Recent HIV Testing Among Young Men Who Have Sex With Men: Correlates, Contexts, and HIV Seroconversion

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Objectives: We evaluated the correlates and contexts of HIV testing within the past year, subsequent risk reduction, and HIV seroconversion among young men who have sex with men (MSM).

Methods: Young men aged 23 to 29 years were approached, interviewed, counseled, and tested for HIV at 181 randomly sampled MSM-identified venues in six U.S. cities from 1998 through 2000. Analyses were restricted to 2,797 MSM who reported never testing HIV-positive.

Results: Of the 2,797 MSM, 1,281 (46%) either never previously tested or had not tested in the past year (never/remote testers); 1,516 (54%) had tested in the past year (recent testers); and 271 (10%) tested HIV-positive as part of the study. Of 1,885 recent sex partners reported by HIV-infected participants, 68% were partners of never/remote testers. Of recent testers, 50% tested anonymously, 51% tested because of specific risks, 59% were counseled, 47% reported reducing their risks after testing, and 8% tested HIV-positive (percent HIV-infected by race: blacks, 24%; Hispanics, 6%; whites, 4%; Asians, 1%).

Conclusion: Nearly half of young MSM participants had not tested in the past year and HIV-infected never/remote testers accounted for approximately two thirds of recent partners potentially exposed to HIV. Of those who had tested recently, many MSM, especially those who are black, had already acquired HIV. To reduce HIV transmission and facilitate early diagnosis and entry into care, increased HIV testing among young at-risk MSM in the United States, especially those who are black, is needed.

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REGULAR HIV TESTING AMONG PERSONS at risk for HIV infection is fundamental for controlling the HIV/AIDS epidemic. For persons who are HIV-negative, HIV testing and counseling is known to help some reduce their risk behavior and avoid infection.[1–6] For persons who are HIV-infected, regular testing promotes early diagnosis and access to effective therapies.[7,8]

Additionally, many persons who become aware of their infection reduce behaviors that can transmit HIV[1,8–12] and inform partners of potential exposure risks.[13–18]

Regular HIV testing among young men who have sex with men (MSM) is particularly important. Young MSM, especially young black MSM, experience the highest in the United States known HIV incidence and prevalence of unrecognized infection.[19–27] As a consequence, the Centers for Disease Control and Prevention (CDC) recommends that at-risk MSM test for HIV at least yearly.[28] Although considerable HIV testing research of MSM has been conducted,[1–3,29–44] no reports have focused on the correlates, contexts, and subsequent HIV infection risks of young MSM who have tested within the past year (recent testing). This information is vital for establishing testing needs, informing prevention efforts on ways to increase testing, and guiding testing policies.

To establish testing needs, we assessed HIV seroconversion among recent testers and the proportion of recent sexual partners whose potential exposures to HIV might have been averted if participants tested every 6 months (biannual testing). To examine ways to increase testing, we evaluated provision of HIV testing services from healthcare providers (HCP). This information is particularly relevant in light of national efforts to increase testing in healthcare settings.[45,46] To help guide policies, we evaluated correlates and subsequent infection risks of young MSM who tested under the following contexts: testing anonymously, testing because of potential HIV exposure, and receiving prevention counseling. This information is relevant in light of calls to eliminate or reduce anonymous testing,[47–49] testing of persons without "risks,"[32,50] and counseling services for those who test.[3,43,51]

To help meet these information needs, we used data obtained from the second phase of the CDC's Young Men's Survey (YMS) to evaluate the correlates and contexts of HIV testing within the

past year, subsequent risk reduction, and HIV seroconversion among young MSM.

Methods

Sampling Procedure

YMS methods have been described extensively.[20–23,41,52–54] In summary, the second phase of YMS was conducted from 1998 through 2000 of men who attend MSM-identified venues (e.g., clubs) in Baltimore, Maryland; Dallas, Texas; Los Angeles, California; Miami, Florida; New York, NY; and Seattle, Washington. Formative research was conducted to construct monthly sampling frames of the days, times, and venues attended by young MSM. Each month, 12 or more venues and their associated day/time periods were selected randomly and scheduled for sampling. During sampling events, men were approached consecutively to assess their survey eligibility. Men aged 23 to 29 years who resided in a locally defined area and who had never previously participated were eligible. Participants were interviewed using a standard questionnaire, had blood drawn for HIV testing, were provided counseling and referral for care (when needed), and were reimbursed $50 for their time. Specimens were tested at local laboratories with U.S. Food and Drug Administration-approved assays. Analyses excluded records of duplicate participants who were identified using the Miragen antibody profile assay[55] and of participants who interviewers had low confidence in the validity of their responses. The YMS protocol was approved by Institutional Review Boards at CDC and at state and local institutions that conducted the survey.

Measures

One standard questionnaire was used in all cities to measure sociodemographic characteristics, healthcare utilization, and sex and drug-use behaviors. Using an HCP was measured with the following question: "Is there a particular doctor's office, health maintenance organization, hospital or some other place that you usually go if you are sick or need advice about your health?" When applicable, we asked how important it was for participants to receive HIV prevention services (e.g., HIV education, risk assessment, risk-reduction counseling, or testing) from their HCP and if they ever discussed with their HCP whether they should test for HIV. We measured importance of prevention services on a seven-point scale (1 = "not important" to 7 = "very important"). Responses ≥5 were categorized as important.

All participants were asked whether they had ever been previously tested for HIV. For previous testers, we asked the month, year, and results of their most recent test and the number of times they tested previously. We defined recent testing as last testing for HIV in the year before the YMS interview; never/remote testing was defined as never previously testing or testing >1 year before the interview. Recent testers were asked where they tested, if they tested anonymously, their reasons for testing, and whether they thought that receiving counseling was important at that test and if they received any counseling.

We defined anonymous testing as testing with an identification number and without the counselor's knowledge of the participant's name. Participants who reported testing because of one or more risks (e.g., unprotected anal intercourse [UAI]) were defined as risk-based testers. Counseling was defined as talking with a test provider either before or after receiving test results about HIV/AIDS, HIV therapy, reason for testing, risk behaviors, or ways to reduce risks. Importance of counseling was measured on a seven-point scale (1 = "not important" to 7 = "very important"). Responses ≥5 were categorized as important. Finally, we asked

recent testers if as a result of their most recent test or counseling experience they 1) increased the frequency of asking about the HIV status of sex partners, 2) decreased the number of sex partners, or 3) decreased the number of UAI occasions after testing. MSM who reported one or more of these risk-reduction behaviors were coded as having reduced their HIV risks after testing.

Analyses

To evaluate HIV seroconversion, we restricted our analyses to MSM who reported never testing HIV-positive. Among these MSM, we evaluated variables associated with 1) recent testing, and among recent testers alone, variables associated with 2) anonymous testing, 3) risk-based testing, and 4) receiving counseling. For each of these four analyses, we first used the Mantel-Haenszel (MH) chi-square test to identify statistically significant ($P < 0.05$) associations controlling for city. Because Breslow-Day test results suggested that associations were homogeneous, we pooled the data from all cities. We next used logistic regression to identify factors independently associated with each of the four outcomes.[56] For each analysis, we included in the model city, age group, race, and all variables that were moderately associated ($P < 0.25$) in our univariate analyses. Full models were then reduced by the stepwise elimination of variables with P values ≥0.05 with the exception of important confounders. We assessed the fit of models using the Hosmer and Lemeshow goodness-of-fit test.[56] For all other analyses reported in the text, we used the MH chi-square test controlling for city, age group, and race. All analyses were performed using Statistical Analysis Software (SAS) version 8.2 (SAS Institute, Inc., Cary, NC).

Results

Recruitment

At 181 venues in the six cities, staff enrolled 3,137 (58%) men of 5,443 who were identified as eligible. Proportionally more men aged 23 to 26 years enrolled compared with men 27 to 29 years (59% vs. 55%; $P < 0.01$). No statistically significant differences were observed in the proportion of men enrolled by race/ethnicity. Of the 3,137 participants, the following were removed from analyses: 53 (2%) duplicates, 13 (<1%) who had low confidence ratings, 11 (<1%) who reported never having sex, 121 (4%) who reported never having sex with men, and 41 (1%) whose blood specimens were not tested for HIV. Of the remaining 2,898 MSM, analyses were restricted to 2,797 (97%) who reported never testing HIV-positive. The 2,797 participants were recruited at dance clubs (27%); bars (20%); street locations (19%); health clubs, cafes, and retail businesses (13%); social organizations (7%); parks (4%); adult bookstores and bathhouses (2%); and other venues (e.g., gay pride) (7%). Of the 2,797 participants, 49% were aged 23 to 25 years, 50% were nonwhite, 75% had attended college, and over 80% were employed (Table 1).

Use of Healthcare and HIV Testing Services

Of the 2,797 participants, 1,760 (63%) reported using an HCP (by type of HCP, private physician or HMO: 44%; health center or clinic: 17%; hospital emergency room: 2%). Of healthcare users, 1,211 (69%) reported that they perceived it important to receive HIV prevention services from their HCP and 57% reported that they had ever discussed HIV testing with their HCP (Table 1). Of the 2,797 participants, few had tested regularly for HIV (median number of prior tests: 3; interquartile range: 1–6); 322 (12%) had never previously tested; 959 (34%)

TABLE 1. Recruitment Outcomes and Demographic, Healthcare Use, and HIV Testing Characteristics of Participating Men Who Have Sex With Men, by City

Characteristic	Baltimore	Dallas	Los Angeles	Miami	New York	Seattle	All
Recruitment							
Venues (no.)	19	26	40	32	38	26	181
Participation rate (%)*	58	60	55	58	59	54	58
Enrolled (no.)[†]	475	467	436	447	519	453	2797
Age (%)[†]							
23–25	53	49	46	48	55	44	49
26–29	47	51	54	52	45	56	51
Race/ethnicity (%)[†]							
Asian	3	2	10	3	8	9	6
Black	30	19	11	6	36	5	19
Hispanic	4	25	22	55	31	7	24
White	61	52	52	36	23	77	50
Mixed/other	2	1	4	1	2	2	2
Education (%)[†]							
High school/technical school	30	28	23	23	30	17	25
At least some college	70	72	77	77	70	83	75
Employment (%)[†]							
Unemployed	12	7	22	16	22	11	15
Part- or full-time	88	93	78	84	78	89	85
Living situation (%)[†]							
Parents/relatives	20	12	14	17	28	8	17
Alone/Friends/lovers	79	87	83	82	70	91	82
School/other	1	<1	1	1	1	1	<1
Homeless	0	<1	2	0	1	0	<1
Use healthcare provider (%)[†‡]							
No	36	36	43	45	31	32	37
Yes	64	64	57	55	69	68	63
HIV prevention services at HCP[§]							
Neutral/not important	35	29	35	26	23	39	31
Important	65	71	65	74	77	61	69
Ever discussed HIV testing with HCP[‖]							
No	43	45	51	42	39	40	43
Yes	57	55	49	58	61	60	57
Prior HIV tests[†]							
None	11	14	9	10	15	9	12
>1 year before interview	36	33	31	36	39	30	34
≤1 year before interview	53	53	60	54	46	61	54

*Among men identified as eligible.
[†]Restricted to analytical sample of 2,797 MSM.
[‡]Measured by the following question: "Is there a particular doctor's office, health maintenance organization, hospital or some other place that you usually go if you are sick or need advice about your health?"
[§]Of 1,760 MSM who reported using a particular HCP. Prevention services included HIV education, risk assessment, risk-reduction counseling, or testing. Importance of prevention services was measured on a seven-point scale (1 = "not important" to 7 = "very important"). Responses ≥5 were categorized as important.
[‖]Of 1,760 MSM who reported using a particular HCP.
MSM indicates men who have sex with men; HCP = healthcare provider.

had last tested >1 year before their interview; and 1,516 (54%) had last tested in the year before their interview (Table 1).

Potential HIV Exposures to Partners

Of the 2,797 participants, 271 (10%) tested positive for HIV as part of the study. Of those who tested HIV-positive, 147 (54%) were never/remote testers and 124 (46%) were recent testers. The 271 HIV-positive MSM reported a total of 1,796 male (median: 2; interquartile range: 1–5) and 89 female sex partners in the 6 months before their interview (recall period). Of these, 1,227 (68%) male and 62 (70%) female partners were reported by the 147 HIV-positive never/remote testers who had not tested in the past year and 6 months before the recall period.

Correlates of Recent HIV Testing

Adjusting for city, age group, and race, the following variables were associated with recent testing: having an annual income ≥$30,000, being recruited at venues other than social organizations, believing it important to receive HIV prevention services from an HCP, discussing HIV testing with an HCP, being aware of highly active antiretroviral therapy (HAART), being "out" sexually to many persons, having six or more lifetime male sex partners, ever being diagnosed with a sexually transmitted infection (STI), using illicit drugs in the last 6 months, perceiving oneself at low risk for being infected, and disclosing one's perceived HIV status to new sex partners (Table 2).

Contexts and Impact of Recent HIV Testing

Locations, Methods, and Reasons for Testing

Of the 1,516 recent testers, 1,428 (94%) were asked about the contexts of their most recent test. Of these, 31% reported testing at a nonhealth department community or school clinic, 27% at their pri-

TABLE 2.   Demographic, Healthcare, and Behavioral Correlates of HIV Testing Within the Past Year Among 2,797 23- to 29-Year-Old Men Who Have Sex With Men, Six U.S. cities, 1998–2000*

Characteristic	No. of Participants	Recent HIV Test (%)	AOR†	95% CI
Total	2797	54	—	—
City				
New York	519	47	Reference	—
Dallas	467	52	1.3	1.0–1.8
Miami	447	54	1.3‡	1.0–1.8
Baltimore	475	53	1.4‡	1.0–1.8
Seattle	453	61	1.6‡	1.2–2.1
Los Angeles	436	60	1.8‡	1.4–2.4
Age group				
26–29	1421	54	Reference	—
23–25	1376	55	1.2‡	1.1–1.5
Race/ethnicity				
Asian	165	49	Reference	—
Black	520	53	1.3	0.9–2.0
Hispanic	670	52	1.2	0.8–1.8
Mixed/other	53	51	0.8	0.4–1.6
White	1385	56	1.0	0.7–1.5
Annual income				
<$15,000	702	47	Reference	—
$15,000–29,999	1027	54	1.1	0.9–1.4
≥$30,000	1059	60	1.3‡	1.1–1.7
Recruitment venue				
Social organizations	208	44	Reference	—
Clubs/businesses/street locations/bathhouses/other	2589	55	1.4‡	1.0–2.0
Disclosure of sexual orientation to others				
Few	312	41	Reference	—
Some	1030	52	1.2	0.9–1.6
Many	1455	59	1.3‡	1.0–1.8
Healthcare utilization§				
Did not use or have a regular provider of healthcare	1037	45	Reference	—
Used care—provider did not discuss HIV testing	760	49	1.0	0.8–1.2
Used care—provider discussed HIV testing	1000	68	1.9‡	1.4–2.4
Prevention services at healthcare provider‖				
Did not use HCP or prevention services not important	1585	48	Reference	—
Used HCP and prevention services important	1212	63	1.4‡	1.1–1.8
Aware of HAART¶				
No	1076	46	Reference	—
Yes	1721	59	1.5‡	1.2–1.7
Use elicit drugs**				
No	1028	51	Reference	—
Yes	1769	56	1.2‡	1.0–1.5
Lifetime male sexual partners				
1–5	535	43	Reference	—
6–19	834	53	1.5‡	1.1–1.9
≥20	1428	59	1.8‡	1.4–2.3
Previous STI				
No	2090	52	Reference	—
Yes	707	61	1.4‡	1.2–1.7
Perceived risk for being HIV-positive††				
Moderate/high	470	43	Reference	—
Low	2318	57	2.1‡	1.7–2.6
Asked ≥1 new partner about his HIV status‡‡				
No new partners/did not ask	1670	48	Reference	—
Yes	1127	63	1.4	1.0–1.8
Told ≥1 new partners HIV status‡‡				
No new partners/did not tell	1661	48	Reference	—
Yes	1136	64	1.5†	1.1–2.0

*Baltimore, Maryland; Dallas, Texas; Los Angeles, California; Miami, Florida; New York, New York; and Seattle, Washington.
†Reported for variables that remained in the reduced logistic regression model predicting HIV testing within the past year (see "Methods"). Model demonstrated adequate fit based on the goodness-of-fit test ($P > 0.05$).
‡$P < 0.05$ (Wald chi-square).
§Measured with the following question: "Is there a particular doctor's office, health maintenance organization, hospital or some other place that you usually go if you are sick or need advice about your health?"
‖Prevention services included HIV education, risk assessment, risk-reduction counseling, or testing. Importance of prevention services was measured on a seven-point scale (1 = "not important" to 7 = "very important"). Responses ≥5 were categorized as important.
¶Measured with the following question: "Have you heard about the new combination-drug treatments for HIV and AIDS that include protease inhibitors? By combination-drug treatment, I mean a protease inhibitor taken with at least one other anti-HIV drug to treat HIV infection. These combination-drug treatments are sometimes called drug cocktails or HAART."
**In the 6 months preceding the survey interview.
††Measured with the following question: "Using this card, choose a number that best describes how likely it is that you are HIV-positive today." Responses of "(3) somewhat likely," "(4) likely," "(5) very likely" were coded as moderate or high; responses of "(1) very unlikely," or "(2) unlikely" were coded as low.
‡‡New partner was defined as a male partner with whom they had sex for the first time in the 6 months before the survey interview.
AOR indicates adjusted odds ratio; CI = confidence interval; HCP = healthcare provider; HAART = highly active antiretroviral therapy; STI = sexually transmitted infection.

vate medical provider, 17% at a health department clinic, 7% at a hospital, 3% through a home test kit, and 15% at other locations (e.g., research study, drug-treatment clinic, prison). Additionally, 707 (50%) reported testing anonymously and 722 (51%) reported one or more exposure risks as a reason for testing. Few reported testing because their doctor recommended testing (7%), because their partner or the health department recommended that they test (1%), or because they believed that HIV therapy has improved (1%).

Correlates of Anonymous and Risk-Based Testing

Adjusting for city, variables associated with anonymous testing include being white (compared with black), not having or not discussing HIV testing with a HCP, testing at locations other than at a private physician's office or hospital, testing because of concerns about a specific risk, and receiving counseling (Table 3). Adjusting for city, race, and testing anonymously, variables associated with risk-based testing include being aware of HAART, ever and recently engaging in UAI, asking new partners about their HIV status, and reducing risks after testing (Table 3).

Perceived Importance, Occurrence, and Correlates of Counseling

Of the 1,428 recent testers, 897 (62%) reported that it was important to receive counseling at their last test and 858 (59%) received at least some counseling. Adjusting for city and testing anonymously, variables associated with receiving at least some counseling were having an HCP with whom they discussed the need for testing, being aware of HAART, ever engaging in UAI, being tested at a community-based or health department clinic, believing that counseling was important, and reducing risks after testing (Table 3).

Subsequent Risk Reduction and HIV Seroconversion

Of the 1,428 recent testers, 665 (47%) reported reducing their HIV risks because of the HIV testing or counseling experience: 26% increasing how frequently they asked their sex partner's HIV status, 27% decreasing the number of sex partners, and 25% decreasing the number of UAI occasions. However, of the 1,428 recent testers, 110 (8%) seroconverted (by race: blacks, 24%; Hispanics, 6%; whites, 4%; Asians, 1%). Of those who seroconverted, 57 (52%) received at least some counseling at their last test.

Among recent testers, proportionally fewer anonymous versus confidential testers seroconverted (5% vs. 10%; $P = 0.03$). Among anonymous testers, no difference was observed in the proportion who seroconverted between those who were counseled versus those who were not (5% vs. 7%; $P = 0.36$). No difference in HIV seroconversion was observed between MSM who reported 1) testing because of specific risks versus testing for other reasons (6% vs. 9%; $P = 0.07$); 2) receiving at least some counseling versus not receiving any counseling (7% vs. 9%; $P = 0.17$); and 3) reducing versus not reducing risk behaviors after testing (9% vs. 7%; $P = 0.64$).

Discussion

Although current guidelines recommend that MSM at risk for HIV infection test at least annually, our findings suggest most young MSM had not tested annually and nearly half had not tested in the past year. Of those who had never or last tested over one year ago, approximately one in nine were found to be HIV-infected. Approximately two thirds of recent male and female sex partners who might have been exposed to HIV were partners of HIV-infected unaware MSM who had not tested in the past year.

Among recent testers, we found that half had tested anonymously, half tested because of specific risks, most thought that counseling was important, over half had received counseling, and nearly half reported reducing their HIV risks because of their testing or counseling experience. However, of those who had tested in the past year, approximately one in 12 MSM overall and nearly one in four black MSM acquired HIV. Our findings, thus, underscore the urgency for renewed initiatives and policies to increase HIV testing and risk reduction among young MSM, especially for those who are black.

Initiatives to Increase Testing

HIV Testing in Clinical Settings. We were encouraged by our findings that a majority of young MSM use a particular source of health care, that nearly seven in 10 who had an HCP thought it important to receive HIV prevention services from their HCP, and that perceiving it important to receive these services and discussing the need for testing with their HCP were associated with recent testing. These findings corroborate other research that providers play an important role in HIV testing for MSM.[3,7,57] However, nearly half of young MSM who had an HCP never discussed the need for testing with their provider and fewer than one in 10 recently tested because their HCP recommended testing. These findings support considerable research that some providers miss opportunities to test persons at risk for infection.[4,58–62] To identify and link more infected young MSM into care, healthcare providers should routinely recommend HIV testing for all patients in healthcare settings where clients are at increased risk for acquiring HIV.[4,63–65] To increase the proportion of patients who receive their test results, providers should consider using rapid HIV tests that are accurate, acceptable, and provide results in approximately 20 minutes.[3,43,65–67]

HIV Testing in Nonclinical Settings. Although we found that many young MSM had ever used health care, nearly two thirds of young MSM either did not use a particular HCP or never discussed testing with their HCP. Also, proportionally fewer young MSM with lower income and who were less "out" about being sexually attracted to men had tested recently. These findings corroborate reports that some young adults do not access health care,[68,69] lack the economic means for regular testing,[35,43] or are reluctant to disclose sexual risks to providers,[70–72] and thus underscore efforts[45,46] to make free testing more widely available in nonclinical settings to reach MSM who do not access care or who do not disclose risks to providers.

We are encouraged by our finding that young MSM who were recruited at clubs, bathhouses, and other venues (relative to those recruited at gay organizations) were more likely to have recently tested. Adjusting for other correlates of recent testing, this association suggests that some MSM may have taken advantage of rapid and conventional HIV testing that has become more widely available at these types of venues.[45,46,73–79] Our finding that few MSM had tested as a result of health department notification was not surprising because relatively few had tested at health department clinics, because partner counseling and referral services[80] are not routinely offered[81–83] and few MSM know of the availability of these services.[3]

HIV Testing Policies

Anonymous Testing. Our findings that half of recent testers in our sample tested anonymously and that anonymous testing was associated with not having or discussing testing with an HCP affirm reports that many MSM are concerned about confidentiality[4,7,29,37,43,57] and will only test anonymously.[3,7,37,57,84] We also found that young MSM recent testers who were concerned about

TABLE 3. Demographic, Healthcare, and Behavioral Correlates of Anonymous Testing, Risk-Based Testing, and Being Counseled Among 1,428 23- to 29-Year-Old Men Who Have Sex With Men Who Tested for HIV in the Past Year, Six U.S. Cities, 1998–2000*

Characteristic	No. of Participants	Anonymous Testing		Risk-Based Testing		Counseled	
		%	AOR[†] (95% CI)	%	AOR[†] (95% CI)	%	AOR[†] (95% CI)
Total	1428	50	—	51	—	59	—
City							
New York	217	35	Reference	34	Reference	65	2.6 (1.7–4.1)[‡]
Miami	228	47	1.6 (1.0–2.6)[†]	40	1.1 (0.7–1.7)	47	Reference
Baltimore	227	50	1.4 (0.9–2.2)	44	1.2 (0.8–1.9)	59	1.6 (1.0–2.4)[‡]
Los Angeles	249	62	1.5 (1.0–2.4)	55	1.7 (1.1–2.6)[‡]	64	2.0 (1.3–3.0)[‡]
Seattle	268	50	1.1 (0.7–1.8)	61	2.0 (1.3–3.1)[‡]	67	2.7 (1.5–4.1)[‡]
Dallas	239	50	1.3 (0.8–2.0)	65	2.9 (2.0–4.4)[‡]	53	1.2 (0.8–1.8)
Age group							
23–25	701	48	—	50	—	58	—
26–29	727	51	—	52	—	60	—
Race/ethnicity							
Black	251	39	Reference	41	Reference	59	—
Hispanic	328	44	1.0 (0.7–1.6)	41	0.9 (0.6–1.3)	56	—
Asian	74	53	1.4 (0.7–2.6)	49	1.1 (0.6–1.9)	65	—
White	749	55	1.6 (1.1–2.3)[‡]	58	1.4 (1.0–1.9)	60	—
Mixed/other	25	60	1.9 (0.7–5.0)	60	1.4 (0.6–3.3)	68	—
Healthcare utilization							
None/provider did not discuss testing	787	56	1.3 (1.0–1.7)[‡]	50	—	57	Reference
Used care—provider discussed testing	641	41	Reference	51	—	62	1.5 (1.1–1.9)[‡]
Aware of HAART[§]							
No	456	43	—	41	Reference	51	Reference
Yes	972	52	—	55	1.3 (1.0–1.7)[‡]	64	1.9 (1.5–2.5)[‡]
Lifetime male sex partners							
1–5	217	45	—	38	Reference	56	—
6–19	417	49	—	46	1.1 (0.8–1.6)	62	—
≥20	794	51	—	57	1.4 (1.0–2.0)	59	—
UAI ever[ǁ]							
No	294	48	—	34	Reference	52	Reference
Yes	1134	50	—	55	1.6 (1.2–2.2)[‡]	61	1.6 (1.2–2.2)[‡]
UAI[¶]							
None/always use condom	746	47	—	43	Reference	58	—
HIV-negative partners only	372	51	—	56	1.4 (1.0–1.8)[‡]	62	—
≥1 partner of unknown HIV status	310	53	—	61	1.4 (1.0–1.9)[‡]	60	—
HIV test provider							
Private physician/HMO/hospital	506	16	Reference	43	—	43	Reference
Other test provider	228	52	5.0 (3.4–7.3)[‡]	46	—	50	1.2 (0.9–1.8)
Community or health department clinic	694	73	11.6 (8.5–15.8)[‡]	57	—	75	3.4 (2.5–4.7)[‡]
Anonymous testing							
No	721	—	—	42	Reference	47	Reference
Yes	707	—	—	59	1.8 (1.5–2.3)[‡]	72	2.0 (1.5–2.6)[‡]
Risk-based testing							
No	706	41	Reference	—	—	55	—
Yes	722	58	1.6 (1.3–2.1)[‡]	—	—	64	—
Counselling important							
No	537	49	—	50	—	46	Reference
Yes	884	50	—	50	—	68	2.9 (2.3–3.8)[‡]
Counseled							
No	579	34	Reference	45	—	—	—
Yes	849	60	1.8 (1.5–2.5)[‡]	54	—	—	—
Asked ≥1 new partner about his HIV status**							
No new partners/did not ask	751	49	—	45	Reference	59	—
Yes	677	50	—	56	1.3 (1.1–1.7)[‡]	60	—
Reduced risks after testing							
No	763	48	—	45	Reference	55	Reference
Yes	665	51	—	57	1.5 (1.2–1.9)[†]	64	1.3 (1.0–1.7)[‡]

*Baltimore, Maryland; Dallas, Texas; Los Angeles, California; Miami, Florida; New York, New York; and Seattle, Washington.
[†]Reported for variables that remained in the reduced logistic regression model (see Methods). Model demonstrated adequate fit based on the goodness-of-fit test ($P > 0.05$).
[‡]$P < 0.05$ (Wald chi-square).
[§]Measured with the following question: "Have you heard about the new combination-drug treatments for HIV and AIDS that include protease inhibitors? By combination-drug treatment, I mean a protease inhibitor taken with at least one other anti-HIV drug to treat HIV infection. These combination-drug treatments are sometimes called drug cocktails or HAART."
[ǁ]Unprotected anal intercourse (UAI) was defined as not wearing a condom during at least one occurrence of anal intercourse (insertive or receptive) with a male partner.
[¶]In the 6 months before the survey interview.
**New partner was defined as a male partner with whom they had sex for the first time in the six months preceding the survey interview. AOR indicates adjusted odds ratio; CI = confidence interval.

potential exposure risks were more likely to have tested anonymously, and encouragingly, anonymous testers were more likely to have been counseled. Our finding of lower HIV seroconversion risk among anonymous testers corroborates a previous report of fewer HIV-positive tests among MSM who tested anonymously at public test sites.[85] Although anonymous testers were more likely to have been counseled, our finding cannot be attributed to counseling that was not associated with lower seroconversion among anonymous testers alone. The high use of anonymous testing services by young at-risk MSM, receipt of HIV prevention counseling, and lower HIV seroconversion risks affirm policies making anonymous testing widely available for young MSM.

Risk-Based Testing. Our finding that only half of young MSM tested because of specific risk behaviors underscores concerns that many young MSM may not be aware of their actual risks for HIV infection.[22,23] Nearly one in 10 young MSM who tested for other reasons subsequently acquired HIV. Additionally, young black and Hispanic MSM, the two subgroups at highest risk for infection, were the least likely to have tested because of recognized risks. Thus, our findings support policies in clinical settings that make testing routinely available for all young MSM, including those who do not recognize or disclose exposure risks. Encouragingly, proportionally more MSM who reported reducing their risks after testing had been risk-based testers. Despite these reductions, however, similar proportions of risk-based and other testers seroconverted.

HIV Counseling. Our finding that most young MSM believe that counseling is important is contrasted by two studies suggesting that many MSM do not want counseling when they test for HIV.[3,43] These reports, however, were based on predominantly white and older MSM. We were encouraged to find that HIV serostatus disclosure to partners was associated with recent testing, that nearly half of recent testers in our survey reported reducing their behavioral risks after testing, and that behavioral risk reduction was associated with having been counseled. Although the reported association between counseling and behavioral risk reduction may be confounded by other (unmeasured) prevention exposures, these findings corroborate reports that counseling can be effective in helping people reduce their sexual risks[1,4–6] and that some MSM use HIV testing as a personal strategy to avoid infection.[1–4,31,34] As surveys have shown for other groups,[4,81,86–89] we found that many young MSM who might have benefited from counseling did not receive any counseling, including nearly half of the MSM who subsequently acquired HIV.

We also found, however, that HIV seroconversion was similar among recent testers who were counseled or not and among those who reported reducing or not reducing their risks after testing. The lack of association between having been counseled and HIV seroconversion was expected because we were unable to distinguish client-centered counseling that is known to reduce STI acquisition risks from counseling that is not effective[5] and that client-centered counseling is infrequently practiced outside of research contexts.[4,5,81,87–89] The lack of association between subsequent behavioral risk reduction and HIV seroconversion was also of no surprise given the magnitude of unrecognized infection among young MSM and infection risks from partners who are perceived to be or report being HIV-negative.[22,23]

Thus, in contrast to policy recommendations to reduce counseling services,[3,43,51] we repeat our call to improve primary prevention practices at the test encounter.[41] Test providers should counsel young MSM, particularly young black MSM, of high seroconversion risks after testing, of the importance in reducing

HIV acquisition risks, and that a negative test result offers no future assurance in remaining free from HIV infection. Because over one third of young MSM in our survey were neutral about counseling or thought that it was not important, and because some MSM believe counseling is repetitive and unnecessary,[3,43] new research efforts should be undertaken to develop practical counseling messages that affect risk awareness and reduction among MSM.

Limitations and Potential Biases. Findings from our survey have several limitations and potential biases. First, because we sampled MSM between 23 and 29 years of age at MSM-identified venues, our findings may not generalize to younger or older MSM and MSM who do not frequent MSM-identified venues. Also, because our sample was restricted to six large cities, our findings may not generalize to MSM who reside in other cities and rural areas. Within large cities, however, most young MSM probably go to venues that are available for sampling. For example, of 563 18- to 29-year-old MSM who participated in a household-based telephone survey in four large U.S. cities from 1996 to 1998, 96% attended a bar, nightclub, or dance club in the previous 12 months (Lance Pollack, PhD, personal communication, November 10, 2003).

Second, our findings may be subject to nonparticipation bias because approximately 42% of eligible men declined to participate. For example, our estimate that 54% of young MSM were recent testers may be biased upward because only MSM who agreed to be tested could participate. However, our finding is very similar to one report that 50% of 3,967 MSM recruited in 16 cities for a behavioral interview alone reported testing in the past year.[30] Although higher rates of recent or regular testing have been reported among MSM, these findings have been based on samples of older MSM.[32,33,44]

Third, we cannot determine the causality of reported associations because our survey was cross-sectional. For example, increased HAART awareness as a result of testing (rather than influencing testing) is plausible because proportionally more recent testers who knew about HAART had been counseled. Also, the association between perceived low risk for infection and recent testing was expected because risk perception was measured after the most recent test and analyses excluded MSM who reported testing HIV-positive.

Fourth, we relied on self-reported data, which is subject to disclosure and recall biases. It may be true, for example, that some participants knew they were HIV-infected but reported that they last tested HIV-negative. We did not use computer-assisted self-interviews, which have been found to obtain more risk information than face-to-face interviews.[90]

Finally, we did not measure the number of partners in the previous 6 months with whom HIV-infected MSM had unprotected sex for the first time. Our two thirds estimate of exposures attributed to HIV-infected MSM who had not tested recently would be biased upward if proportionally fewer never/remote than recent testers had unprotected sex with new partners. We observed, however, no differences in the proportion of HIV-infected never/remote versus recent testers who engaged in unprotected anal or vaginal sex (54% vs. 46%; $P = 0.17$) or who reported having new sex partners (61% vs. 60%; $P = 0.90$) in the previous 6 months.

Conclusion

Several recent reports suggest that meaningful reductions in new HIV transmission among young MSM are dependent on large reductions in the prevalence of unrecognized infection among young MSM.[20–25] Our findings suggest that biannual HIV testing of all at-risk young MSM, with commensurate risk reduction

among those who test positive in the subsequent 6 months,[1,8–12] would avert approximately two thirds of potential HIV exposures over a 6-month period and potentially a much higher proportion of potential exposures over longer periods (provided behaviors to eliminate or reduce transmissions are maintained). The sequelae of reduced HIV transmission, and early access to health care and social support services for those who test positive, provides a strong rationale for more frequent testing of young at-risk MSM in the United States.

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