STD and HIV Risk Factors Among U.S. Young Adults: Variations by Gender, Race, Ethnicity and Sexual Orientation

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Abstract

CONTEXT—STDs, including HIV, disproportionately affect individuals who have multiple minority identities. Understanding differences in STD risk factors across racial, ethnic and sexual minority groups, as well as genders, is important for tailoring public health interventions.

METHODS—Data from Waves 3 (2001–2002) and 4 (2007–2008) of the National Longitudinal Study of Adolescent Health were used to develop population-based estimates of STD and HIV risk factors among 11,045 young adults (mean age, 29 at Wave 4), by gender, race and ethnicity, and sexual orientation (heterosexual, mixed-oriented, gay). Regression analyses were conducted to examine associations between risk factors and young adults' characteristics.

RESULTS—Overall, sexual-minority women in each racial or ethnic group had a higher prevalence of sexual risk behaviors—including a history of multiple partners, forced sex and incarceration—than their heterosexual counterparts. Mixed-oriented women in each racial or ethnic group were more likely than heterosexual white women to have received an STD diagnosis (odds ratios, 1.8–6.4). Black men and sexual-minority men also appeared to be at heightened risk. Gay men in all racial and ethnic groups were significantly more likely than heterosexual white men to report having received an STD diagnosis (2.3–8.3); compared with heterosexual white men, mixed-oriented black men had the highest odds of having received such a diagnosis (15.2).

CONCLUSIONS—Taking account of multiple minority identities should be an important part of future research and intervention efforts for STD and HIV prevention.

In the United States, sexual minorities, such as gay and bisexual men, as well as racial and ethnic minorities, such as blacks and Hispanics, have higher rates of STDs and HIV than their majority counterparts.[1,2] Indeed, people who have multiple minority identities are at disproportionate risk of acquiring STDs, including HIV.[1,3,4] For example, Hispanic and black men who have sex with men have HIV diagnosis rates three and five times, respectively, as high as that of white men who have sex with men.[1] Further, research suggests that significant proportions of these disparities in STD and HIV rates may be established during adolescence and early adulthood.[5,6]

Much of the previous research on STD risk among sexual, racial and ethnic minorities has relied on convenience or clinical samples, or has focused on particular high-risk cities and counties, or on one or two dimensions of identity.[3,4,7–11] We build on this work by using data from the National Longitudinal Study of Adolescent Health (Add Health) to provide population-based estimates of the distribution of STD and HIV risk factors across subgroups defined simultaneously by race, ethnicity, sexual orientation and gender, as well as to examine the relative significance of these risk factors for the different subgroups. This will enable us to compare the prevalence of risk factors across subgroups, as well as to identify risk factors that are specific to particular populations and those that are more universal.

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Finally, these estimates will allow practitioners and policymakers to better target intervention to the most at-risk groups.

METHODS

Data

The data for this study come from Waves 3 and 4 of Add Health, a nationally representative, longitudinal survey that began in 1994. The initial sample was drawn from 80 high schools and 52 middle schools throughout the United States. Respondents' ages at baseline ranged from 11 to 21 and averaged 16. Wave 3, which was conducted in 2001–2002, had a response rate of 77%; Wave 4, conducted in 2007–2008, had a response rate of 80%. At Wave 3, the age range of respondents was 18–28 and the mean age was 21; at Wave 4, the age range was 24–34 and the mean age was 29. Our sample consists of non-Hispanic white, non-Hispanic black and Hispanic respondents who were interviewed at Waves 1, 3 and 4. We exclude other racial and ethnic groups because of small sample sizes, especially when groups are split by gender and sexual orientation. We further restrict our sample to respondents who had had at least one sexual partner by Wave 4, and we exclude persons who refused to answer or who answered "don't know" to the question on sexual orientation at Wave 4. Our final sample comprises 11,045 respondents—6,036 females and 5,009 males.

Measures

Sexual orientation is derived from a question that asked respondents at each wave to "please choose the description that best fits how you think about yourself: 100% heterosexual (straight); mostly heterosexual (straight), but somewhat attracted to people of your own sex; bisexual—that is, attracted to men and women equally; mostly homosexual (gay), but somewhat attracted to people of the opposite sex; and 100% homosexual (gay)." We collapse these five responses into three to have adequate sample sizes to produce stable standard errors and perform multivariate analyses. Specifically, we combine mostly heterosexual and bisexual respondents into a single group labeled "mixed-oriented," and we combine mostly gay and 100% gay respondents into a single group.* We create nine subgroups for the analysis, defined by gender, sexual orientation, and race and ethnicity.

We examine several well-established STD and HIV risk factors: number of sexual partners (lifetime and before age 18), forced sex, condom use, incarceration, injection-drug use, commercial sex and self-reported STD diagnoses.[2,12–15]

To measure number of partners, we draw on Wave 4 questions that asked respondents how many male and female partners they had ever had sex with, "considering all types of sexual activity," both ever and before the age of 18. We sum those responses to get the total number of partners.

Forced sex is a dichotomous measure derived from two survey items in Wave 4: "Have you ever been forced, in a nonphysical way, to have any type of sexual activity against your will? For example, through verbal pressure, threats of harm or by being given alcohol or drugs" and "Have you ever been physically forced to have any type of sexual activity against your will?" Respondents were instructed to exclude any experiences with a parent or adult caregiver.

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*In separate analyses (not shown), mostly straight respondents differed significantly from 100% straight respondents, but not from bisexual respondents, in STD risk behaviors and self-reported STD rates. Mostly gay respondents did not differ significantly from 100% gay respondents in STD risk behaviors or self-reported STD rates.

Condom use is a dummy variable that measures whether respondents reported having used a condom (male or female) in the last 12 months. We restrict our analyses of condom use to respondents who had had a sexual relationship in the last year.

Incarceration captures whether respondents reported at Wave 3 or 4 that they had "ever spent time in a jail, prison, juvenile detention center or other correctional facility." Incarceration facilities are critical environments for the acquisition of HIV because of needle-sharing for injection-drug use and high-risk sexual behavior (principally, unprotected anal sex).[16]

Injection-drug use is a dichotomous measure, derived from survey items from both Waves 3 and 4 that asked respondents, "Have you ever injected (shot up with a needle) an illegal drug, such as heroin or cocaine?"

Commercial sex is a dichotomous measure that captures whether respondents have ever given or received money for sex. We draw on two items from Wave 3 ("Have you ever had sex with someone who paid you to do so?" and "Have you ever paid someone to have sex with you?") and one from Wave 4 ("In the last 12 months, how many times have you paid someone to have sex with you or has someone paid you to have sex with them?"). Respondents who answered yes to either item in Wave 3 or reported having had at least one commercial sex interaction in the last 12 months at Wave 4 are coded as yes, and all others are coded as no.

Self-reported STD diagnosis is derived from questions at Waves 3 and 4 that asked respondents if they had "ever been told by a doctor, nurse or other health professional" that they had an STD;[*] at Wave 4, respondents were also asked if they had received an STD diagnosis in the previous 12 months. We use dichotomous measures indicating whether respondents had ever had an STD by Wave 3 and ever had an STD by Wave 4.[*] Wave 3 reports of STDs were used to determine the increase in disease burden between waves. Reports from Waves 3 and 4 were combined to capture lifetime experience of STDs.

Social and demographic characteristics available for potential use as controls were age, education, income and marital status.

Analyses

We first present population-based estimates for both genders by race or ethnicity and sexual orientation. We then use adjusted Wald tests, and calculate 95% confidence intervals, to assess whether the STD and HIV risk factors of racial, ethnic and sexual minorities differ significantly from those of heterosexual whites and from those of whites of all orientations. Unless otherwise noted, trends highlighted in the text are significant at the 5% level.

Finally, we conduct multivariate analyses to examine associations between racial, ethnic and sexual orientation subgroups and STD diagnoses and risk behaviors; we use logistic regression for dichotomous variables and linear regression for number of partners, a continuous variable. The models control for age and education. In addition, because sexual identity and behavior can be unstable as youth transition to adulthood,[17,18] we control for whether respondents changed their reported sexual orientation between Waves 3 and 4, as this may affect their STD risk behaviors. Income and marital status did not improve model

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[*]Those who responded yes were then asked to report if they had ever received a diagnosis of chlamydia, trichomoniasis, syphilis, genital herpes, genital warts, hepatitis B, human papillomavirus, pelvic inflammatory disease, cervicitis or mucopurulent cervicitis, urethritis, vaginitis, HIV infection or AIDS, or any other STD.
[*]We present data only on self-reported STDs because biomarker data on STDs were not collected at Wave 4, and same-sex sexual activity was not measured at Wave 3.

fit nor mediate the relationships between racial, ethnic and sexual orientation subgroups, so they are not included in the models. All analyses were conducted in Stata 9.2 and used the *svy* commands, which account for Add Health's complex sampling frame.

RESULTS

Descriptive and Bivariate Analyses

Females—Overall, mixed-oriented women in each racial or ethnic group had had significantly higher numbers of male partners than their heterosexual counterparts (Table 1). Further, compared with a lifetime mean of 9.8 male partners for the total female population, the lifetime average among mixed-oriented whites and blacks was almost twice as high (18.1 and 18.2, respectively). This difference by sexual-minority status emerges early among whites and blacks. Before age 18, mixed-oriented white and black females reported, on average, roughly twice as many male partners as their heterosexual peers. As in prior literature,[8,9,19] the data illustrate that many gay young women have engaged in sex with men. The average number of male partners reported was 5–9 in the various racial and ethnic groups, but these subgroups were small (53 white women, 29 blacks and 21 Hispanics); there were no significant differences among racial and ethnic groups. Combining these reports with gay women's reported number of female partners indicates that gay women had had higher total numbers of sexual partners than heterosexual women in all racial and ethnic groups. Gay women's male partnerships may be partly explained by shifts in reported sexual orientation among most sexual-minority women between their early and late 20s.

About one-quarter (24%) of females reported ever having been forced to engage in sex. More than 40% of sexual-minority white women reported forced sex, proportions significantly higher than that among heterosexual whites. Black women reported a significantly lower rate of forced sex (19%) than white women (26%) overall. Among women who were sexually active in the last year, 40% reported having used a condom during that period. Black women reported a significantly higher rate of condom use (51%) than both white and Hispanic women (38% and 42%, respectively).

Overall, 8% of females reported having been incarcerated. The proportion was significantly higher among mixed-oriented (13%) and gay (21%) white women, as well as mixed-oriented black (17%) and Hispanic (12%) women, than among heterosexual white women (5%). Only 1% of the total female population reported injection-drug use. Mixed-oriented white women reported a significantly higher rate of injection-drug use (3%) than heterosexual white women (0.1%). Blacks overall were at virtually no risk of HIV acquisition through injection-drug use (0%). However, they reported a significantly higher rate of participating in commercial sex (8%) than whites (1%), Hispanics (2%) or the general female population (3%). Compared with heterosexual white women, mixed-oriented black women reported the highest rate of commercial sex participation (0.1% vs. 16%).

Given the uneven distribution of risk factors among women, it is not surprising that STD history varied substantially. By Wave 3, at an average age of 21, almost 15% of the female population had received an STD diagnosis; by Wave 4, at an average age of 29, the proportion had more than doubled, to 37%. Overall, white and Hispanic females' rates of self-reported STDs did not differ statistically, but black women had significantly higher rates of STD diagnoses than others at both Wave 3 (28% vs. 12–14%) and Wave 4 (60% vs. 32–35%). Among both whites and Hispanics, mixed-oriented women reported the highest levels of self-reported STD diagnoses at Wave 4. A significantly lower proportion of gay white women than of heterosexual white women reported an STD history at Wave 4 (13% vs. 29%).

Males—On average, men reported 3.6 female partners before the age of 18 (Table 2). Whereas many gay women did not differ from their heterosexual counterparts in reports of male partners,[*] gay men in all racial and ethnic groups reported significantly fewer female partners, both before age 18 and ever, than their heterosexual counterparts. They reported, on average, fewer than two female lifetime partners. Heterosexual white males reported 15.9 opposite-sex partners, blacks 24.5 and Hispanics 17.4. Most sexual-minority white men and mixed-oriented black men shifted sexual orientation reports between Waves 3 and 4, but the data suggest lower proportions shifted among gay black and sexual-minority Hispanic men.

Overall, 4% of men reported forced sex. Black men reported a significantly higher rate than whites (8% vs. 4%). Gay Hispanic men's rates (26%) appeared to be the highest and marginally different from that of heterosexual whites; given the small sample size, this finding can be considered suggestive of particular vulnerability. Fifty-one percent of all males who reported a sexual relationship in the past year used condoms; black males reported a significantly higher condom use rate than whites (63% vs. 49%). The average prevalence rate of incarceration for males was 24%. Overall, black and Hispanic males had significantly higher levels of incarceration than whites.

Reported injection-drug use was low among the total male population (2%), and blacks and Hispanics reported significantly lower rates than whites. Seven percent of men reported having participated in commercial sex. Prevalence was highest among black males, and concentrated among heterosexual men. Both heterosexual black men and mixed-oriented white men reported at least marginally significant higher rates of participating in commercial sex than heterosexual white men (18% and 11%, respectively, compared with 4%).

Overall, black males had a significantly higher STD diagnosis rate than whites and Hispanics. By Wave 4, 34% of black males had ever received an STD diagnosis compared with 12% of white males and 18% of Hispanic males; mixed-oriented black men reported significantly higher rates than heterosexual black men (69% vs. 32%).

Multivariate Analyses

Females—Mixed-oriented women of all racial and ethnic groups were significantly more likely to report an STD than were heterosexual white women, at both Waves 3 and 4 (odds ratios, 1.8– 6.4; Table 3). Gay white women were significantly less likely than heterosexual white women to ever report an STD (0.3). Mixed-oriented and gay white women had had a higher lifetime number of partners than heterosexual white women (coefficients, 11.9 and 10.1, respectively); they also were more likely ever to have been incarcerated (odds ratios, 2.1 and 3.6, respectively) and to have experienced forced sex (2.4 and 2.7, respectively). Compared with heterosexual white women, gay white women were significantly more likely to report injection-drug use (6.4) and less likely to report condom use in the last 12 months (0.2); mixed-oriented white women were more likely to report commercial sex (3.2).

Mixed-oriented black women had the highest odds of having received an STD diagnosis (odds ratio, 6.4 by Wave 3). There were no significant differences in number of sexual partners between heterosexual black and white women. Mixed-oriented and gay black women had had higher lifetime numbers of partners than heterosexual white women (coefficients, 11.8 and 12.5). Heterosexual and mixed-oriented black women were significantly more likely than heterosexual white women to report condom use in the last year (odds ratios, 1.8 and 1.7, respectively) and commercial sex (9.6 and 16.9); gay black

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[*]Gay white women were significantly different from heterosexual white women in total number of male partners at the 10% level.

women were significantly more likely than heterosexual white women to report commercial sex (9.1).

Hispanic women differed little from heterosexual white women. Heterosexual Hispanic women had significantly fewer total partners and were less likely to report forced sex (odds ratio, 0.7), but mixed-oriented Hispanic women reported a significantly higher number of partners and more forced sex (1.9), than heterosexual white women. Hispanic women did not differ from heterosexual white women on injection-drug and condom use. Heterosexual Hispanic women were marginally more likely than their white counterparts to report commercial sex (2.6).

Males—At Wave 4, gay males in all racial and ethnic groups were significantly more likely than heterosexual white males to have received an STD diagnosis (odds ratios, 2.3–6.9). Mixed-oriented blacks and gay Hispanics had the highest odds of reporting having had an STD diagnosis by Wave 4 compared with heterosexual white males (15.2 and 6.9, respectively). Mixed-oriented white and Hispanic males were not significantly different from heterosexual white males in STD diagnoses.

Gay males of every race or ethnicity reported a higher number of sexual partners than heterosexual white males (although the difference was only marginally significant for blacks and whites). Heterosexual black and Hispanic males were significantly more likely than their white counterparts to report incarceration (odds ratios, 1.5 and 1.4, respectively). Gay Hispanic and black males had the highest odds of reporting forced sex (10.7 and 6.8), relative to heterosexual white males. Every subgroup except gay whites and mixed-oriented blacks was less likely than heterosexual white males to report injection-drug use. Gay Hispanics had the highest odds of reporting condom use in the last year (24.2) compared with heterosexual white males. Finally, heterosexual black males were significantly more likely to report commercial sex (4.3) than were heterosexual white males.

DISCUSSION

Using data from a nationally representative survey, this article provides a fresh set of population-based estimates of the distribution of STD and HIV risk factors among U.S. white, black and Hispanic young adults. In addition, it shows how these risk factors vary across gender and racial, ethnic and sexual orientation subgroups. We find that overall, across all racial and ethnic groups, sexual-minority women, and those of mixed orientation in particular, engage in higher risk sexual behaviors and are at greater risk of acquiring an STD or HIV than heterosexual women. Gay men, black men of all orientations and mixed-oriented black men in particular report significantly higher STD diagnoses rates than heterosexual white men. We also find substantial evidence of early adulthood shifts in sexual orientation among women.

Our findings on the prevalence of risk factors among mixed-oriented women, particularly blacks, as well as mixed-oriented black men, add to literature that suggests that these groups face unique sexual health challenges. Indeed, studies have shown that bisexual youth have a higher risk of substance abuse and victimization, higher rates of stigmatization and lower levels of social support than heterosexual and gay youth, and are marginalized by both heterosexual and gay communities.[20–23] Increased stigmatization and fewer social and sexual health resources may in part explain elevated risk among mixed-oriented men and women.[24,25] Also striking is the lack of significant difference between heterosexual white and black women's reports of number of sexual partners, despite substantial differences in STD reports. Research suggests that black women's disproportionate risk for STDs may be explained less by their sexual behavior than by the sexual networks in which they are

embedded, which tend to be racially segregated and characterized by relatively high community STD prevalence levels.[2,26,27]

Limitations

This study has a number of limitations. The primary one is the small sample of sexual-minority individuals in the survey. While we apply appropriate population weights in our analyses, present confidence intervals and report significance testing at the 5% and 10% levels, these results should be interpreted with caution and treated as suggestive. The exclusion of racial and ethnic groups other than whites, blacks and Hispanics limits the generalizability of this study beyond those populations. The measures used in the study also have limitations. The sexual orientation measure does not differentiate among sexual identity, attraction, orientation and behavior, and previous research suggests that these are not always correlated.[3,18,28] Self-reported STD diagnoses are often underreported because of social desirability bias or, in the case of the lifetime measure, recall bias.[*,29–34] Ever-use of condoms in the last year does not provide a precise measure of current safer-sex behaviors (e.g., condom use at last sex). Further, opposite-sex couples who perceive STD risk as low may use alternative methods of birth control. Unfortunately, in Wave 4, this is the only measure available on condom use.

Conclusion

These findings highlight the particular vulnerability that young adults in the United States who have multiple minority identities face. However, they are based on small sample sizes of sexual minorities. Larger surveys that oversample racial, ethnic and sexual minorities are urgently needed to further explore the associations found in this study. Research is also needed to further investigate the high rates of forced sex reported by sexual-minority white women, black men and gay Hispanic men. In addition, public health interventions should be directed at racial and ethnic minorities whose sexual identities and behaviors do not fall into neat categories (e.g., who do not identify themselves as 100% heterosexual or gay), who might be missed by interventions focused solely on gay men or heterosexual women. Interventions should also account for the findings on early adulthood shifts in sexual orientation. These shifts occur after many young adults have transitioned out of settings such as high school and college where they were easier to reach with risk reduction programs. Interventions among youth in such settings should address risks faced by all youth, whether sexual majority or sexual minority, thus equipping them to appropriately manage and assess their sexual health risk as they move into and through adulthood.

Acknowledgments

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[*]While many researchers have found that respondents underreported their STD diagnoses,[29–32] others have found no significant differences when comparing medical records, state reports and self-reported STD diagnoses.[33] Finally, one study examined men's STD self-reports in Add Health Waves 1–3 and found that 7% of the sample changed their reports from "no" in adolescence to "yes" in middle adolescence to "no" in young adulthood.[34]

Biography

Sanyu A. Mojola is assistant professor, Department of Sociology, and faculty affiliate, Institute of Behavioral Science; at the time this article was written, Bethany Everett was a doctoral candidate, Department of Sociology, and graduate research assistant, Institute of Behavioral Science—all at the University of Colorado, Boulder.

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TABLE 1

Selected characteristics of female respondents, National Longitudinal Study of Adolescent Health, Waves 3 (2001–2002) and 4 (2007–2008), by race, ethnicity and sexual orientation

Characteristic	Total (N=6,036)	White				Black				Hispanic			
		All (N=3,628)	Heterosexual (N=2,846)	Mixed-oriented (N=729)	Gay (N=53)	All (N=1,446)	Heterosexual (N=1,225)	Mixed-oriented (N=192)	Gay (N=29)	All (N=962)	Heterosexual (N=791)	Mixed-oriented (N=150)	Gay (N=21)
Mean no. of partners													
Male, before 18	2.7 (2.4–2.9)	2.7 (2.5–2.9)	2.2 (2.0–2.4)	4.6 (3.8–5.4)†	2.5 (0.9–4.2)	2.8 (2.3–3.3)	2.5 (1.9–3.0)	5.4 (4.1–6.8)†	1.9 (1.2–2.7)	2.2 (1.7–2.8)†‡	1.9 (1.3–2.5)	3.7 (2.4–5.1)†	1.4 (0.0–3.1)
Female, before 18	0.1 (0.1–0.1)	0.1 (0.1–0.1)	0.0 (0.0–0.0)	0.2 (0.1–0.3)†	1.0 (0.5–1.5)†	0.0 (0.0–0.1)§	0.0 (0.0–0.0)	0.2 (0.1–0.3)†	0.7 (0.0–1.3)†	0.1 (0.0–0.1)	0.0 (0.0–0.1)	0.2 (0.0–0.4)*	0.7 (0.1–1.2)†
Male, ever	9.8 (9.2–10.5)	10.2 (9.4–11.1)	8.3 (7.8–8.8)	18.1 (14.4–21.7)†	5.5 (2.5–8.4)*	9.8 (8.8–10.8)	8.8 (7.8–9.7)	18.2 (14.2–22.3)†	8.7 (4.4–12.9)	7.4 (6.1–8.7)§	6.0 (5.1–7.0)†	14.1 (10.0–18.1)†	5.0 (2.3–7.7)†
Female, ever	0.6 (0.4–0.7)	0.6 (0.4–0.8)	0.1 (0.1–0.1)	1.6 (1.0–2.2)†	12.5 (4.8–20.2)†	0.4 (0.2–0.7)	0.1 (0.0–0.1)	1.3 (0.9–1.7)†	11.6 (3.0–20.1)**	0.4 (0.3–0.5)§	0.1 (0.1–0.1)	1.3 (0.7–1.9)†	3.5 (1.1–5.8)†
Ever had forced sex	24.2 (22.5–26.0)	26.1 (24.0–28.1)	22.1 (20.1–24.1)	40.4 (35.4–45.3)†	43.1 (27.2–58.9)†	19.1 (15.3–22.8)§	17.7 (14.1–21.3)†	28.3 (18.7–37.9)	28.5 (7.0–50.0)	19.9 (14.9–25.0)	16.7 (11.9–21.4)†	34.9 (23.7–46.1)†	19.2 (0.0–40.6)
Ever used condom in past 12 mos. †‡	40.4 (38.2–42.5)	38.0 (35.5–40.3)	37.3 (34.7–39.9)	42.8 (37.7–47.9)*	11.2 (2.7–19.7)†	50.7 (47.3–54.1)§	50.4 (46.8–54.1)†	52.7 (42.6–62.8)†	49.6 (24.5–74.7)	41.9 (36.8–47.0)	40.1 (33.6–46.6)	51.0 (38.1–63.8)†	31.6 (1.3–61.8)
Ever incarcerated	7.6 (6.6–8.7)	7.1 (6.0–8.3)	5.4 (4.2–6.5)	12.9 (9.6–16.2)†	20.8 (7.0–34.5)†	9.2 (6.4–12.1)	8.4 (5.8–11.0)†	16.5 (8.2–24.7)†	8.0 (0.0–22.3)	8.7 (5.7–11.7)	8.0 (4.7–11.3)	11.6 (5.5–17.8)†	9.9 (0.0–22.3)
Ever injected drugs	1.1 (0.1–1.5)	1.3 (0.8–1.8)	0.1 (0.0–0.1)	2.6 (1.0–4.2)†	7.8 (0.0–17.2)	0.0 (0.0–0.0)§	0.1 (0.1–0.1)†	0.0 (0.0–0.0)†	0.0 (0.0–0.0)†	1.4 (0.3–2.5)	1.3 (0.0–2.4)	1.4 (0.0–3.5)	7.0 (0.0–20.8)
Ever had commercial sex	2.6 (1.9–3.2)	1.3 (0.1–1.8)	0.1 (0.0–0.1)	3.3 (1.7–4.9)†	2.0 (0.0–6.8)	8.4 (5.7–11.0)†	7.4 (4.8–10.0)†	15.5 (8.1–23.0)†	10.6 (0.0–26.3)	2.3 (0.8–3.9)	2.2 (0.0–4.0)	3.3 (0.0–6.7)	0.4 (0.0–1.2)
Ever had STD													
By Wave 3	14.5 (13.0–16.0)	11.6 (10.1–13.0)	10.2 (8.8–11.7)	17.3 (13.6–21.1)†	5.8 (0.0–14.9)	28.3 (25.0–31.5)§	27.5 (24.2–30.8)†	35.1 (24.5–45.6)†	24.4 (0.0–50.3)	14.0 (10.3–17.7)	12.1 (8.2–16.0)	22.6 (13.5–31.6)†	13.8 (0.0–42.4)
By Wave 4	36.9 (34.5–39.2)	32.3 (30.4–34.1)	29.2 (27.3–31.2)	45.8 (41.3–50.3)†	12.6 (1.7–23.5)†	59.6 (55.9–63.3)§	58.3 (54.3–62.2)†	74.0 (66.3–81.7)†	38.7 (10.5–67.0)	34.6 (28.5–40.8)	31.3 (24.4–38.2)	51.5 (41.0–62.0)†	20.3 (0.0–33.6)
In 12 mos. before Wave 4	14.4 (13.0–15.7)	13.1 (11.6–14.6)	11.4 (9.8–13.0)	19.8 (16.5–23.2)†	12.4 (1.5–23.2)	19.1 (16.4–21.8)§	18.2 (15.4–21.0)†	28.1 (19.4–36.7)†	7.3 (0.0–18.0)	16.0 (11.5–20.4)	16.1 (10.5–21.6)	17.4 (11.1–23.8)*	0.0 (0.0–0.0)†
Mean age (Wave 4)	28.6 (28.4–28.7)	28.6 (28.3–28.9)	28.7 (28.4–28.9)	28.3 (28.0–28.6)†	28.6 (28.0–29.2)	28.8 (28.4–29.2)	28.8 (28.4–29.3)	28.5 (28.0–28.9)	28.3 (27.3–29.4)	28.6 (28.2–29.1)	28.7 (28.1–29.2)	28.6 (28.0–29.1)	28.1 (27.2–29.1)
Education													

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Characteristic	Total (N=6,036)	White				Black				Hispanic			
		All (N=3,628)	Heterosexual (N=2,846)	Mixed-oriented (N=729)	Gay (N=53)	All (N=1,446)	Heterosexual (N=1,225)	Mixed-oriented (N=192)	Gay (N=29)	All (N=962)	Heterosexual (N=791)	Mixed-oriented (N=150)	Gay (N=21)
<high school	6.9 (5.4–8.3)	5.8 (4.2–7.4)	5.8 (4.1–7.4)	7.9 (5.0–10.8)	3.4 (0.0–10.0)	8.8 (6.1–11.6)‡	8.7 (5.9–11.6)†	9.4 (2.3–16.4)	13.3 (0.0–30.9)	8.7 (5.7–11.7)	8.9 (5.1–12.6)	6.5 (0.9–12.2)	21.9 (0.0–52.6)
High school graduate	13.4 (11.7–15.0)	12.6 (10.3–14.2)	12.2 (9.9–14.4)	11.8 (8.7–14.8)	22.3 (7.0–37.6)	15.7 (12.0–19.3)†	16.2 (12.1–20.3)*	9.7 (4.0–15.4)	25.3 (0.1–50.1)	17.3 (13.3–21.3)§	18.6 (14.0–23.1)†	13.1 (5.3–20.9)	3.7 (0.0–11.0)†
>high school	79.8 (77.2–82.3)	81.6 (78.8–84.4)	82.1 (79.1–85.0)	80.3 (76.0–84.6)	74.3 (58.2–90.3)	75.5 (70.6–80.3)§	75.1 (69.7–80.4)*	80.9 (73.0–88.9)	61.4 (36.1–86.7)*	74.0 (69.5–78.4)§	72.6 (67.5–77.6)†	80.4 (71.9–88.9)	74.4 (44.3–100.0)
Changed sexual orientation between waves	17.8 (16.1–19.4)	19.1 (17.0–21.2)	6.5 (4.7–8.3)	64.5 (60.0–69.0)†	73.8 (59.6–88.0)†	11.9 (9.6–14.1)§	2.9 (1.4–4.5)†	71.7 (63.5–79.8)†	83.9 (64.0–100.0)†	17.6 (14.4–20.9)	6.0 (4.0–7.9)	64.4 (53.4–75.4)†	73.3 (45.4–100.0)†

*
Significantly different from heterosexual whites at p<.10.

†
Significantly different from heterosexual whites at p<.05.

‡
Significantly different from whites of all orientations at p<.10.

§
Significantly different from whites of all orientations at p<.05.

**
Significantly different from heterosexual whites at p<.001.

††
Restricted to sexually active women.

Notes: Unless otherwise noted, data are percentages. Figures in parentheses are 95% confidence intervals.

TABLE 2

Selected characteristics of male respondents, National Longitudinal Study of Adolescent Health, Waves 3 (2001–2002) and 4 (2007–2008), by race, ethnicity and sexual orientation

Characteristic	Total (N=5,009)	White				Black			
		All (N=3,096)	Heterosexual (N=2,883)	Mixed-oriented (N=141)	Gay (N=72)	All (N=1,020)	Heterosexual (N=964)	Mixed-oriented (N=27)	Gay (N=29)
Mean no. of partners									
Male, before 18	0.1 (0.0–0.2)	0.1 (0.0–0.1)	0.0 (0.0–0.0)	0.4 (0.2–0.6)†	2.6 (1.2–4.0)†	0.3 (0.0–0.8)	0.0 (0.0–0.0)	0.7 (0.0–1.5)*	11.4 (0.0–30.8)
Female, before 18	3.6 (3.1–4.1)	3.3 (2.8–3.8)	3.4 (2.9–4.0)	2.3 (1.0–3.5)*	0.6 (0.3–0.9)†	4.9 (3.7–6.2)§	5.1 (3.8–6.5)†	2.3 (0.9–3.8)	0.5 (0.0–1.0)†
Male, ever	0.9 (0.6–1.1)	0.7 (0.4–1.1)	0.1 (0.1–0.2)	1.6 (0.8–2.3)†	24.7 (11.3–38.1)†	1.3 (0.5–2.1)	0.3 (0.0–0.5)	4.2 (0.2–8.2)†	35.9 (10.5–61.3)†
Female, ever	16.7 (15.4–18.1)	15.4 (14.4–16.5)	15.9 (14.7–17.0)	12.7 (7.8–17.6)	1.9 (0.9–3.0)†	23.4 (18.3–28.6)	24.5 (19.3–29.8)	8.8 (5.2–12.4)†	1.1 (0.3–1.9)†
Ever had forced sex	4.4 (3.6–5.2)	3.6 (2.9–4.4)	3.4 (2.6–4.2)	8.4 (3.2–13.6)*	3.6 (0.0–9.0)	7.7 (5.1–10.3)§	7.4 (4.7–10.1)†	18.1 (0.0–38.2)	18.0 (0.0–40.0)
Ever used condom in past 12 mos. **	51.2 (48.6–53.8)	48.6 (45.6–51.6)	47.3 (44.4–50.3)	62.3 (52.2–72.4)†	74.7 (63.3–86.0)†	62.5 (58.2–66.8)§	62.0 (13.5–22.5)†	74.4 (52.9–95.8)†	70.7 (44.3–97.2)*
Ever incarcerated	24.2 (21.9–26.5)	21.7 (19.3–24.2)	21.7 (19.6–23.9)	25.3 (13.2–37.5)	13.5 (1.4–25.7)	31.0 (24.5–37.6)§	32.1 (25.5–38.8)†	18.1 (0.0–38.2)	2.4 (0.0–6.4)†
Ever injected drugs	2.1 (1.6–2.7)	2.7 (1.9–3.5)	2.7 (1.9–3.5)	1.1 (0.0–2.3)†	4.7 (0.0–10.7)	0.4 (0.0–0.8)§	0.3 (0.0–0.7)†	2.8 (0.0–8.2)	0.0 (0.0–0.0)†
Ever had commercial sex	6.9 (5.8–8.0)	4.7 (3.8–5.7)	4.4 (3.4–5.3)	11.4 (3.6–19.1)*	5.2 (0.0–11.5)	17.1 (12.6–21.6)†	17.8 (13.1–22.6)†	9.8 (0.0–25.3)	2.6 (0.0–6.6)
Ever had STD									
By Wave 3	5.7 (4.7–6.7)	4.5 (3.5–5.5)	4.4 (3.4–5.4)	2.9 (0.0–5.7)	9.5 (1.5–17.6)†	12.9 (9.7–16.1)§	12.9 (9.7–16.0)†	17.0 (0.0–35.8)	9.7 (0.0–21.4)
By Wave 4	16.0 (14.2–17.7)	12.1 (10.6–13.6)	11.6 (10.1–13.1)	16.3 (8.9–23.6)	24.8 (12.7–36.9)	33.5 (29.0–38.1)§	32.3 (27.9–36.9)†	68.6 (47.1–90.1)†	39.7 (12.6–66.9)†
In 12 mos. before Wave 4	5.0 (4.1–5.8)	3.9 (2.9–4.9)	3.7 (2.6–4.7)	7.4 (1.1–13.7)	8.0 (0.5–15.5)	8.8 (6.6–11.1)§	8.0 (5.6–10.5)†	41.0 (16.3–65.7)†	5.2 (0.0–10.9)
Mean age (Wave 4)	28.9 (28.6–29.1)	28.8 (28.5–29.1)	28.8 (28.5–29.1)	28.7 (28.0–29.3)	28.7 (28.1–29.3)	29.1 (28.7–29.6)	29.1 (28.7–29.6)	28.7 (27.9–29.4)	28.9 (28.1–29.9)
Education									

Characteristic	Total (N=5,009)	White				Black			
		All (N=3,096)	Heterosexual (N=2,883)	Mixed-oriented (N=141)	Gay (N=72)	All (N=1,020)	Heterosexual (N=964)	Mixed-oriented (N=27)	Gay (N=29)
<high school	10.0 (8.4–11.7)	8.1 (6.5–9.8)	8.3 (6.6–10.0)	7.8 (2.3–13.3)	1.5 (0.0–3.8)[†]	14.3 (10.3–18.2)[§]	14.2 (10.1–18.4)[†]	15.5 (0.0–35.4)	14.3 (0.0–35.5)
High school graduate	20.4 (17.9–22.9)	19.1 (16.4–21.8)	19.8 (17.1–22.6)	7.9 (2.2–13.6)[†]	10.5 (0.0–21.7)[*]	26.2 (20.3–32.0)[§]	26.8 (20.7–32.9)[†]	27.4 (2.5–52.4)	0.8 (0.0–2.2)[†]
>high school	69.6 (66.1–73.1)	72.8 (69.1–76.4)	71.9 (68.2–75.5)	84.3 (76.4–92.2)[†]	87.9 (76.6–99.2)[†]	59.6 (51.7–67.4)[§]	59.0 (50.8–67.2)[†]	57.1 (30.3–83.9)	85.0 (63.8–100.0)
Changed sexual orientation between waves	6.2 (4.9–7.5)	6.9 (5.2–8.6)	2.6 (1.7–3.5)	69.2 (58.3–80.0)[†]	61.1 (43.5–78.8)[†]	4.2 (2.9–5.5)[§]	1.2 (0.4–1.9)[†]	71.2 (48.3–95.0)	47.5 (18.5–76.5)[†]

[*] Significantly different from heterosexual whites at p<.10.

[†] Significantly different from heterosexual whites at p<.05.

[§] Significantly different from whites of all orientations at p<.05.

[**] Restricted to sexually active men.

Notes: Unless otherwise noted, data are percentages. Figures in parentheses are 95% confidence intervals.

TABLE 3

Odds ratios or coefficients from multivariate regression analyses assessing associations between STD and HIV risk factors and selected characteristics, by gender

Characteristic	Ever had STD, Wave 3	Ever had STD, Wave 4	Total no. of partners	Ever incarcerated	Ever had forced sex	Ever injected drugs	Ever used condom in past 12 mos.	Ever had commercial sex
FEMALES								
Interactions								
White × heterosexual (ref)	1.00	1.00	na	1.00	1.00	1.00	1.00	1.00
White × mixed-oriented	1.77***	1.84***	11.90***	2.08***	2.38***	2.04	0.99	3.24*
White × gay	0.61	0.31*	10.09**	3.58**	2.66**	6.39*	0.16***	1.71
Black × heterosexual	2.96***	3.37***	0.38	1.49†	0.74*	0.05**	1.82***	9.55***
Black × mixed-oriented	6.43***	6.14***	11.77***	2.73**	1.37	0.11†	1.65*	16.94***
Black × gay	6.15*	1.29	12.52*	0.89	1.36	u	1.22	9.11*
Hispanic × heterosexual	1.20	1.08	−2.28***	1.38	0.70*	1.45	1.22	2.61†
Hispanic × mixed-oriented	2.05*	2.33***	7.55**	1.85†	1.88*	1.16	1.36	3.12
Hispanic × gay	1.31	0.51	0.82	1.21	0.79	5.24	0.54	0.32
Changed sexual orientation between waves	na	1.18	−0.80	1.44†	1.02	1.89	1.10	1.60
Age	0.97	0.98	0.40*	1.03	1.04	0.93	0.90***	1.08
Education								
>high school (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
High school graduate	0.97	1.04	0.73	2.20***	1.04	1.62	0.73*	1.69†
<high school	1.32	1.49*	0.63	4.02***	1.50**	1.79	0.48***	1.98*
Constant	na	na	1.94	na	na	na	na	na
MALES								
Interactions								
White × heterosexual	1.00	1.00	na	1.00	1.00	1.00	1.00	1.00
White × mixed-oriented	0.86	1.34	0.07	1.08	2.86**	0.21*	1.76*	2.19
White × gay	8.30***	2.31*	12.31†	0.56	1.16	1.08	3.26**	0.98
Black × heterosexual	2.91***	3.64***	8.55**	1.51**	2.22***	0.12***	3.00***	4.34***

Characteristic	Ever had STD, Wave 3	Ever had STD, Wave 4	Total no. of partners	Ever incarcerated	Ever had forced sex	Ever injected drugs	Ever used condom in past 12 mos.	Ever had commercial sex
Black × mixed-oriented	5.97***	15.18***	−1.03	0.51	3.21	0.53	3.30	0.86
Black × gay	3.20	4.58*	21.70†	0.07**	6.84*	u	4.83†	0.45
Hispanic × heterosexual	1.00	1.51*	1.26	1.40*	1.27	0.32*	1.46**	1.69
Hispanic × mixed-oriented	1.80	1.08	0.61	1.40	2.74	0.07*	1.01	0.99
Hispanic × gay	u	6.88***	14.22*	0.29	10.67***	u	24.20**	u
Changed sexual orientation between waves	na	1.15	−2.95	1.42	0.90	2.26	1.31	1.55
Age	0.98	1.03	0.61†	0.99	0.98	1.06	0.84***	1.22***
Education								
>high school (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
High school graduate	1.06	0.92	−1.52	2.13***	1.24	0.84	0.77*	1.23
<high school	1.89***	1.10	2.51	4.79***	1.22	1.81†	0.80	1.78*
Constant	na	na	6.43	na	na	na	na	na

*
p<.05.

**
p<.01.

***
p<.001.

†
p<.10.

Notes: All figures are odds ratios except those for "Total no. of partners," which are beta coefficients. ref=reference group. na=not applicable. u=