



HHS Public Access

Author manuscript

J Acquir Immune Defic Syndr. Author manuscript; available in PMC 2017 January 18.

Published in final edited form as:

J Acquir Immune Defic Syndr. 2013 June 01; 63(2): 254–258. doi:10.1097/QAI.0b013e31828e0cfc.

Temporal Trends in Sexual Behavior among Men Who Have Sex with Men in the United States, 2002 to 2006–10

Jami S. Leichter, PhD, Laura T. Haderxhanaj, MPH, MS, Harrell W. Chesson, PhD, and Sevgi O. Aral, PhD

Division of STD Prevention, Centers for Disease Control and Prevention, Atlanta, GA

Abstract

Little is known about national trends in sexual behavior among MSM in the U.S. Data from the 2002 and 2006–10 National Survey of Family Growth were used to compare sexual behaviors of sexually active MSM. Mean number of recent male partners significantly decreased from 2.9 in 2002 to 2.1 in 2006–10 ($p=.027$), particularly among young MSM. Other sexual risk behaviors did not change or decreased over time. Our findings that sexual risk decreased as HIV and syphilis increased among MSM suggest that factors in addition to individual-level sexual risk should also be examined in relation to recent disease increases.

Keywords

trends; national probability sample; sexual behavior; MSM

INTRODUCTION

There have been recent increases in HIV and primary and secondary (P&S) syphilis among men who have sex with men (MSM), especially among young or minority MSM, in the United States (U.S.).^{1,2} From 2006 to 2009, estimated HIV incidence increased 35% among MSM 13–29 years old and 48% among black MSM 13–29 years old.¹ Similarly, from 2005 to 2008, rates of reported P&S syphilis increased 74% among black MSM (adjusted for age and region of U.S.), and 160% and 117% among 15–19 and 20–24 year olds, respectively (adjusted for age, region, and race/ethnicity).² Furthermore, analysis of trends in HIV and P&S syphilis from 2004 to 2008 found that increases among black men 13–24 years old were identified in nearly all parts of the U.S. included in the study indicating that the increases were widespread rather than limited to a few areas.³ For both diseases, it is possible that increases among MSM began earlier. From 2000 to 2004, P&S syphilis increased 81% among men (believed to be driven by MSM)⁴ and HIV/AIDS cases appeared to increase in 2004 among MSM.⁵

Correspondence to: Jami S. Leichter, PhD, Division of STD Prevention, Centers for Disease Control and Prevention, 1600 Clifton Rd MS E-44, Atlanta, GA 30333; p: 1-404-639-1821; f: 1-404-639-8622 (jleichter@cdc.gov).

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

A portion of these data were presented at the National STD Prevention Conference, Minneapolis, March 13, 2012.

Conflicts of Interest and Source of Funding: The authors have no conflicts of interest to disclose.

Although studies have examined temporal trends in sexual behaviors among MSM pre- and post-HAART and in the late 1990s and early 2000s,⁶⁻⁹ few studies have examined recent behavioral trends in MSM in the U.S. One study, a random digit dialing survey in Seattle, compared the sexual behavior of MSM from 2003 to 2006 and found a significant decrease in median number of sex partners in the past year over time and no change in unprotected anal intercourse (UAI).¹⁰ However, given the widespread increases in HIV and P&S syphilis in the U.S., national data on temporal trends in the sexual behaviors of MSM are needed. To date, there has been a lack of data from national population-based surveys that include MSM. The purpose of this study was to examine nationally representative data on sexually active MSM to determine if behaviors changed recently while P&S syphilis and HIV increased among MSM.

METHODS

We used data from the 2002 and 2006–10 National Survey of Family Growth (NSFG). NSFG is a multi-stage national probability sample of 15–44 year olds living in U.S. households, with over-samples of 15–24 year olds, blacks, and Hispanics. Detailed information on the survey design and sampling procedures has been previously described;^{11,12} however, in 2006, NSFG switched from periodic administration (i.e., conducting the survey every 3–7 years) to continuous administration (i.e., conducting interviews from June 2006 to June 2010). The same primary sampling units were used in 2002 and 2006–10. The sample sizes and response rates for males were 4,928 (78%) in 2002 and 10,403 (75%) in 2006–10.^{13,14} All questions about same-sex partners and sexual risk included in this analysis were collected via audio computer assisted self-interview.

We used SAS-callable SUDAAN (Release 10.0, Research Triangle Institute, Research Triangle Park, NC) for analyses to account for the complex sampling procedures used by NSFG and data were weighted for nonresponse. For men who reported one or more male anal and/or oral sex partners in the 12 months prior to interview (referred to as “sexually active MSM”), we used t-tests to compare mean number of male sex partners (top coded at 6 or more partners by NSFG; range = 1 to 6+ partners) across time by demographics including age, race/ethnicity, household income as related to federal poverty level (FPL), education, and residing in a metropolitan statistical area (MSA). Additionally, we used chi-square tests to compare reported sexual risk behaviors [specific sexually transmitted disease (STD)/HIV risk behaviors including those with male partners], sex with female partners, and STD/HIV testing across time.

RESULTS

The percentage of men who reported having a male sex partner in the past 12 months did not differ across time with 2.7% (n=197) of all men categorized as sexually active MSM in 2002 and 2.1% (n=272) in 2006–10 (p=.103); thus, there were an estimated population total of 1.3 to 1.7 million sexually active MSM aged 15–44 years in the U.S. during the survey years (Table 1). Among all sexually active MSM, there was a significant decrease across time in the reported number of male partners in the past 12 months with an average of 2.9 partners in 2002 and 2.3 in 2006–10 (p=.035). This decreasing trend was also identified among

sexually active MSM 15–24 years old (2.9 partners in 2002 to 2.1 in 2006–10, $p=.027$) and there was a non-significant decreasing trend for 35–44 year olds ($p=.072$). Also, there were no significant differences in the average number of male partners reported by any racial or ethnic group (Hispanic, non-Hispanic white, non-Hispanic black) across time.

We found significant decreases in number of male partners in the past 12 months for some subpopulations. Specifically, sexually active MSM with an income less than 150% of the FPL reported a mean of 3.0 male partners in 2002 significantly decreasing to 2.1 male partners in 2006–10 ($p=.032$). Additionally, mean number of partners decreased for sexually active MSM with some college experience from 3.2 in 2002 to 2.3 in 2006–10 ($p=.033$) and for those living in a MSA, other from 3.2 in 2002 to 2.1 in 2006–10 ($p=.009$). There were no changes over time for the remaining subpopulations by income, education, or residence.

Similarly, we found no changes over time or declines in several STD/HIV risk behaviors (past 12 months) and STD/HIV testing (past 12 months/lifetime). Specifically, there was no significant difference across time in sexually active MSM reporting spending time in jail, not using a condom at last sex, injection drug use (IDU) and/or sex with a male IDU, or sex with an HIV-infected male (Table 2). In both timeframes, over half of sexually active MSM (56.7% in 2002 and 58.3% in 2006–10) reported that they did not use a condom at last sex with a male partner. We found a significant decrease in reports of exchanging sex with a male for money or drugs from 15.1% in 2002 to 3.1% in 2006–10 ($p=.002$). Additionally, there were no differences in reports of STD testing in the past 12 months ($p=.945$) or in receipt of last HIV test ($p=.319$).

Finally, there was a significant decrease in sexually active MSM who reported a female partner in the past 12 months (MSMW) from 38.4% in 2002 to 24.8% in 2006–10 ($p=.027$). MSMW were 1.0% (2002) to 0.5% (2006–10) of all men ($p=.004$) with an estimated population total of 315,642 MSMW in 2006–10. Although we found a significant decrease in condom use at last sex among MSMW ($p=.039$), the decrease in overall numbers of MSMW meant that there were significantly fewer MSMW who did not use a condom at last sex down from 292,114 in 2002 to 210,930 in 2006–10. Among MSMW, reports of sex with an at-risk female (exchange sex, IDU, or HIV-positive) in the past 12 months significantly declined from 32.1% in 2002 to 11.0% in 2006–10 ($p=.009$).

We conducted post-hoc analyses to examine average number of male partners by age and race/ethnicity within survey year. We found no differences between 15–24 year olds and 25–34 and 35–44 year olds in 2002 ($p=.575$ and $.729$, respectively) or 2006–10 ($p=.183$ and $.724$, respectively). Additionally, there were no differences in number of male partners between white MSM and Hispanic and non-Hispanic black MSM in 2002 ($p=.140$ and $.122$, respectively) or between white MSM and Hispanic MSM ($p=.872$) or white MSM and black MSM ($p=.054$) in 2006–10.

DISCUSSION

During the time when HIV and P&S syphilis were increasing, self-reported number of male sex partners and several STD/HIV-related sexual risk behaviors were stable or decreasing

among sexually active MSM in the U.S. Our findings were generally consistent with a previous study of recent behavioral trends among MSM in Seattle,¹⁰ and a study of MSM in Peru that found increases in HIV while condom use was increasing and STDs were decreasing.⁹ Additionally, we found no evidence that increases in STD/HIV testing were related to the overall disease increases as recent testing among sexually active MSM did not differ across time.

Consistent with a review and meta-analysis,^{15,16} we found that subpopulations most affected by the recent increases in HIV and P&S syphilis^{1,2} did not report a higher number of male sex partners. Specifically, adolescent and young adult MSM did not report a higher number of male partners than other adult MSM. Additionally, sexually active black and Hispanic MSM did not report more partners than their white counterparts, and, in 2006–10, blacks reported fewer partners than whites although the difference was not statistically significant. These findings suggest that factors other than an individual's sexual behavior should also be examined in relation to the increases in HIV and P&S syphilis.

It is possible that sexual network factors are associated with the increases in HIV and P&S syphilis. Partner-level factors such as sexual risk, a lack of awareness of HIV infection, and less access to HIV care have been associated with disparities in HIV infection among MSM. One study found that black MSM had higher reports of same-race partners and partners who were significantly older than MSM of other racial or ethnic groups,¹⁷ and a 2005–06 study found that black MSM who were HIV-positive but not aware of their infection were more likely to believe that having sex with a same-race partner (i.e., assortative mixing) lowered their HIV risk.¹⁸ A 2008 study that included multiple partner-level factors found that having a partner with an unknown HIV status was associated with HIV and was more commonly reported by black than white MSM.¹⁹ Furthermore, black men are estimated to have the highest number of unidentified HIV infections,²⁰ and studies have found that minority MSM (black, Hispanic, mixed race) were more likely to be unaware of their HIV infection.^{21–23} Additionally, access to antiretroviral therapy which has been associated with reduced HIV transmission²⁴ is lower among black MSM.²⁵ Finally, it is possible that STD/HIV prevalence within the partner pool are related to the increases in P&S syphilis and HIV as young and minority MSM have higher rates of HIV and STD. Thus, sexual network factors including partner risk and underlying disease prevalence may contribute to a higher risk of acquiring HIV and syphilis.^{4–5}

There are limitations to this study. The same-sex measures included in NSFG through 2010 were limited; therefore, we could not examine the number of unprotected anal intercourse partners, partner characteristics (e.g., type, age, or race of partner), or whether MSM had partners who were non-monogamous. Also, 2002 NSFG did not assess the use of crystal methamphetamines. NSFG relies on self-reported data so the potential non-reporting of same-sex behaviors exists; however, the use of ACASI minimizes the chance that disclosure of same-sex sexual behaviors would have changed over time. It is possible that behavioral trends influence morbidity trends with a time lag that was not possible to assess given available survey years. Finally, it is possible that household surveys may underestimate the riskiest MSM populations (e.g., core groups); therefore, findings may be most useful in combination with venue-based²⁶ and convenience samples.

Data on MSM from national probability samples may be useful for STD/HIV prevention, particularly aiding in the identification of larger patterns of risk. Our findings suggest the need to also consider issues in addition to sexual behavior, such as sexual networks and disease prevalence in the sexual network, to better identify the factors associated with the observed increases in syphilis/HIV in young and minority MSM.

Acknowledgments

This research was supported in part by an appointment to the Research Participation Program at the Centers for Disease Control and Prevention (CDC) administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy and CDC.

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Table 1

Mean number of male partners for sexually active MSM (report sex with a man in the past 12 months), age 15–44 years, by demographics in the United States: 2002 and 2006–2010

	Year				
	2002		2006–2010		
	n	Mean (95% CI)	n	Mean (95% CI)	P
Had a male partner in past 12 months*					0.103
Yes	197	2.7% (2.1%, 3.4%)	272	2.1% (1.7%, 2.6%)	
No	4,731	97.3% (96.6%, 97.9%)	10,131	98.0% (97.5%, 98.4%)	
Population total estimate, MSM	1.7 million		1.3 million		
Mean number of male sex partners					
All sexually active MSM	197	2.9 (2.5, 3.2)	272	2.3 (2.0, 2.7)	0.035
Age (years)					
15–24	57	2.9 (2.3, 3.4)	77	2.1 (1.7, 2.5)	0.027
25–34	64	2.7 (2.2, 3.2)	97	2.7 (1.9, 3.5)	0.971
35–44	76	3.0 (2.3, 3.8)	98	2.2 (1.7, 2.7)	0.072
Race/ethnicity					
Hispanic	45	2.4 (1.8, 3.1)	67	2.6 (2.0, 3.2)	0.755
White (non-Hispanic)	108	3.0 (2.6, 3.4)	140	2.5 (2.0, 3.0)	0.162
Black (non-Hispanic)	40	2.4 (1.7, 3.0)	47	1.9 (1.4, 2.4)	0.247
Other (non-Hispanic) [†]	4	--	18	--	--
Income as % FPL					
0–149%	51	3.0 (2.3, 3.7)	71	2.1 (1.6, 2.6)	0.032
150% or higher	146	2.8 (2.4, 3.3)	201	2.4 (2.0, 2.9)	0.232
Education					
Less than high school	31	2.6 (1.6, 3.5)	45	2.1 (1.6, 2.6)	0.411
High school/GED	60	2.7 (2.2, 3.2)	66	2.3 (1.8, 2.8)	0.267
Some college	56	3.2 (2.5, 3.9)	73	2.3 (1.8, 2.8)	0.033
College or higher	50	2.9 (2.2, 3.5)	88	2.5 (1.7, 3.2)	0.409
Residing in MSA					
MSA, central city	116	2.6 (2.1, 3.1)	161	2.6 (2.1, 3.0)	0.980

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	2002		2006–2010		P
	n	Mean (95% CI)	n	Mean (95% CI)	
MSA, other	64	3.2 (2.6, 3.8)	96	2.1 (1.5, 2.7)	0.009
Non-MSA [‡]	17	--	15	--	--

FPL: federal poverty level. MSA: metropolitan statistical area.

* Data are percentages with 95% confidence intervals.

[‡] Estimates have been suppressed as the numerator n < 10 or denominator n < 75.

Table 2
Sexually active MSM (report sex with a man in the past 12 months), age 15–44 years, by STD/HIV risk behaviors and testing in the United States: 2002 and 2006–2010

	Year				P
	2002		2006–2010		
	n	% (95% CI)	n	% (95% CI)	
Unweighted sample size	197		272		
Population total estimate	1.7 million		1.3 million		
STD/HIV risk behaviors (male partners)					
Spent time in jail, past 12 months					0.331
Yes	14 [†]	9.1 (4.5, 17.8)	26	5.7 (3.4, 9.4)	
No	183	90.9 (82.2, 95.6)	246	94.3 (90.6, 96.7)	
Condom use during last sex with male					0.806
Yes	89	43.3 (34.9, 52.1)	124	41.7 (32.8, 51.1)	
No	106	56.7 (47.9, 65.1)	148	58.3 (48.9, 67.2)	
IDU or sex with male IDU, past 12 months					0.096
Yes	18 [†]	12.2 (6.4, 21.8)	12 [†]	4.9 (2.0, 11.4)	
No	179	87.9 (78.2, 93.6)	260	95.1 (88.6, 98.0)	
Exchanged sex for \$ or drugs with a male, past 12 months					0.002
Yes	22	15.1 (9.0, 24.2)	21	3.1 (1.9, 5.1)	
No	175	85.0 (75.9, 91.0)	251	96.9 (94.9, 98.1)	
Sex with HIV-infected male, past 12 months					0.556
Yes	23	13.7 (7.6, 23.5)	32	10.8 (6.3, 17.8)	
No	174	86.3 (76.5, 92.5)	240	89.2 (82.2, 93.7)	
Female partners (MSMW)					0.027
MSMW					
Yes	72	38.4 (29.4, 48.2)	69	24.8 (18.2, 32.8)	
No	125	61.6 (51.8, 70.6)	203	75.2 (67.2, 81.8)	
Population total estimate, MSMW	633,208		315,642		
Condom use during last sex					0.039
Yes	38	53.9 (39.9, 67.3)	29	33.2 (20.5, 48.9)	

	Year				P
	2002		2006–2010		
	n	% (95% CI)	n	% (95% CI)	
No	34	46.1 (32.7, 60.2)	40	66.8 (51.1, 79.5)	
Population total estimate, MSMW who did not use condom (last sex)	292,114		210,930		
Sex with female at risk (exchange sex, IDU, or HIV-positive), past 12 months					0.009
Yes	19	32.1 (20.5, 46.4)	11 [†]	11.0 (4.9, 23.1)	
No	54	67.9 (53.6, 79.5)	57	89.0 (77.0, 95.1)	
STD/HIV testing					0.945
STD test, past 12 months					
Yes	73	38.2 (28.7, 51.4)	122	38.7 (29.7, 48.5)	
No	124	61.8 (48.7, 71.3)	150	61.3 (51.5, 70.3)	
Last HIV test					0.319
Past 12 months	71	40.6 (31.0, 50.9)	117	41.4 (31.9, 51.5)	
Over 12 months ago	71	34.4 (26.4, 43.3)	100	43.5 (34.3, 53.2)	
Never tested	39	25.1 (17.8, 34.0)	35	15.1 (9.5, 23.0)	

MSMW = men who had sex with men and women in past 12 months.

[†]Estimates are unstable as the relative standard error (RSE) > 30 (but < 60). No RSE > 60 for estimates provided in this table.