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SEXUAL RISK BEHAVIOR HAS DECREASED AMONG MEN WHO HAVE SEX WITH MEN IN LOS ANGELES BUT REMAINS GREATER THAN THAT AMONG HETEROSEXUAL MEN AND WOMEN

Ronald A. Brooks, Sung-Jae Lee, Peter A. Newman,
and Arleen A. Leibowitz

We examined changes and correlates of sexual risk behavior of men who have sex with men (MSM) compared with heterosexual men and women over three time periods. Data from the 1997, 1999, and 2003 Los Angeles County Health Surveys, a population-based telephone survey, were analyzed to examine the association of sociodemographic and health-related factors with sexual risk behaviors among the three groups. In each time period, MSM reported a significantly greater percentage of sexual risk (i.e., both inconsistent condom use and multiple sex partners in the past 12 months) compared with heterosexual men and women. Multivariate analyses indicated that MSM and heterosexual men reported greater sexual risk than heterosexual women. Respondents who were younger, U.S. born, reported heavy alcohol consumption, or had been tested for HIV in the past 24 months were more likely to report sexual risk behavior. The findings suggest the need for continued targeted prevention for MSM and prevention efforts for segments of the general population at elevated risk for HIV.

In the United States HIV continues to disproportionately impact men who have sex with men (MSM), particularly when compared with heterosexual men and women. Recent data indicate that the incidence of new HIV infections and AIDS diagnoses among MSM continues to vastly exceed those of heterosexual men and women (Centers for Disease Control and Prevention [CDC], 2007). Nationally, MSM make up the largest proportion (39%) of new infections, compared with 5% and 12% for

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heterosexual men and women, respectively. MSM also constitute the largest proportion (40%) of newly reported AIDS cases, compared with 7% for heterosexual men and 12% for heterosexual women. Furthermore, between 1999 and 2002, the number of new HIV infections among MSM increased 17% while the number of new diagnoses among men and women exposed through heterosexual contact did not change significantly (CDC, 2003b). This epidemiological profile indicates that MSM continue to be at elevated risk for HIV/AIDS.

Early in the epidemic, throughout the 1980s and early 1990s, there was a dramatic shift in sexual behaviors of MSM toward safer sexual practices. Increases in condom use and decreases in multiple sex partners, in particular, were realized (Catania et al., 1991; Fenton & Imrie, 2005; McKusick, Coates, Morin, Pollack, & Hoff, 1990). This was perhaps one of the most successful large-scale changes in health-related behaviors in recent history—a result of early HIV prevention programs and a shift in norms of many gay communities toward safer sexual practices, largely spearheaded by the gay community itself (McKusick, Horstman, & Coates, 1985; Wolitski, Halkitis, Parsons, & Gomez, 2001). However, these positive changes were not sustained into the second decade of the epidemic. Several studies indicated an increase in risky sexual behaviors among MSM in major urban areas in the United States since the mid-1990s. For example, the CDC (1999) reported increases in unprotected sex and rectal gonorrhea among MSM in San Francisco in the period from 1994 to 1997. A study of young MSM in San Francisco indicated that unprotected anal intercourse jumped from 37% in 1993–1994 to 50% in 1996–1997 (Ekstrand, Stall, Paul, Osmond, & Coates, 1999). In another study, investigators found that among MSM unprotected anal sex increased from 32% to 38% between 1999 and 2001 (Chen et al., 2002). The successes in behavioral risk reduction among MSM earlier in the epidemic did not remain constant.

The introduction of highly active antiretroviral therapy (HAART) in 1996 contributed to this change in behaviors among MSM. HAART was associated with significant declines in HIV-associated morbidity and mortality among MSM (Detels et al., 1998). The effectiveness of HAART also contributed to a reduced fear of death from AIDS (Buchacz, Greenberg, Onorato, & Janssen, 2005) as well as a growing complacency among MSM toward HIV/AIDS and reduced vigilance about safer sex practices (Crepaz, Hart, & Marks, 2004; Dilley, Woods, & McFarland, 1997; Dukers et al., 2001; Elford, 2006; Kelly, Hoffman, Rompa, & Gray, 1998).

Among MSM, unprotected anal sex represents the greatest threat for HIV infection. As such, the centerpiece of “safer sex” messages has been the promotion of condom use to prevent sexual transmission of HIV. Condom use has been an integral part of comprehensive HIV prevention programs and is an essential tool to prevent transmission of HIV and other sexually transmitted diseases (STD) (CDC, 2001b; UNAIDS & World Health Organization, 2004). Enhancing condom efficacy and condom use skills among at-risk MSM has long been a goal of prevention programs (McKusick et al., 1985). Reducing the number of sexual partners for anal sex is an additional component of HIV risk reduction (CDC, 2003a; Finer, Darroch, & Singh, 1999). Together, these two methods have been effective in decreasing the risk of acquiring HIV among sexually active persons. However, absent sufficient and sustained funding and political will, HIV prevention tailored for MSM has suffered (Holtgrave

& Curran, 2006), with serious consequences for MSM communities and society as a whole (Holtgrave & Pinkerton, 2003).

In this article we examine changes and correlates of sexual risk behavior, defined as both inconsistent condom use and having multiple sex partners for anal or vaginal sex, and its association with HIV acquisition among population-based telephone survey samples of MSM in the general population compared with their heterosexual male and female counterparts, over three time periods in the post-HAART era. What is unique about this investigation is the examination of MSM in the general population. Many studies of MSM have focused on high-density gay communities or convenience samples of gay men at bars, HIV testing sites, commercial sex venues, or STD clinics (Catania et al., 2001; Crosby & Mettey, 2004; Dodds, Nardone, Mercey, & Johnson, 2000; Hart & Williamson, 2005). These samples are of limited generalizability, however, and there is a tendency to overrepresent MSM at higher risk levels than would be found among MSM in the general population. This study offers a unique opportunity to examine changes in sexual risk behavior of MSM, heterosexual men, and heterosexual women in the general population of a major urban AIDS epicenter and to identify correlates of sexual risk behavior for each of these groups.

METHOD

STUDY DESIGN AND DATA COLLECTION

We analyzed data from the 1997, 1999, and 2003 Los Angeles County Health Surveys, a population-based telephone survey of households (Simon, Wold, Cousineau, & Fielding, 2001). The sampling frame includes all households in Los Angeles County with phone numbers, listed and unlisted. Households were selected by random digit dial (RDD) techniques. From each household, one adult (18 or older) was randomly selected to participate in a 30- to 35-minute standardized interview. All interviews were conducted by professionally trained staff working in multiple languages and using a computer-assisted telephone-interviewing (CATI) system. Each survey was approved by the Institutional Review Board of the Los Angeles County Department of Health Services.

For each survey, a sample of over 8,000 households was selected in order to provide meaningful population estimates for each gender and for each of the four largest racial/ethnic groups in the county (i.e., White/Caucasian, Hispanic/Latino, African American/Black, and Asian/Pacific Islander; Simon et al., 2001). The response rate for each survey was over 50% (1997: $n = 8,004$, response rate 52%; 1999: $n = 8,354$, response rate 55%; 2003: $n = 8,167$, response rate 58%; Eisenman et al., 2004; Simon et al., 2001; Upchurch, Kusunoki, Simon, & Doty, 2003). Although response rates are lower than would be ideal, they are comparable to those of other similar large scale surveys; for example, the statewide Behavioral Risk Factor Surveillance System (BRFSS) surveys reported response rates of 54% in 1997, 69% in 1999, and 51% in 2000 (CDC, 2001a). This underscores the challenges of conducting telephone surveys in large urban settings where telemarketing and other survey activities are prevalent.

Because the focus of the study is on assessing changes and correlates of sexual risk behavior, the analyses include only sexually active adults. Focusing on sexually active adults from each survey produced final samples of $n = 5,246$ for 1997; $n = 5,184$ for 1999; and $n = 5,925$ for 2003.

MEASURES AND DATA ANALYSIS

Background Characteristics. Data were collected on participants' demographic characteristics (e.g., race and ethnicity, age, education, and birthplace).

Health-Related Behaviors. HIV testing history was derived from a question asking about a battery of health-related tests or exams. Respondents were asked, "During the past 2 years, have you had any of the following tests or exams administered to you by a doctor, nurse, or other health professional?" Alcohol consumption was determined with a series of questions beginning with, "If a drink is considered one can or bottle of beer, one glass of wine or cocktail or shot of liquor . . . during the past month, had you had at least one drink of any alcoholic beverage such as beer, wine, wine coolers, or liquor?" If respondents answered yes, they were asked the following question, "On the days that you drank alcohol during the past month, how many drinks did you have on average?" For our analysis, heavy drinking (also known as binge drinking) was defined as consumption of five or more drinks in one sitting for men and four or more drinks for women, on average, on the days alcohol was consumed in the past month (Wechsler, Lee, Michun, & Lee, 2002).

Outcome Measure. Sexual risk behavior, defined as both inconsistent condom use and having multiple sex partners in the past 12 months, was the outcome of interest; for brevity we refer to sexual risk behavior as sexual risk. Sexual behavior was ascertained from respondents with the following question: "Have you had sex with anyone in the past 12 months?" If respondents answered yes, they were asked about condom use: "In the past 12 months, did you or your partner(s) use a condom all the time, most of the time, some of the time, rarely, or never?" Respondents were also asked about the number and gender of their sexual partners: "In the past 12 months, how many different people have you had as sexual partners?" and "In the past 12 months, has your sexual activity been only with men, only with women, or with both men and women?" From this series of questions, we created three behavioral risk groups: men who have sex with men, men who have sex with women only (heterosexual men), and women who have sex with men only (heterosexual women). The MSM behavioral risk group was based on reported behavior. Men who responded yes to sexual activity and reported having sex with men only or with both men and women were classified as MSM, regardless of how they identified themselves.

DATA ANALYSIS

SAS version 9.1 (SAS Institute, Cary, NC) was used to examine unweighted frequencies and Stata version 9 (StataCorp, College Station, TX) was used for all data analyses to account for the multilevel survey design. In the analyses, each case was weighted to account for the probability of selection, nonresponse, and undercoverage. Descriptive analyses were performed to calculate weighted frequencies for variables in order to create a sociodemographic profile of the study sample. Chi square tests ($p < .05$) were used to determine crude associations between the outcome of interest, sexual risk behavior, and independent variables of interest. A series of multivariate logistic regression models were conducted to examine the independent association between sexual risk behavior and sociodemographic characteristics and health-related behaviors of the different behavioral risk groups while adjusting for multiple

TABLE 1. Sociodemographic Characteristics and Health-Related Behaviors of Sexually Active Adults (1997–2003)

	Survey Year			Total %
	1997 %	1999 %	2003 %	
Sociodemographic Characteristics and Health-Related Behaviors	<i>n</i> = 5,246	<i>n</i> = 5,184	<i>n</i> = 5,925	<i>N</i> = 16,355
Behavioral Risk Groups				
Men who have sex with men	4.3	5.1	4.4	4.6
Men who have sex with women	39.1	38.3	41.9	39.8
Women who have sex with men	58.0	57.6	54.5	56.7
Race/Ethnicity				
White	41.8	46.8	51.1	46.6
Hispanic	39.5	33.1	30.2	34.2
African-American	9.4	11.2	9.7	10.1
Asian American	8.5	6.8	8.9	8.1
Nativity				
U.S. born	63.9	62.8	61.7	62.6
Foreign born	36.1	37.8	38.3	37.4
Age				
18–24	13.0	15.7	10.7	13.1
25–29	15.3	15.6	12.8	14.6
30–39	30.7	30.2	29.4	30.1
40–49	20.3	21.6	22.0	21.3
50+	20.7	16.6	23.7	20.4
Education				
Less than 12 years	9.0	9.3	8.7	9.0
12 years	20.2	20.6	20.8	20.6
Some college	26.9	27.9	26.4	27.1
College or graduate degree	33.9	30.2	33.7	32.7
Reported multiple sex partners	63.5	61.8	63.9	62.9
Reported not always using condoms	9.6	12.7	10.0	10.7
Reported heavy drinking	6.1	7.2	5.4	6.2
Tested for HIV in the past two years	39.0	42.7	37.6	39.7

Note. Percentages are weighted. Source. Los Angeles County Health Survey, 1997, 1999, 2003.

variables. To account for the multilevel survey design, weighted variables were used for both descriptive statistics and population estimates.

RESULTS

The sociodemographic, health-related, and behavioral risk group profiles of sexually active adults were similar for each of the three time periods (Table 1). For the combined data, the majority (56.7%) of respondents were heterosexual women followed by heterosexual men (39.8%); the smallest group was MSM (4.6%). The largest racial/ethnic group was White/Caucasian (46.6%), followed by Hispanic (34.2%), African American (10.1%), and Asian/Pacific Islander (8.1%). The majority (62.6%) of respondents were born in the United States. In terms of age and education, almost three quarters (71.8%) of respondents were 30 years or older and more than half (59.8%) had more than a high school education. The majority (62.9%) of respondents reported having multiple sex partners and 10% reported not always using condoms in the past 12 months. A small percentage (6.2%) of individuals reported heavy drinking and over a third (39.7%) reported they had been tested for HIV in the past 2 years.

TABLE 2. Comparisons of Characteristics and Behaviors of Sexually Active Adults Who Reported Sexual Risk Behavior by Year (1997–2003).

Characteristics	Survey Year			Total Sexual Risk (%)
	1997 Sexual Risk (%)	1999 Sexual Risk (%)	2003 Sexual Risk (%)	
Total Population	10.5	9.1	7.6	8.8
Behavioral Risk Groups				
Men who have sex with men	25.2*	19.7*	18.6*	21.1*
Men who have sex with women	10.9	15.0	11.6	12.5
Women who have sex with men	4.8	6.7	5.2	5.6
Race/Ethnicity				
White	8.8*	10.1†	9.1†	9.3*
Hispanic	6.8	10.3	7.6	8.1
African–American	9.6	14.0	11.2	11.7
Asian American	6.4	8.3	6.1	6.8
Birthplace				
U.S. born	9.3*	12.2*	10.4*	10.6*
Foreign born	5.3	7.6	5.1	6.0
Age				
18–24	16.7*	19.6*	17.7	18.1*
25–29	10.6	13.1	12.0	11.9
30–39	6.5	8.7	7.7	7.6
40–49	4.8	8.3	6.3	6.5
50+	5.2	5.7	5.3	5.4
Education				
Less than 12 years	4.6*	4.5*	5.0	4.7*
12 years	8.1	11.7	8.0	9.2
Some college	9.4	12.3	8.8	10.1
College or graduate degree	7.7	10.5	9.6	9.2
Reported heavy drinking				
Yes	20.2*	25.8*	20.4*	22.4*
No	7.05	9.3	7.7	8.0
Tested for HIV in the past two years				
Yes	10.5*	14.4*	12.3*	12.42*
No	6.2	7.5	6.0	6.54

Note. Percentages are weighted. Source. Los Angeles County Health Survey, 1997, 1999, 2003. * $p < .01$; † $p < .05$.

Significant differences were seen in the sexual risk of MSM, heterosexual men, and heterosexual women in each time period as well as for the combined data (Table 2). For the total population, sexual risk declined across the three time periods, going from 10.5% in 1997 to 7.6% in 2003. By behavioral risk group, a significantly greater percentage of MSM (21.1%) reported sexual risk compared with heterosexual males (12.5%) and females (5.6%). The largest percentage (25.2%) of sexual risk was reported by MSM in 1997, with it declining successively to 19.7% in 1999 and 18.6% in 2003, although this decline was not statistically significant ($p < .008$). However, in 2003, the rate of sexual risk among MSM (18.6%) remained significantly higher than that of heterosexual males (11.6%) and heterosexual females (5.2%). In each time period, MSM reported the greatest sexual risk and heterosexual women reported the least sexual risk.

Sexual risk also differed by sociodemographic characteristics and health-related behaviors (see Table 2). For the pooled data as well as in each time period, respondents who were African American, U.S. born, or had 12 years or more of education were consistently more likely to report more sexual risk than their counterparts. Sex-

ual risk decreased significantly with age. Respondents who reported heavy alcohol consumption or having been tested for HIV in the past 24 months were more likely to report sexual risk than respondents who did not report these behaviors.

We initially examined the correlates of sexual risk among the pooled sample of respondents for all three time periods (data not shown). The odds of sexual risk were 6.45 times as great among MSM ($p < .0001$) and 2.52 times as great among heterosexual men as among heterosexual women ($p < .0001$). The model also indicated that MSM in 1999 reported less sexual risk than MSM in 1997 ($p < .01$). In 2003, MSM also reported less sexual risk than MSM in 1997, but this difference was not significant ($p < .08$). In contrast, there was no significant change in sexual risk reported by heterosexual men for each of the three time periods.

The association between sexual risk and sociodemographic characteristics and health-related behaviors differed somewhat for MSM, heterosexual men and heterosexual women. Therefore, we developed separate models for each group that included all variables from the main model and used the combined data for all three time periods while controlling for other variables. Only significant variables ($p < .05$) for each model are described below. Data for these subgroup analyses are shown in Table 3.

In the MSM only model, the odds of sexual risk were significantly greater for MSM who were U.S. born, reported heavy alcohol consumption, or reported having received an HIV test in the past 24 months. The odds of sexual risk were significantly less for MSM who were African American compared with White/Caucasians, aged 30–39, 40–49, or over the age of 50 compared with MSM aged 18–24.

In the heterosexual men only model, the odds of sexual risk were significantly greater for men who were African American compared with White/Caucasians, reported heavy alcohol consumption, or having had an HIV test in the past 24 months. The odds of sexual risk were significantly less for men who were aged 25–29, 30–39, 40–49, or over the age of 50 compared with men aged 18–24.

In the heterosexual women only model, the odds of sexual risk were significantly greater for women who were U.S. born, reported heavy alcohol consumption, or having had an HIV test in the past 24 months. The odds of sexual risk were significantly less for women who were Hispanic compared with White/Caucasians, aged 25–29, 30–39, 40–49, or over the age of 50 compared women aged 18–24.

DISCUSSION

From 1997 to 2003 sexually active MSM in the second-largest AIDS epicenter in the United States reduced their levels of sexual risk behavior. Our finding is consistent with a recent study that supports the impression that HIV prevention efforts targeting MSM have been effective, to an extent, in changing behaviors (Johnson et al., 2005). At the same time, however, MSM also maintained higher levels of sexual risk compared with heterosexual men and women across the three time periods, indicating a continuing and wide disparity in the levels of sexual risk between MSM and their heterosexual counterparts. These higher levels of sexual risk behavior among MSM suggest the need for a continued focus on HIV prevention efforts tailored for MSM.

From our pooled data, we estimated that among sexually active men in Los Angeles a relatively high proportion (10.4%) of men reported having sex with men in the past year. We also estimated that among all men in our sample (i.e., sexually active and not sexually active) 8.2% (95% confidence interval [CI] 7.66–8.74%) of men reported having sex with men in the past year. This estimate of male-to-male sex is slightly lower than the commonly reported 10% identified by Kinsey, Pomeroy, and

TABLE 3. Logistic Regression Examining Correlates of Sexual Risk Behaviors by Risk Groups (1997–2003)

Independent Variables*	MSM		MSW		WSM	
	Adjusted odds ratio	95% Confidence Intervals	Adjusted odds ratio	95% Confidence Intervals	Adjusted odds ratio	95% Confidence Intervals
Race/Ethnicity (White)						
African–American	0.31**	(0.11, 0.77)	1.42**	(1.11, 1.87)	0.90	(0.65, 1.16)
Hispanic	1.11	(0.61, 1.74)	0.91	(0.74, 1.11)	0.69**	(0.55, 0.89)
Asian American	0.83	(0.51, 2.49)	0.82	(0.54, 1.06)	0.96	(0.60, 1.50)
Birthplace (Foreign Born)						
U.S. born	2.3**	(1.21, 3.73)	1.09	(0.92, 1.35)	3.3**	(2.22, 3.85)
Age (18–24)						
25–29	0.48	(0.26, 1.05)	0.67**	(0.47, 0.76)	0.70**	(0.55, 0.95)
30–39	0.43**	(0.25, 0.83)	0.38**	(0.28, 0.44)	0.44**	(0.33, 0.55)
40–49	0.38**	(0.17, 0.62)	0.33**	(0.23, 0.38)	0.33**	(0.23, 0.44)
50+	0.38**	(0.18, 0.75)	0.31**	(0.20, 0.33)	0.18**	(0.09, 0.23)
Education (less than 12 yrs)						
12 years	1.62	(0.72, 3.13)	1.10	(0.77, 1.32)	0.91	(0.66, 1.29)
Some college	1.36	(0.60, 2.47)	1.22	(0.86, 1.46)	1.20	(0.85, 1.61)
College or graduate degree	2.05	(0.80, 3.27)	1.31	(0.90, 1.54)	1.04	(0.76, 1.50)
Reported Heavy Drinking	1.56**	(1.51, 1.61)	2.06**	(1.70, 2.59)	3.46**	(2.49, 5.21)
Tested for HIV in the past two years	1.33**	(1.05, 2.42)	1.60**	(1.37, 1.88)	2.3**	(1.82, 2.76)
Survey Year (1997)						
1999	0.73	(0.42, 1.10)	1.37	(0.96, 1.41)	1.26	(0.88, 1.41)
2003	0.71	(0.43, 1.14)	1.15	(0.87, 1.28)	1.13	(0.81, 1.31)

*Comparison categories are in parentheses. MSM indicates men who have sex with men; MSW indicates men who have sex with women; WSM indicates women who have sex with men. Source: Los Angeles County Health Survey, 1997, 1999, 2003. ** $p < .05$.

Martin (1948) but higher than more recent estimates that range from 3% to 6% (Anderson & Stall, 2002; Binson et al., 1995).

Among our three behavioral risk groups, a number of demographic and health-related behaviors were independently associated with sexual risk. Membership in a younger age cohort was identified as a strong correlate of sexual risk. Current HIV/AIDS surveillance data indicate increasing numbers of new HIV infections among younger people (CDC, 2006c). Previous studies have documented the increased risk taking behaviors of younger people compared with older people, particularly among MSM (CDC, 2006c; Dodds et al., 2000). The greater risk taking behavior of younger adults may also be related to how they perceive HIV/AIDS. For example, they may view HIV as a chronic, manageable disease addressed through daily medications and not as a serious illness with multiple complications. This may be particularly true for younger MSM who did not experience the devastating impact of the epidemic on a previous generation of MSM, and who may not know firsthand persons living with HIV/AIDS. Our findings suggest the need to direct HIV prevention efforts to younger adults in the general population, as they are at greater risk for HIV infection than their older counterparts.

Being born in the United States was a correlate of sexual risk behavior, suggesting a U.S. cultural and/or societal influence on sexual risk taking. We found this correlate held only for MSM and heterosexual women. In contrast, foreign-born status is pro-

tective against sexual risk taking. However, the impact of being born outside the United States on sexual risk taking may be confounded by other acculturation-related variables (e.g., primary language spoken, nativity and race/ethnicity of social network members, extent to which host culture is embraced, etc.), and the relationship of these variables to sexual risk has not been clearly defined (Guilamo-Ramos, Jaccard, Pena, & Goldberg, 2005). In our preliminary analyses, not reported here, we examined the relationship between language and sexual risk and found no difference between English and non-English speaking respondents. Although our findings indicate a difference in sexual risk behaviors between U.S. born and foreign-born MSM and heterosexual women, more in-depth research is needed for a more definitive understanding of this relationship.

Heavy alcohol consumption was also identified as a strong correlate of sexual risk. This finding supports previous studies indicating that a history of alcohol abuse is correlated with sexual risk behaviors, including having multiple sex partners, unprotected sexual intercourse, and sex with high-risk individuals (Avins et al., 1994; Boscarino et al., 1995; Cooper, 2002; MacDonald, MacDonald, Zanna, & Fong, 2000; Malow, Devieux, Jennings, Lucenko, & Kalichman, 2001). In addition, studies in the field of alcohol abuse have consistently demonstrated that people who believe that alcohol will enhance their sexual arousal and performance are more likely to engage in sexual risk behavior after drinking (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2002). Alcohol abuse also tends to occur among persons who are already predisposed to high-risk behaviors (NIAAA, 2002). The strong relationship between alcohol and sexual risk behavior suggests that HIV prevention efforts specifically target heavy alcohol use prior to or during sexual activity as a risk factor and consider bars as a potential venue for the dissemination of HIV prevention information.

HIV testing was also independently associated with sexual risk. Individuals reporting they had been tested for HIV in the past 2 years were more likely to report sexual risk. We believe the causality of this relationship is complex. Individuals who reported engaging in sexual risk behaviors, for fear of having been exposed to HIV, may be more likely to get tested for HIV than individuals who had not engaged in any sexual risk behaviors. In contrast, people who test negative may perceive that they avoided infection and may not feel the need to decrease their sexual risk behaviors (Weinhardt et al., 1999). The association between HIV testing and sexual risk points to a vital opportunity to provide HIV risk reduction counseling and prevention methods (i.e., condoms) during the HIV testing process.

Our future HIV prevention efforts will need to reflect the evolving HIV risk context of MSM, heterosexual men, and heterosexual women. In particular, MSM today face a host of social and contextual risk factors that are quite different from those experienced by MSM at the start of the epidemic. The Internet has created a virtual meeting ground for MSM, offering quick and easy access to multiple and anonymous sex partners where unprotected sex may be normative (Bolding, Davis, Hart, Sherr, & Elford, 2005; Buchacz, Greenberg, et al., 2005; Davis, Hart, Bolding, Sherr, & Elford, 2006; Elford, Bolding, Davis, Sherr, & Hart, 2004; Elford, Bolding, & Sherr, 2001; McKirnan, Houston, & Tolou-Shams, 2007). Alcohol and substance abuse is also contributing to sexual risk behaviors. In particular, the growing abuse of methamphetamine has been associated with unprotected sex (Benotsch, Kalichman, & Cage, 2002; Buchacz, McFarland, et al., 2005). The practice of intentional unprotected sex (aka "barebacking") is another troubling trend among segments of the MSM popula-

tion (Blechner, 2002). Additionally, optimism about HIV treatments, future HIV vaccines and other forms of HIV chemoprophylaxis may contribute to lower perceived risk (Newman, Duan, Rudy, & Anton, 2004). Finally, a growing fatigue with safer sex (aka “burnout”) also contributes to sexual risk taking among MSM (McKirnan et al., 2007; Ostrow et al., 2002). Given the new risk realities, tailored prevention efforts for MSM in the third decade of the epidemic will need to adapt in order to address a new set of challenges and a new generation of young MSM.

Heterosexual men and women in the general population consistently reported lower levels of sexual risk compared with MSM and had no significant changes in their behaviors across the three time periods. For many heterosexual men and women, HIV may not be perceived as a real threat. In many communities, people still perceive of HIV as primarily a gay disease and may therefore not see the need to concern themselves with practicing safer sex (Greene & Banerjee, 2006; Herek & Capitano, 1999). However, the higher levels of sexual risk noted for heterosexual men suggests the need to consider ways of providing HIV prevention messages for these men. Unfortunately, HIV-related stigma can serve as an obstacle to heterosexual men’s participation in HIV identification and prevention services. For example, some men may forego HIV testing for fear of being perceived as gay or having engaged in stigmatized behaviors (i.e., having sex with a man or injecting illicit drugs; Brooks, Etzel, Hinojos, Henry, & Perez, 2005). In addition, both men and women may be inhibited from introducing condoms with sexual partners for fear of its impact on their partner’s perception of trust in the relationship (Duncan et al., 2002; Grimley, Hook, DiClemente, & Lee, 2004; Roye & Seals, 2001). In this study women reported less sexual risk than heterosexual men and MSM. Current epidemiological data, however, indicate that HIV is a serious threat among African American women, in particular (CDC, 2006b). As HIV prevention efforts move forward, it is important to identify segments of the heterosexual population that are most vulnerable to HIV infection and to design appropriate interventions.

There are several limitations to this study. First, the uniqueness of this examination of MSM in the general population may be a limitation. Because sexual risk behaviors are more prevalent in segments of the MSM population that may be less likely to participate in phone surveys (e.g., methamphetamine abusers, homeless youth, MSM with co-morbid mental health issues; CDC, 2006a; Koblin et al., 2006; Williams et al., 2003) these groups may not be represented in the MSM samples examined in this study. As a result, the levels of sexual risk reported in these findings for MSM may be underestimated. In addition, our definition of multiple sex partners pertains to vaginal or anal sex. We did not have information on other sexual practices such as oral sex and mutual masturbation. Second, although the data are from a population-based sample of MSM, inferences can be made only for MSM in Los Angeles. The extent to which this population differs from MSM populations nationally limits the generalizability of the findings. Third, because condom use was not examined in relation to types of sexual acts, we cannot determine if inconsistent condom use was associated with anal, vaginal, or oral sex.

Notwithstanding these limitations, this study of 16,355 sexually active adults in the second-largest AIDS epicenter in the United States reveals important trends in sexual risk behaviors. Although sexual risk behaviors for HIV infection may be lower in the general population than in identified risk groups, the findings presented here identified segments of the general population at elevated risk of acquiring HIV that would benefit from targeted prevention activities. It is important that HIV prevention efforts

continue to target the general population, including MSM not reached by targeted interventions, younger adults, individuals who engage in heavy alcohol consumption, and heterosexual men, in order to decrease sexual risk taking and change the perception that only certain categories of individuals are at risk for sexual transmission of HIV infection.

REFERENCES

- Anderson, J.E., & Stall, R. (2002). Increased reporting of male-to-male sexual activity in a national survey. *Sexually Transmitted Diseases*, 643-646.
- Avins, A. L., Woods, W. J., Lindan, C. P., Hudes, E. S., Clark, W., & Hulley, S. B. (1994). HIV infection and risk behaviors among heterosexuals in alcohol treatment programs. *Journal of the American Medical Association*, 271(7), 515-518.
- Benotsch, E. G., Kalichman, S., & Cage, M. (2002). Men who have met sex partners via the Internet: Prevalence, predictors, and implications for HIV prevention. *Archives of Sexual Behavior*, 31(2), 177-183.
- Binson, D., Michaels, S., Stall, R., Coates, T.J., Gagnon, J.-J., & Catania, J.A. (1995). Prevalence and social distribution of men who have sex with men: United States and its urban centers. *Journal of Sex Research*, 32(2), 245-254.
- Blechner, M. J. (2002). Intimacy, pleasure, risk and safety: Discussion of Cheuvront's "High-risk sexual behavior in the treatment of HIV-negative patients." *Journal of Gay and Lesbian Psychotherapy*, 6(3), 27-33.
- Bolding, G., Davis, M., Hart, G., Sherr, L., & Elford, J. (2005). Gay men who look for sex on the Internet: Is there more HIV/STI risk with online partners? *AIDS*, 19(9), 961-968.
- Boscarino, J. A., Avins, A. L., Woods, W. J., Lindan, C. P., Hudes, E. S., & Clark, W. (1995). Alcohol-related risk factors associated with HIV infection among patients entering alcoholism treatment: Implications for prevention. *Journal of Studies on Alcohol*, 56(6), 642-653.
- Brooks, R. A., Etzel, M. A., Hinojos, E., Henry, C. L., & Perez, M. (2005). Preventing HIV among Latino and African American gay and bisexual men in a context of HIV-related stigma, discrimination, and homophobia: perspectives of providers. *AIDS Patient Care and STDS*, 19(11), 737-744.
- Buchacz, K., Greenberg, A., Onorato, I., & Janssen, R. (2005). Syphilis epidemics and human immunodeficiency virus (HIV) incidence among men who have sex with men in the United States: Implications for HIV prevention. *Sexually Transmitted Diseases*, 32(Suppl. 10), S73-S79.
- Buchacz, K., McFarland, W., Kellogg, T. A., Loeb, L., Holmberg, S. D., Dilley, J., et al. (2005). Amphetamine use is associated with increased HIV incidence among men who have sex with men in San Francisco. *AIDS*, 19(13), 1423-1424.
- Catania, J. A., Coates, T. J., Stall, R., Bye, L., Kegeles, S. M., Capell, F., et al. (1991). Changes in condom use among homosexual men in San Francisco. *Health Psychology*, 10(3), 190-199.
- Catania, J. A., Osmond, D., Stall, R. D., Pollack, L., Paul, J. P., Blower, S., et al. (2001). The continuing HIV epidemic among men who have sex with men. *American Journal of Public Health*, 91(6), 907-914.
- Centers for Disease Control and Prevention. (1999). Increases in unsafe sex and rectal gonorrhea among men who have sex with men—San Francisco, California, 1994-1997. *Morbidity and Mortality Weekly Report*, 48(3), 45-48.
- Centers for Disease Control and Prevention. (2001a). *2000 BRFSS summary data quality report*. Atlanta, GA: Author.
- Centers for Disease Control and Prevention. (2001b). *HIV prevention strategic plan through 2005*. Atlanta, GA: Author.
- Centers for Disease Control and Prevention. (2003a). *HIV and AIDS: Are you at risk?* Atlanta, GA: Author.
- Centers for Disease Control and Prevention. (2003b). Increases in HIV diagnoses—29 states, 1999-2002. *Morbidity and Mortality Weekly Report*, 52, 1145-1148.
- Centers for Disease Control and Prevention. (2006a). *HIV/AIDS among men who have sex with men*. Atlanta, GA: Author.
- Centers for Disease Control and Prevention. (2006b). *HIV/AIDS among women*. Atlanta, GA: Author.
- Centers for Disease Control and Prevention. (2006c). *HIV/AIDS among youth*. Atlanta, GA: Author.

- Centers for Disease Control and Prevention. (2007). *HIV/AIDS surveillance report, 2005* (Vol. 17, rev ed.) Atlanta, GA: Author.
- Chen, S. Y., Gibson, S., Katz, M. H., Klausner, J. D., Dilley, J. W., Schwarcz, A. K., et al. (2002). Continuing increases in sexual risk behavior and sexually transmitted diseases among men who have sex with men: San Francisco, Calif, 1999–2001. *American Journal of Public Health, 92*(9), 1387–1388.
- Cooper, M. L. (2002). Alcohol use and sexual risk behavior among college students and youth: Evaluating the evidence. *Journal of Studies on Alcohol, 14*(Suppl.), 101–117.
- Crepaz, N., Hart, T. A., & Marks, G. (2004). Highly active antiretroviral therapy and sexual risk behavior: A meta-analytic review. *Journal of the American Medical Association, 292*(2), 224–236.
- Crosby, R., & Mettey, A. (2004). A descriptive analysis of HIV risk behavior among men having sex with men attending a large sex resort. *Journal of Acquired Immune Deficiency Syndromes, 37*(4), 1496–1499.
- Davis, M., Hart, G., Bolding, G., Sherr, L., & Elford, J. (2006). E-dating, identity and HIV prevention: Theorising sexualities, risk and network society. *Sociology of Health and Illness, 28*(4), 457–478.
- Detels, R., Munoz, A., McFarlane, G., Kingsley, L. A., Margolick, J. B., Giorgi, J., et al. (1998). Effectiveness of potent antiretroviral therapy on time to AIDS and death in men with known HIV infection duration. *Journal of the American Medical Association, 280*(17), 1497–1503.
- Dilley, J. W., Woods, W. J., & McFarland, W. (1997). Are advances in treatment changing views about high-risk sex? *New England Journal of Medicine, 337*(7), 501–502.
- Dodds, J. P., Nardone, A., Mercey, D. E., & Johnson, A. M. (2000). Increase in high risk sexual behaviour among homosexual men, London 1996–8: Cross sectional, questionnaire study. *British Medical Journal, 320*(7248), 1510–1511.
- Dukers, N. H., Goudsmit, J., de Wit, J. B., Prins, M., Weverling, G. J., & Coutinho, R. A. (2001). Sexual risk behaviour relates to the virological and immunological improvements during highly active antiretroviral therapy in HIV-1 infection. *AIDS, 15*(3), 369–378.
- Duncan, C., Miller, D. M., Borskey, E. J., Fomby, B., Dawson, P., & Davis, L. (2002). Barriers to safer sex practices among African American college students. *Journal of the National Medical Association, 94*(11), 944–951.
- Eisenman, D. P., Wold, C., Setodji, C., Hickey, S., Lee, B., Stein, B. D., et al. (2004). Will public health's response to terrorism be fair? Racial/ethnic variations in perceived fairness during a bioterrorist event. *Biosecurity and Bioterrorism, 2*(3), 146–156.
- Ekstrand, M. L., Stall, R. D., Paul, J. P., Osmond, D. H., & Coates, T. J. (1999). Gay men report high rates of unprotected anal sex with partners of unknown or discordant HIV status. *AIDS, 13*(12), 1525–1533.
- Elford, J. (2006). Changing patterns of sexual behavior in the era of highly active antiretroviral therapy. *Current Opinion in Infectious Diseases, 19*, 26–32.
- Elford, J., Bolding, G., Davis, M., Sherr, L., & Hart, G. (2004). Web-based behavioral surveillance among men who have sex with men: a comparison of online and offline samples in London, UK. *Journal of Acquired Immune Deficiency Syndromes, 35*(4), 421–426.
- Elford, J., Bolding, G., & Sherr, L. (2001). Seeking sex on the Internet and sexual risk behaviour among gay men using London gyms. *AIDS, 15*(11), 1409–1415.
- Fenton, K. A., & Imrie, J. (2005). Increasing rates of sexually transmitted diseases in homosexual men in Western Europe and the United States: Why? *Infectious Disease Clinics of North America, 19*(2), 311–331.
- Finer, L. B., Darroch, J. E., & Singh, S. (1999). Sexual partnership patterns as a behavioral risk factor for sexually transmitted diseases. *Family Planning Perspectives, 31*(5), 228–236.
- Greene, K., & Banerjee, S. C. (2006). Disease-related stigma: Comparing predictors of AIDS and cancer stigma. *Journal of Homosexuality, 50*(4), 185–209.
- Grimley, D. M., Hook, E. W., III, DiClemente, R. J., & Lee, P. A. (2004). Condom use among low-income African American males attending an STD clinic. *American Journal of Health Behavior, 28*(1), 33–42.
- Guilamo-Ramos, V., Jaccard, J., Pena, J., & Goldberg, V. (2005). Acculturation-related variables, sexual initiation, and subsequent sexual behavior among Puerto Rican, Mexican, and Cuban youth. *Health Psychology, 24*(1), 88–95.
- Hart, G. J., & Williamson, L. M. (2005). Increase in HIV sexual risk behaviour in homosexual men in Scotland, 1996–2002: Prevention failure? *Sexually Transmitted Infections, 81*, 367–373.
- Herek, G. M., & Capitanio, J. P. (1999). AIDS stigma and sexual prejudice. *American Behavioral Scientist, 42*(7), 1130–1147.
- Holtgrave, D. R., & Curran, J. W. (2006). What works, and what remains to be done, in HIV

- prevention in the United States. *Annual Review of Public Health*, 27, 261–275.
- Holtgrave, D. R., & Pinkerton, S. D. (2003). Economic implications of failure to reduce incident HIV infections by 50% by 2005 in the United States. *Journal of Acquired Immune Deficiency Syndromes*, 33(2), 171–174.
- Johnson, W.D., Holtgrave, D.R., McClellan, W.M., Flanders, W.D., Hill, A.H., & Goodman, M. (2005). HIV intervention research for men who have sex with men: A 7-year update. *AIDS Education and Prevention*, 17(6), 568–589.
- Kelly, J. A., Hoffman, R. G., Rompa, D., & Gray, M. (1998). Protease inhibitor combination therapies and perceptions of gay men regarding AIDS severity and the need to maintain safer sex. *AIDS*, 12(10), F91–F95.
- Kinsey, A., Pomeroy, W., & Martin, C. (1948). Sexual behavior in the human male. Philadelphia: Saunders.
- Koblin, B. A., Husnik, M. J., Colfax, G., Huang, Y., Madison, M., Mayer, K., et al. (2006). Risk factors for HIV infection among men who have sex with men. *AIDS*, 20(5), 731–739.
- MacDonald, T. K., MacDonald, G., Zanna, M. P., & Fong, G. T. (2000). Alcohol, sexual arousal, and intentions to use condoms in young men: Applying alcohol myopia theory to sexual risk behavior. *Health Psychology*, 19(3), 290–298.
- Malow, R. M., Devieux, J. G., Jennings, T., Lucenko, B. A., & Kalichman, S. C. (2001). Substance-abusing adolescents at varying levels of HIV risk: Psychosocial characteristics, drug use, and sexual behavior. *Journal of Substance Abuse*, 13, 103–117.
- McKirnan, D., Houston, E., Tolou-Shams, M. (2007). Is the Web the culprit? Cognitive escape and internet sexual risk among gay and bisexual men. *AIDS and Behavior*, 11(1), 151–160.
- McKusick, L., Coates, T. J., Morin, S. F., Pollack, L., & Hoff, C. (1990). Longitudinal predictors of reductions in unprotected anal intercourse among gay men in San Francisco: The AIDS Behavioral Research Project. *American Journal of Public Health*, 80(8), 978–983.
- McKusick, L., Horstman, W., & Coates, T. J. (1985). AIDS and sexual behavior reported by gay men in San Francisco. *American Journal of Public Health*, 75(5), 493–496.
- National Institute on Alcohol Abuse and Alcoholism. (2002). *Alcohol and HIV/AIDS*. Rockville, MD: Author.
- Newman, P. A., Duan, N., Rudy, E. T., & Anton, P. A. (2004). Challenges for HIV vaccine dissemination and clinical trial recruitment: If we build it, will they come? *AIDS Patient Care and STDs*, 18(12), 691–701.
- Ostrow, D. E., Fox, K. J., Chmiel, J. S., Silvestre, A., Visscher, B. R., Vanable, P. A., et al. (2002). Attitudes toward highly active antiretroviral therapy are associated with sexual risk taking among HIV-infected and uninfected homosexual men. *AIDS*, 16(5), 775–780.
- Royce, C. F., & Seals, B. (2001). A qualitative assessment of condom use decisions by female adolescents who use hormonal contraception. *Journal of the Association of Nurses in AIDS Care*, 12(6), 78–87.
- Simon, P. A., Wold, C. M., Cousineau, M. R., & Fielding, J. E. (2001). Meeting the data needs of a local health department: The Los Angeles County Health Survey. *American Journal of Public Health*, 91(12), 1950–1952.
- UNAIDS & World Health Organization. (2004). *Position Statement on Condom and HIV Prevention*. Geneva, Switzerland: UNAIDS.
- Upchurch, D. M., Kusunoki, Y., Simon, P., & Doty, M. M. (2003). Sexual behavior and condom practices among Los Angeles women. *Women's Health Issues*, 13(1), 8–15.
- Wechsler, H., Lee, J. E., Michun, K., & Lee, H. (2000). College binge drinking in the 1990s: A continuing problem. *Journal of American College Health*, 48, 199–210.
- Weinhardt, L.S., Carey M.P., Johnson B.T., Bickham N.L. (1999). Effects of HIV counseling and testing on sexual risk behavior: A meta-analytic review of published research, 1985–1997. *American Journal of Public Health*, 89(9), 1397–405.
- Williams, M. L., Timpson, S., Klovdal, A., Bowen, A. M., Ross, M. W., & Keel, K. B. (2003). HIV risk among a sample of male sex workers. *AIDS*, 17, 1402–1404.
- Wolitski, R. J., Halkitis, P. N., Parsons, J. T., & Gomez, C. A. (2001). Awareness and use of untested barrier methods by HIV-seropositive gay and bisexual men. *AIDS Education and Prevention*, 13(4), 291–301.