4% at other locations (eg, beaches).

### HIV and STD Prevalence

Overall, HIV infection prevalence was 7.2% and was lower in Seattle (2.2%) and higher in New York City (12.1%) vs the other areas ( $P < .001$ ) (TABLE 2). The prevalence of markers for hepatitis B virus was 10.7% overall and was lower in Seattle (5.8%) vs the other areas ( $P = .001$ ). Prevalence of markers for syphilis was 0.7% overall and was similar in all areas ( $P = .30$ ).

### Factors Associated With HIV Prevalence

Univariate analyses showed that HIV prevalence was higher among 20- to 22-year-olds than among 15- to 19-year-olds (TABLE 3). None of the 15-year-olds were HIV infected (n=56); 9.7% of the 22-year-olds were (n=619). Prevalence of HIV was higher among blacks, Hispanics, and men of mixed or other race than among whites. Among men of mixed race, HIV prevalence was higher among those who reported black backgrounds (n=172) than among those who did not (n=212; 16.9% vs 9.1%; OR, 2.0; 95% CI, 1.1-3.7). Sexual orientation was measured by reported sexual identity and by reported lifetime sexual activity with men only or with both men and women; HIV prevalence was higher only among transgender persons. Prevalence of HIV increased with greater number of lifetime male sex partners. When we compared lifetime behaviors and experiences, HIV prevalence was higher among men who reported anal sex with

men, injecting drugs, having had an STD, or having run away from home.

In multivariate analysis, the demographic and lifetime behavioral characteristics and experiences associated with HIV infection were being aged 20 to 22 years old; being black, Hispanic, mixed or other race; having had 20 or more male sex partners; having had 5 to 19 male sex partners; having had anal sex with men; injecting drugs; or having had an STD (Table 3). The results from multivariate analysis controlling for area were not substantially different from these results.

To determine which factors were associated with HIV infection by race or ethnicity group, we entered all the variables in Table 3 except race or ethnicity in 3 logistic regression models for race or ethnicity groups with sample sizes of more than 500. For blacks, the associated factors were having had 20 or more male sex partners (OR, 3.4; CI, 1.8-6.4) or having had 5 to 19 male sex partners (OR, 2.9; CI, 1.3-6.2). For Hispanics, the associated factors were having had 20 or

more male sex partners (OR, 4.6; CI, 2.1-10.2), having had an STD (OR, 2.4; CI, 1.3-4.4), having been forced to have sex (OR, 0.5; CI, 0.3-0.9), or being aged 20 to 22 years (OR, 2.0; CI, 1.1-3.6). For whites, the associated factors were having had 20 or more male sex partners (OR, 6.5; CI, 1.4-28.9), having had 5 to 19 male sex partners (OR, 6.4; CI, 1.4-28.3), having had an STD (OR, 3.7; CI, 1.8-7.5), or having been forced to have sex (OR, 2.8; CI, 1.4-5.7).

### HIV Testing History

All 3492 young men received HIV counseling and testing as part of YMS: 2268 (65%) reported having been tested previously, and 2186 (63%) knew the results. Of the 249 young men who tested positive in YMS testing, 79% had been tested previously, compared with 64% of the men who tested negative in YMS testing (OR, 2.1; CI, 1.5-2.8). Of the 249 HIV positive men, 189 (76%) knew their previous test results, but only 46 (18%) knew that they were currently HIV positive. Of these 249 men,

**Table 1.** Sampling Periods and Enrollment for the Young Men's Survey\*

Characteristics	Baltimore, Md	Dallas, Tex	Los Angeles, Calif	Miami, Fla	New York, NY	SF Bay Area, Calif	Seattle, Wash	Total
Years sampled	1996-1998	1994-1995	1994-1996	1995-1996	1997-1998	1994-1995	1997-1998	1994-1998
Enrollment rate	57	51	57	75	64	74	61	62
No. enrolled	357	530	509	488	541	702	365	3492
Age, y								
15-19	39	37	49	43	57	41	48	45
20-22	61	63	51	57	43	59	52	55
Race or ethnicity								
Black	40	15	8	16	24	15	8	17
Asian/Asian American/ Pacific Islander	3	3	6	2	2	15	7	6
Hispanic	3	19	41	61	41	27	4	30
White	48	59	31	18	12	32	66	36
Mixed or other†	7	5	14	4	21	11	16	11

\*SF indicates San Francisco. The Bay Area includes San Francisco, Oakland, and San Jose. All data are percentages except where indicated.

†American Indian (n = 45).

**Table 2.** Prevalence of HIV and Hepatitis B Infection and Syphilis, by Metropolitan Area\*

Variables	Baltimore, Md	Dallas, Tex	Los Angeles, Calif	Miami, Fla	New York, NY	SF Bay Area, Calif	Seattle, Wash	All
No. enrolled	357	530	509	488	541	702	365	3492
HIV†	8.5	6.5	8.3	5.8	12.1	6.2	2.2	7.2
Hepatitis B‡	10.8	10.8	10.7	9.4	11.9	13.2	5.8	10.7
Syphilis	...	1.5	0.6	0.4	0.6	0.6	...	0.7

\*HIV indicates human immunodeficiency virus; SF, San Francisco; and ellipses, areas that did not participate in syphilis testing. The Bay Area includes San Francisco, Oakland, and San Jose. All data are percentages except where indicated.

†Enzyme immunoassay could not be done for 43 blood specimens due to insufficient volumes.

‡Hepatitis B testing could not be done for 60 blood specimens due to insufficient volumes.



37 (15%) were receiving medical care for HIV infection, and 19 (8%) were taking medical drugs for HIV infection or to prevent HIV-related infections.

### Sexual Risk Behaviors and HIV Serostatus

Among these 3492 young men, 90% reported having had sex with at least 1

man, and 23% had had sex with at least 5 men during the past 6 months. Overall, the prevalence of unprotected anal sex (insertive or receptive) was 41% (range, 33%-49%); 30% had had unprotected insertive anal sex, and 31% had had unprotected receptive anal sex (TABLE 4). We compared the sexual risk behaviors of the HIV-negative and HIV-

positive men (Table 4). Compared with HIV-negative men, HIV-positive men who did not know they were infected were more likely to have had unprotected insertive or receptive anal sex during the past 6 months. Compared with HIV-negative men, HIV-positive men who had known for 6 months or more that they were infected were just as likely to have had unprotected insertive or receptive anal sex during the past 6 months.

**Table 3.** Univariate and Multivariate Analyses of HIV Prevalence by Demographic Characteristics, Sexual Identity, and Lifetime Behaviors and Experiences of Young MSM\*

Characteristics	No. of Participants (n = 3449)†	HIV Positive, %	OR (95% CI)	AOR (95% CI)
Age, y				
15-19	1542	5.6	1.0	1.0
20-22	1906	8.6	1.6 (1.2-2.1)	1.4 (1.0-1.9)
Race				
White	1246	3.3	1.0	1.0
Black	587	14.1	4.8 (3.3-7.1)	6.3 (4.1-9.8)
Asian/Asian American/Pacific Islander	203	3.0	0.9 (0.4-2.1)	1.1 (0.5-2.8)
Hispanic	1027	6.9	2.2 (1.5-3.2)	2.3 (1.5-3.4)
Mixed or other	380	12.6	4.2 (2.8-6.6)	4.8 (3.0-7.6)
Sexual identity				
Heterosexual	132	3.8	1.0	
Homosexual	2240	7.5	2.1 (0.8-5.1)	...
Bisexual	1025	6.5	1.8 (0.7-4.5)	...
Transgender	42	14.3	4.2 (1.2-14.7)	...
Sex partners				
Men and women	2117	7.9	1.0	
Men only	1332	6.2	0.8 (0.6-1.0)	...
Male sex partners, No.				
1-4	1218	3.0	1.0	1.0
5-19	1361	7.1	2.5 (1.7-3.7)	1.9 (1.3-2.9)
≥20	851	13.2	5.0 (3.4-7.3)	3.0 (2.0-4.7)
Anal sex with men				
No	451	0.9	1.0	1.0
Yes	2997	8.2	9.9 (4.4-22.3)	5.0 (1.8-13.8)
Used "party" drugs‡				
No	1672	6.6	1.0	
Yes	1777	7.8	1.2 (0.9-1.6)	...
Injected drugs				
No	3200	6.7	1.0	1.0
Yes	241	14.5	2.4 (1.6-3.5)	2.0 (1.3-3.2)
Had an STD				
No	2986	5.6	1.0	1.0
Yes	462	17.8	3.6 (2.8-4.8)	2.4 (1.7-3.3)
Runaway or removed from home				
No	2232	6.3	1.0	
Yes	1216	9.0	1.5 (1.1-1.9)	...
Forced to have sexual contact				
No	2234	6.9	1.0	
Yes	1203	7.8	1.1 (0.9-1.5)	...

\*HIV indicates human immunodeficiency virus; MSM, men who have sex with men; OR, odds ratio; CI, confidence interval; AOR, adjusted odds ratio; ellipses, variables that were removed from the final model; and STD, sexually transmitted disease.

†Entries may not add up to 3449 because for some characteristics, a possible response category was "don't know" or "refuse." In 1 case a questionnaire page was missing. The range of missing values is 0 to 19. Enzyme immunoassay could not be done for 43 blood specimens due to insufficient volumes.

‡Includes amphetamines, cocaine, lysergic acid diethylamide (LSD), methylenedioxymethamphetamine (ecstasy), and nitrites.

### COMMENT

In all 7 US areas, the prevalence of HIV infection and associated sexual risk behaviors were high among these young MSM. Considering their youth, their recent initiation of sexual activity, and the high prevalence of recent unsafe sex, many of the HIV-positive men probably were infected recently. Considering their youth, the high prevalence of recent unsafe sex, and the high HIV prevalence in US MSM, many of the HIV-negative men are likely to become HIV-infected in the near future.

Results from this large sample of young men are consistent with the high prevalence of HIV suggested from smaller samples of young men in single areas,<sup>8,11,12</sup> including the 1992 through 1993 YMS in San Francisco and Berkeley.<sup>10</sup> The results are alarming in light of the men's youth and compared with the HIV prevalence for samples of primarily heterosexual youth in the United States. For example, according to 1996 data on 33 989 males aged 16 to 21 years entering the US Job Corps, a training program for disadvantaged out-of-school youth, HIV prevalence was 0.22% among black men, 0.10% among Hispanic men, and 0.04% among white men.<sup>26</sup> Data on 205 026 males aged 17 to 22 years applying for US military service during 1996 showed HIV prevalence of 0.11% among black men, 0.01% among Hispanic men, and 0.01% among white men (L.A.V., unpublished data, 1999).

Being black, mixed or other race, having ever had anal sex with a man, or having had sex with 20 men or more in their lifetimes were the demographic and life-

time behavioral characteristics and experiences most strongly associated with HIV infection. The prevalence of HIV infection in this large sample of young blacks was 14%. This high prevalence among blacks was suggested from data from very small samples of blacks in earlier surveys.<sup>8,10-12</sup> Our data show very high HIV prevalence among men of mixed race who reported black backgrounds (16.9%). Prevalence of HIV was also higher among men of mixed or other race (12.6%) and Hispanics (6.9%), than among Asian Americans and Pacific Islanders, and whites. These findings display the large racial gap in the current HIV epidemic in the United States and point to the need for HIV intervention research, prevention programs, and early care programs for young men of color who have sex with men.

Considering their youth, the proportion of these men who had been tested for HIV was high: almost two thirds of all the men and almost four fifths of the HIV-positive men reported having been tested previously. High proportions of all the men and of the HIV-positive men also reported knowing these previous test results. However, only 18% of the men who tested HIV positive in the YMS knew they were currently HIV-infected, only 15% were receiving medical care for HIV, and only 8% were taking medical drugs for HIV. Many of these young men may have become infected since their most recent test. Prevention efforts should continue to make HIV counseling and testing services available and attractive for young MSM, so that these men can learn their serostatus, receive appropriate counseling, and be referred for care if necessary.

We also examined recent HIV-related sexual risk behaviors in light of HIV serostatus and self-knowledge of serostatus. It is sobering that 41% of all the men had had unprotected anal sex during the past 6 months. It is also sobering that 37% of the HIV-infected men who did not know they were infected (n=75), and 13% of the HIV-infected men who did know they were HIV infected (n=4), reported unprotected insertive anal sex during the past 6 months. Although we

**Table 4.** Prevalence of Sexual Risk Behavior in Past 6 Months\*

Characteristics	Prevalence, %	Risk Prevalence Ratio (95% Confidence Interval)
Sex with ≥1 man		
All participants	90	
HIV-negative	90	1.00
HIV-positive, did not know their serostatus	95	1.05 (1.02-1.09)
HIV-positive, did know their serostatus	97	1.08 (1.01-1.15)
Unprotected anal sex (insertive or receptive)		
All participants	41	
HIV-negative	40	1.00
HIV-positive, did not know their serostatus	52	1.30 (1.13-1.49)
HIV-positive, did know their serostatus	29	0.72 (0.42-1.25)
Unprotected insertive anal sex		
All participants	30	
HIV-negative	30	1.00
HIV-positive, did not know their serostatus	37	1.25 (1.03-1.50)
HIV-positive, did know their serostatus	13	0.44 (0.17-1.09)
Unprotected receptive anal sex		
All participants	31	
HIV-negative	30	1.00
HIV-positive, did not know their serostatus	40	1.35 (1.13-1.61)
HIV-positive, did know their serostatus	29	0.97 (0.56-1.69)

\*HIV indicates human immunodeficiency virus. The total number surveyed was 3492; number of men who were HIV negative, 3200; number of HIV-positive men who did not know they were infected, 203; and number of HIV-positive men who had known they were infected for 6 months or more, 31. Enzyme immunoassay could not be done for 43 blood specimens due to insufficient volumes.

asked the men if they knew their own serostatus, we did not ask whether they knew the serostatus of their sex partners, so we do not know the risk of these sex acts. However, it is clear that the prevalence of unprotected anal sex was high, especially among HIV-positive men who had not known they were infected.

There are 2 potential biases to consider concerning our estimates of HIV prevalence and its associated risks. The first is potential enrollment bias. Our enrollment rates were high, considering that we sampled through outreach at venues. However, there was some variation in enrollment rates by age and race. Younger men (among whom seroprevalence was lower) were more likely to enroll; older men (among whom seroprevalence was higher) were less likely. Men of mixed race (among whom seroprevalence was higher) were more likely to enroll; Asian Americans (among whom seroprevalence was lower) were less likely. However, since approximately equal numbers of younger and older men enrolled, and since approximately equal numbers and relatively few Asian American and men of mixed race

enrolled, we do not think that enrollment rate variations biased our prevalence estimates markedly. We have no data on whether enrollment rate was associated with HIV testing history.

Our estimates may be affected by sampling bias. We sampled young MSM who went to public venues in 7 metropolitan areas. We did not sample young men who did not go to venues or young men who did not live in these metropolitan areas; presumably, our prevalence estimates would have been lower if we had also sampled these men. However, in conducting a venue-based survey, we assumed that many young MSM who live in these areas do go to venues and do so frequently, as shown by data from the San Francisco Young Men's Health Study, a population-based, randomized household survey of young men. According to this study, 91% of the 18- to 23-year-old young MSM had gone to a gay bar in San Francisco in the past 6 months (Kimberly Page Shafer, PhD, MPH, oral communication, June 6, 2000).<sup>10</sup> Similarly, the Urban Men's Health Survey, a population-based telephone sample

of MSM in San Francisco, Los Angeles, New York, NY, and Chicago, Ill, found that 74% of the 18- to 22-year-olds sampled had gone to a bar, night club, or dance club at least once a month in the past 12 months (Joseph Catania, PhD, oral communication, July 19, 1999). Even though we sampled only young men who went to venues, we tried throughout the survey period to identify all the venues frequented by young MSM. We did not just sample young men at bars and dance clubs; approximately half the young men we sampled enrolled at street locations, social organizations, and businesses.

Despite the young age of those participating in our study and their presumed exposure to HIV/AIDS prevention educational initiatives while they were growing up, HIV prevalence was high, particularly among blacks, men of mixed race, and Hispanics. The high prevalence of recent sexual risk-taking portends additional HIV infections. Our findings signal a critical and widespread public health problem and underscore a need to evaluate and intensify prevention efforts for young MSM. Particular attention should be paid to reaching blacks, men of mixed race, Hispanics, and young adolescents before they begin having sex with men.

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