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HIV Sexual Risk Behavior by Men Who use the Internet to Seek Sex with Men: Results of the Men's INternet Sex Study-II (MINTS-II)

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Abstract

This study sought to identify the magnitude of HIV risk in a diverse sample of Men who use the Internet to seek Sex with Men (MISM), and test if specific sub-populations are at sufficiently increased risk to warrant tailored interventions. A sample of 2,716 American MISM, stratified by race/ethnicity, completed an Internet survey of online and offline sex seeking behavior during the last 3 months. Across most demographics, a minority of MISM reported unprotected anal intercourse with male partners (UAIMP). Across all demographics, risk of UAIMP substantially increased with partners met online. Other predictors of increased online partner risk include being 30–39 years old, having children, not living in the Northeast, and low income. HIV-positive men and African Americans reported increased online and offline partner risk. To address higher risk of UAIMP, online HIV interventions should prioritize the needs of MISM, especially HIV-positive men, with content focused on online-mediated liaisons.

Keywords

High-risk sex; Unprotected sex; Homosexuality; Internet; Demographic factors; HIV seropositivity

Introduction

In the US, male-male sexual transmission is estimated to account for 59–68% of men living with AIDS, 64–71% of men living with HIV (non-AIDS), 70–75% of new HIV diagnoses in men, and 59–68% of deaths of men with AIDS (Centers for Disease Control and Prevention 2007). Over 300,000 men who have sex with men (MSM) in the US have died of AIDS over the course of the epidemic. In the last decade, major shifts toward increasing HIV risk behavior have been reported in behavioral surveillance studies of MSM (Koblin et al. and the EXPLORE study team 2003). These trends have been followed by increasing rates of sexually transmitted infections (Centers for Disease Control and Prevention 1999a, b) and HIV (Jaffe et al. 2007), raising concerns that HIV prevention targeting MSM in the US has not adequately addressed this second wave of infections (Gross 2003) and that HIV prevention has collapsed (Coates 2008; Jaffe et al. 2007).

Coinciding with these trends, the Internet has emerged as one of the most popular venues for MSM to meet their sex partners, leading some to question whether Internet use is in part fueling the epidemic. MSM were early adopters of the Internet for meeting sex partners with a recent meta-analysis estimating that 35–45% of MSM report having used the Internet for this purpose (Liau et al. 2006). Syphilis outbreaks and cases of HIV transmission have been tied to online sex seeking (Klausner et al. 2000; Tashima et al. 2003). Furthermore, STI clinic studies have reliably reported Internet sex seeking as a risk factor (McFarlane et al. 2000) and studies comparing samples of MSM recruited offline or online have reported higher rates of unprotected anal intercourse (UAI) among the latter (Rosser et al. 2008). Prior research shows that online sex seeking is associated with being younger, less educated, living in a rural area, methamphetamine use, HIV seropositivity, and identifying as bisexual (Benotsch et al. 2002; Horvath et al. 2006; Hoppers et al. 2005; Kim et al. 2001; Tikkanen and Ross 2003). In London a comparative study of HIV-positive gay men recruited from a clinic ($n = 506$), gym ($n = 88$), and the Internet ($n = 67$) found higher rates of UAI reported by the Internet sample (Bolding et al. 2005). HIV-positive men were more likely to report UAI with other HIV-positive casual partners that they met online (than offline). In the larger study ($N = 4,225$ gay and bisexual men), approximately 10% of men who use the Internet to seek Sex with men (MISM) reported UAI with non-concordant partners found from both online and offline venues.

Studies of risk associated with the Internet generally have taken a rudimentary approach, most often by examining demographic and behavioral differences between groups who do and do not go online seeking sex. Although rates of risk behavior are typically higher among MSM who use the Internet to meet sex partners, most studies nonetheless show a minority of men who engage in UAI with partners found online or offline (Liau et al. 2006). However, Internet-based studies have recruited largely homogeneous samples despite consistent sexual risk-taking differences across race/ethnicity and HIV status shown in offline studies of MSM (Halkitis et al. 2003; Millett et al. 2006). As comparative analysis across these factors using Internet-recruited samples remains an important area of inquiry, we conducted this study on a racially/ethnically diverse sample of MISM.

There were three aims of the paper. First, we sought to examine the relationship between demographic characteristics and risk behavior in a geographically, racially and ethnically diverse sample of men who use the Internet to seek sex with men (MISM). The second aim of the study was to explore the degree to which the demographic profile shifted according to level of risk activity. The final aim was to compare the relative risk behavior of MISM in online-versus offline-mediated sexual liaisons.

Methods

Participants

Recruitment for the MINTS-II survey was conducted online from the nation's largest gay/bi website, Gay.com (Dawley 2007; PlanetOut Inc. 2006). Eligible participants were identified using a masked online screener confirming them as (a) men, (b) 18 years or older, (c) who reported having had sex with at least one man in their lifetime (regardless of sexual identification), and (d) living in a US residential zip code. Participants were recruited in five racial/ethnic blocks: Asian, Black, Latino, White and Other/multiracial, with recruitment in each racial/ethnic group closing as the category was filled. With the demographic composition of Gay.com members described as 77% White, 9% Latino, 5% African American, 5% Asian American, and 3% Other, recruitment was capped at 750 per group to ensure a sufficiently diverse sample to enable racial/ethnic comparisons.

The specific flow of recruitment is documented in Fig. 1. In total, 98,790,803 advertising impressions were displayed, yielding 62,257 clicks, and 52,629 visits to the study website (0.063 and 0.053% of impressions, respectively). This click-through rate is comparable with other research, particularly given the fact that advertisement images were changed to emphasize recruitment of subjects of color after the white group had been filled. The recruitment campaign included ten million purchased advertising impressions (the rest were overruns). As part of our agreement with PlanetOut, advertisements were distributed among chat, profile, and all other (run of service) locations. Separate tallies were reported for advertisements on the planetout.com site and Latino subsite. We did not have the ability to target advertisements by race/ethnicity, although we did change advertisements to better target smaller groups as the larger ones were filled. We did not attempt to oversample geographically since our prior work with Gay.com established that national sampling for the Latino population did an effective job delivering a geographic distribution comparable to that of census data.

The difference between reported clicks and logged site visits is explained by the fact that a banner click can be preempted before completion by clicking elsewhere, an "escape" operation, or closing the web browser window. Some of the "lost" users may have inadvertently clicked on the advertisement when meaning to click elsewhere. Other reasons that likely total into the discrepancy include respondents double clicking on the banner, or clicking the banner when the survey was offline for a few hours. Of those who visited the site, 29% completed screening, 14% were eligible, and 12% consented. While the total recruitment effort may seem high (over 36,000 banner advertisements per completed survey), it can be explained by the combination of the personal and sensitive nature of the survey subject matter, the significant number of prospective subjects turned away when high-population groups were closed, the high level of advertising to which recruits are subjected, and the challenge of recruiting people who may be online with a targeted purpose (e.g., sex-seeking).

Procedures

Potential participants who clicked on the banner advertisement were sent to the MINTS II website, which was protected with appropriate encryption to ensure that transmission of information was secure. Participants who entered the site were shown a welcome page that provided options to (1) check whether they were eligible; (2) resume a previously started survey; (3) read an overview of the study or; (4) learn about the research team. Inclusion criteria for the study were as listed above; e.g. men, 18 years or older, living in the US, who have reported having sex with at least one man. Potential subjects were also excluded for prior completion of the survey instrument, or refusing to allow a cookie to be stored on their

computers. (The cookie was needed as part of the survey infrastructure). Persons found ineligible were thanked for their interest and informed that they did not meet study requirements. Eligible participants reviewed web pages that required they provide informed consent and contact information. If a participant declined to consent, they were given a brief one-question exit page to determine the reason for leaving.

Participants could begin the online survey any time after successfully enrolling in the study. The survey questionnaire consisted of 17 sections with a total of 170 questions. To minimize participant burden, skip and branch patterns were used to administer only those questions that were relevant to each participant. Sections were randomized where order effects were considered possible, automated calculation checks were used to prevent impossible responses, and a progress bar was used to enable participants to gauge time to completion. Participants who started the survey but did not complete it within 24 h were sent an automated reminder notice. Automated validation protocols were used to decrease the likelihood of invalid or duplicate participation. Any suspicious responses were flagged for further review. Data collection began June 6, 2005 and ended September 12, 2005 (98 days). After completion of the questionnaire, participants initially received \$10 to compensate them for their time and effort. Compensation was later increased to \$20 to improve recruitment of targeted racial groups in the larger multi-ethnic sample. Participants were allowed to specify their preferred type of payment (e-payment, check, donation to charity, no payment).

Measures

The survey was adapted from a previous study of Latino MSM conducted by this research group (Rosser et al. 2008). Questionnaires were developed and placed online internally and black-box tested to ensure proper skip and branching operations. A “Refuse to Answer” option enabled participants to actively decline any particular question.

Demographics—Demographic questions were taken from the US Census (2000). This included questions on race (“What is your race?” Mark one or more races to indicate what you consider yourself to be); ethnicity (“Are you Spanish/Hispanic/Latino?” with five response options—“No”, “Mexican”, “Puerto Rican”, “Cuban”, or “Other”— which included the three main Latino sub-ethnicities in the USA); income (“What is your annual income?” defined as amount of gross, pre-tax income earned in 2001); and citizenship (“Are you a citizen of the United States?” yes/no). State of residence and region of the USA were obtained indirectly by converting zip code of residence. Age and education was asked in years. Urban–rural residence was asked “How would you describe the town or community where you live?” with response categories compatible with Census (2000) definitions (see Table 1 for response options). Because this was a sample of MSM, legal marital status categories from the Census (2000) were adapted for clarity by adding “to a woman” and “to a man” to each response option.

Sexual Demographics—Sexual orientation was assessed by adapting the 7-point Kinsey scale to measure behavior. Participants were asked “In the last 3 years, in terms of my sexual behavior, I have had sex with...” (a) “only men,” (=0); (b) “equally men and women,” (=3); or (c) “only women.” (=6). The change from Kinsey’s “exclusively homosexual” and “exclusively heterosexual” categories to “only men” and “only women” was made both to improve readability and to compare responses from the prior survey.

Sexual Risk Measures—For the primary dependent variable, two questions were asked concerning the participants online and offline sex-seeking behaviors. First participants were asked how many sex partners they had met online, or how many they had met offline, within

the last 3 months. Next they were asked with how many of their online, or offline partners, did they have *unprotected anal and/or vaginal sex*. For each question, the number of sex partners could be divided into three response categories; males, females, and transgender. Total male partners were the sum of those met via the Internet plus those met not via the Internet. A computer algorithm randomized question presentation so that half of participants received the online questions first, while the other half received the offline questions first.

Because we anticipated high risk behavior to be common in our sample, we chose to measure the number of partners with whom a participant engaged in UAI, rather than the number of unprotected sex acts. This measure may be most appropriate in settings with high numbers of partners (e.g., Internet, bathhouse) as it would appear a more reliable measure than occasions of unsafe sex behavior. Similarly, we chose the time period, last 3 months, both to maximize recall reliability and to operationally define risk behavior with casual partners.

Other sections of the survey investigated Internet and computer use, online profiles, detailed questions about meeting men for sex online and offline (asked separately), comparison of sexual experiences with partners met online and offline, sexual misrepresentation, sexual history, long-term relationship history, sexual health, HIV/STI history, scales of compulsive sexual behavior, internalized homo-negativity, and a needs assessment investigating what kind of Internet-based sexual and HIV prevention education participants would find acceptable and helpful. Copies of the study questions are available from the study investigators.

Analysis

Analytic procedures included summary statistics for marginal distributions, *t*-tests and ANOVA's for differences between means, median tests, and logistic and negative-binomial regression models. The principal analytic challenge revolved around the distribution of our main outcome measure: number of partners with whom our respondents reported having unprotected sex. This risk measure was extremely skewed with an extraordinary number of zero values. Since the modeling of such outcomes is not straightforward, we employed several techniques. First, we dichotomized the measure to be risk/no-risk, where no-risk was no unsafe sex or unprotected anal sex with only one partner. To examine robustness, we also coded, in secondary analyses risk/no risk as running 0/1 + partners and (0–1)/2+ partners, and the relationships results were robust. Logistic regression models were fit to these outcomes. Since this approach discards a great deal of information about the degree of risk (large numbers of unsafe sex partners) we also employed (1) ordinal logistic regression and (2) negative-binomial regression procedures (Long 1997). None of our ordinal logistic models passed the critical proportional odds test and so were not presented here. Importantly, all presented models are robust to slight-modest specification changes and robust standard errors (Greene 1997) are employed throughout.

Results

In the last 3 months, 1,857 (69%) of the sample reported no unprotected anal intercourse with male partners (UAIMP), either met online ($n = 2,059$ of 2,710 or 76%), or offline ($n = 2,237$ of 2,709 or 82.6%). The distribution of risk behavior, as measured by the number of men with whom participants reported engaging in unprotected anal intercourse (UAIMP) is heavily skewed, with median number of UAIMP being 0, but the mean UAIMP being 1.24 ($SD = 5.88$).

Table 1 breaks down risk by common distributional cut-points and demographic subgroups. Notice that across all demographic characteristics, median values only differ by HIV status.

There is no risk, or risk variation, for at least 50% of respondents regardless of their demographic characteristics. Indeed, demographic variation was observed only in those participating in the riskiest sexual behavior (i.e., large number of UAIMP at or above the 95th percentile).

Table 2 presents risk (mean number of UAI partners in last 90 days) across demographic characteristics by meeting mechanism (i.e., online vs. offline). While not presented in full, the highly skewed outcome measure compelled us to conduct Wilcoxon median tests for each comparison; corresponding P-values are listed to support conclusions about mean tests. The table shows that participants reported significantly more UAIMP with men first met online ($M = 0.823$; $SD = 4.550$) than offline ($M = 0.427$; $SD = 2.297$, $t_{2,703} = 5.231$, $P < 0.001$). However, participants reported significantly more male sex partners (not necessarily for UAI) first met online ($M = 3.79$; $SD = 7.79$) than offline ($M = 2.21$; $SD = 6.50$, $t_{2,708} = 17.37$, $P < .001$). When the proportion of risky sex partners (UAIMP/total partners) met in each environment was compared, the proportion met online ($M = 0.19$; $SD = 0.33$) was slightly *less* than the mean number of partners met offline ($M = 0.22$; $SD = 0.45$; $t_{1,078} = 2.25$, $P = .025$).

Whether compared as means or medians, the raw number of UAIMP met online versus offline are consistently higher overall, across most demographic characteristics (and levels of same). Significantly higher numbers of UAIMP partners were reported for all marginal levels of participants under 50 years of age, who graduated high school, earn less than US \$60,000, of all race/ethnicities, live anywhere except very rural US, in all Census regions, of all religious backgrounds (possibly excepting those of Muslim and Jewish extraction), who are not highly religious, whether or not they have children, and regardless of sexual orientation, US citizenship or HIV status.

Table 3 presents risk analyses from three multiple negative binomial regression models; number of UAIMP met online, offline, and either on- or off-line (i.e., total). In order to facilitate readability, this table presents asterisk labels for statistical significance, model log likelihoods, and Bayesian information criteria as a comparable fit statistic. The table shows that as compared to their referent group, those at highest likelihood of engaging in UAIMP (online or offline) are HIV positive MSM (IRR = 3.75; 95%CI: 2.34–6.00); men who have children (IRR = 2.82; CI: 1.31–6.09); African American men (IRR = 1.90; CI: 1.32–2.71); men not living in the Northeast (IRRs = 1.64–1.78) men aged 30–39 years (IRR = 1.53; CI: 1.12–2.10); and men earning \$20,000–40,000 (IRR = 1.42; CI: 1.07–1.88), even accounting for the contribution of other demographic variables.

Discussion

Taken together, these results present an important, complex, and highly consistent picture of the relationship between HIV risk behavior of MSM and demographic characteristics. First, although most respondents across all demographic characteristics did not engage in UAIMP, almost one-third reported that they did. A small group of MSM, estimated at less than 5% of the total sample, reported having UAI with 50–180 male partners in a 90-day period. Thus, a relatively small number of men may be at extreme risk of acquiring and/or transmitting HIV. While others have reporting a similar finding, this is the first paper, to our knowledge to confirm this is true across almost all demographic characteristics of MSM.

Second, participants report almost twice the number of UAIMP met online than offline; although the *proportion* of partners with whom they engaged in UAI was actually less for online than offline. This association is robust across demographic characteristics confirming the need for HIV prevention to address sexual risk behavior with partners met on the

Internet. The Internet appears to facilitate efficiency in meeting men for sex (and hence significantly increasing the likelihood of UAI male partners) rather than increasing the rates of unsafe sex. Third, a worrisome difference was found between HIV-positive and HIV-negative men, where HIV-positive MSM appear 4.1 times at greater risk of engaging in UAI with male partners met online than HIV-negative MSM, and 2.6 times more at risk than when meeting them offline (see Table 3). This and other studies (Halkitis and Parsons 2003) demonstrate that online HIV primary prevention interventions targeting HIV-positive MSM, and tailored to address risk from the perspective of men already HIV-positive, appears urgent. Fourth, while risk of engaging in UAI appears elevated for most MSM with male partners met online, the multiple regression analyses identified several key demographic characteristics of men at higher risk. In addition to HIV-positive status, men with children were at 3.9 times the risk of engaging in UAI with male partners but only when meeting men online. These men may have less opportunity to meet other men for sex, may experience greater isolation and stress, and may feel more need to seek sexual partners via the Internet given childrearing responsibilities. African American MSM were the only racial or ethnic group at greater risk for engaging in UAIMP although here, the point estimate of the odds of engaging in UAI with men met offline (IRR = 2.81) is *greater* than those met online (IRR = 1.48). This finding differs from at least one prior study that showed that African American MSM reported similar or fewer numbers of male sexual partners and UAI occurrences than Caucasian MSM (Halkitis and Parsons 2003; Millett et al. 2007, 2006). On the other hand, the findings are consistent with national trends revealing that HIV disproportionately and increasingly affects African American communities (Centers for Disease Control and Prevention 2007).

Why MSM in the Northeast of the country are likely to engage in significantly less risk behavior than MSM in other parts, and especially independent of race/ethnicity, income or other studied characteristics, is an interesting question to consider. It may be that HIV prevention has been more effective in this region, that laws and policies concerning same sex marriage and civil unions which at the time of this study only existed in this region are positively impacting risk behavior, or that these and/or a combination of other factors have contributed to this regional difference. Men in their thirties and low income earners appeared more likely to report UAIMP with men met online although the odd ratios for these relationships are less remarkable.

These results appear robust and internally consistent. The same results emerged regardless of which analytic method/model or coding-scheme we employed. Similarly, across demographics, the same key findings emerged. These results also are consistent with those previously reported in a smaller study of Latino MSM by our team (Rosser et al. 2008).

Limitations of the study include that the data are cross-sectional and hence we lack the ability to follow those at highest risk longitudinally (although this is proposed in the next phase of this study). It should also be noted that all recruitment was from a single gay website service provider and that the respondents represent a sample of men likely to respond to research surveys; hence generalization to MSM more broadly or to MSM at other sites cannot be assumed. Other limitations, common in sexual risk assessment studies, include the inability to independently confirm risk behavior, concerns about validity of responses in online research, and questions of representativeness in online convenience samples. The primary risk measure used, UAI male partners, does not take into account other strategies MSM may use to lower risk such as sero-sorting and sero-positioning; hence the risk estimates may be higher than actual risk. Finally, our analyses have been confined to the demographic and behavioral characteristics under study. It is interesting to speculate whether there are other variables such as internet use, prior exposure to HIV prevention, and psychosexual characteristics (e.g., compulsive sexual behavior and

internalized homonegativity) which may, or even likely, distinguish the high risk MSM from other MSM. We confirm that we are analyzing these data and propose reporting on the findings in a future publication.

We also considered stratifying the results by HIV status and confirm that stratifying does make some difference in risk prediction models (with mean risk being higher for HIV+ MSM both online and offline). However, with just 110 HIV+ respondents, the pooled (HIV + and HIV-) models closely track with the HIV- only models. As our primary question here was to document risk behavior of MSM for informing HIV prevention (behavioral epidemiology), not a comparison study of risk factors (etiology), we concluded unstratified analyses were more appropriate to examine the research question.

Implications for primary HIV prevention include the prioritization of online HIV primary prevention interventions, recognizing the Internet is now the largest gay venue nationally and internationally and also a most efficient venue for meeting partners. We predict Internet-mediated liaisons will increasingly be identified as a high risk venue for MSM. HIV prevention needs to build understanding of online-mediated HIV risk between men by being grounded in a realistic, empirically-based understanding of *virtual-mediated* risk. In particular, we stress that while for most MSM the Internet is not a higher risk environment, for a minority of MSM, it appears to substantially elevate risk. The exception appears to be African American MSM where there appears greater risk in meeting partners offline rather than online. Aside from the characteristics identified in the regression, even in a large study, most demographic characteristics fail to distinguish MSM at risk from those not at risk. With Internet-mediated liaisons defining MSM, and a similar level of risk common across most demographics, we concluded it makes the most sense to target online interventions towards all MSM, or possibly target those engaging in the most high risk behavior. The exception may be men with many partners, HIV status and possibly MSM with children, where tailored intervention may prove highly effective.

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Fig. 1.
MINTS-II, survey participant recruitment and flow diagram

Distributions of total unprotected anal sex male partners in last 90 days by demographic characteristics of men who use the internet to seek sex with men (MISM)

Table 1

	N	Mean	SD	Min	Median	90th	95th	Max
Total sample	2,716	1.25	5.87	0	0	3	5	180
Age								
18-24	1,159	1.04	5.68	0	0	2	4	150
25-29	510	0.99	2.84	0	0	2	5	40
30-39	724	1.70	8.00	0	0	3	7	180
40-49	249	1.49	4.54	0	0	4	8	45
50-59	62	1.21	2.79	0	0	3	8	15
60+	9	0.11	0.33	0	0	1	1	1
Years of education								
<12	88	1.39	4.16	0	0	3	5	31
12-15	1,093	1.38	6.23	0	0	3	6	150
16	827	1.19	3.87	0	0	3	5	48
>16	704	1.11	7.28	0	0	2	5	180
Annual income, \$1000								
<20	938	1.09	6.06	0	0	2	4	150
20-39	852	1.42	4.29	0	0	3	6	55
40-59	419	1.24	3.65	0	0	3	7	48
60-79	194	1.09	3.92	0	0	2	4	34
>80	207	1.82	12.95	0	0	3	5	180
Occupation								
Professional	1,315	1.31	6.31	0	0	3	5	180
Lower skilled worker	460	1.39	4.00	0	0	3	6	48
Student	787	0.89	3.46	0	0	2	4	70
Unemployed	32	2.66	7.05	0	0	6	18	34
Retired	103	2.32	14.84	0	0	3	5	150
Race/ethnicity								
White-American	728	0.96	3.14	0	0	2	5	48
Latino-American	683	1.42	6.80	0	0	3	6	150

	N	Mean	SD	Min	Median	90th	95th	Max
Asian-American	512	0.74	3.53	0	0	2	3	70
African American	445	2.11	9.84	0	0	4	8	180
Other ^a	348	1.12	3.76	0	0	2	5	45
Urbanicity								
Rural	130	1.20	3.40	0	0	4	5	30
Small town	378	1.13	7.95	0	0	2	4	150
Medium-sized city	690	1.12	3.56	0	0	3	5	55
Suburb	655	1.42	8.00	0	0	2	5	180
Downtown	831	1.28	4.55	0	0	3	6	70
Region of USA								
Northeast	405	0.82	3.22	0	0	2	3	50
Midwest	633	1.10	3.70	0	0	3	5	48
West	779	1.33	6.51	0	0	3	5	150
Southeast	873	1.48	7.38	0	0	3	6	180
Religion-of-origin								
Catholic	1,042	1.22	3.92	0	0	3	5	50
Protestant	564	1.38	8.60	0	0	2	4	180
Evangelical	283	1.20	2.76	0	0	4	6	23
Muslim	22	0.55	0.91	0	0	2	2	3
Jew	38	2.05	6.52	0	0	3	28	30
Atheist/agnostic	182	1.68	11.32	0	0	2	5	150
Other	518	0.97	3.79	0	0	2	5	70
Level of religiosity								
Low	786	1.40	6.75	0	0	3	5	150
Medium	1,729	1.13	5.44	0	0	3	5	180
High	181	1.44	5.49	0	0	2	5	48
Ever married to a woman								
No	2,512	1.14	4.79	0	0	3	5	150
Yes	180	2.43	13.83	0	0	4	8	180
Ever married to a man								
No	2,568	1.19	5.91	0	0	2	5	180

	<i>N</i>	Mean	SD	Min	Median	90th	95th	Max
Yes	123	1.85	4.66	0	0	4	8	34
Number of children								
None	2,569	1.10	3.79	0	0	3	5	70
One or more	144	3.92	19.71	0	0	5	9	180
Sexual orientation								
Gay/homosexual	1,758	1.28	5.85	0	0	3	5	180
Bisexual	948	1.87	5.93	0	0	2	4	150
Straight/heterosexual	4	0.00	0.00	0	0	0	0	0
Citizenship								
US citizen	2,341	1.27	6.13	0	0	3	5	180
Other	350	0.98	3.50	0	0	2	5	40
HIV status								
Positive	119	4.81	15.49	0	1	10	23	150
Other	2,578	1.07	4.93	0	0	2	4	180

^aIncludes native, biracial and multiracial/ethnic identified

Table 2

Bivariate comparison of mean and median unsafe sex partners met online and offline in last 90 days, by demographic characteristics

Demographic	Value	Mean partners met		Difference in means		Difference in medians	
		Online	Offline	P-value		P-value	
Total sample		0.823	0.427	<0.001		<0.001	
Age	18–24	0.721	0.325	0.008		<0.001	
	25–29	0.667	0.326	<0.001		<0.001	
	30–39	1.076	0.624	<0.001		<0.001	
	40–49	0.934	0.528	0.076		<0.007	
	50–59	0.661	0.548	0.743		0.582	
Years of education	60+	0.000	0.111	0.347		0.317	
	<12	0.897	0.500	0.267		0.924	
	12–15	0.937	0.440	0.002		<0.001	
	16	0.749	0.439	0.002		<0.001	
	>16	0.728	0.385	<0.001		<0.001	
Annual income (in \$ 1,000s)	<20	0.727	0.369	0.040		<0.001	
	20–39	0.937	0.487	<0.001		<0.001	
	40–59	0.842	0.407	0.003		0.001	
	60–79	0.720	0.3711	0.163		0.133	
	>80	1.126	0.699	0.083		0.113	
Occupation	Professional	0.819	0.490	<0.001		1.000	
	Lower skilled worker	0.960	0.429	<0.001		1.000	
	Student	0.569	0.327	0.004		1.000	
	Unemployed	1.875	0.781	0.408		0.519	
	Retired	1.981	0.340	0.264		0.827	
Race/ethnicity	White	0.690	0.276	<0.001		<0.001	
	Black	1.251	0.880	0.012		0.016	
	Latino	0.953	0.470	0.040		<0.001	
	Asian	0.551	0.195	0.004		<0.001	
	Other	0.701	0.424	0.135		0.033	
Urban/rural	Rural	0.685	0.519	0.495		0.115	
	Small town	0.817	0.317	0.220		0.011	

Demographic	Value	Mean partners met		Difference in means		Difference in medians	
		Online	Offline	P-value		P-value	
Region of USA	Medium-sized city	0.688	0.430	0.001		<0.001	
	Suburb	0.927	0.492	<0.001		<0.001	
	Downtown	0.873	0.413	<0.001		<0.001	
	Northeast	0.554	0.275	0.003		<0.001	
	Midwest	0.742	0.364	0.003		<0.001	
	West	0.920	0.417	0.021		<0.001	
Religion	Southeast	0.938	0.548	<0.001		<0.001	
	Catholic	0.761	0.459	<0.001		<0.001	
	Protestant	0.897	0.484	0.001		<0.004	
	Evangelical	0.788	0.418	0.002		<0.001	
	Muslim	0.409	0.136	0.083		0.046	
	Jewish	0.842	1.211	0.408		0.747	
	Atheist/Agnostic	1.440	0.243	0.160		<0.001	
	Other	0.663	0.350	0.032		<0.001	
	High	1.018	0.425	0.094		0.114	
Level of religiosity	Medium	0.688	0.448	<0.001		<0.001	
Number of children	Low	1.018	0.383	0.003		<0.001	
	None	0.709	0.392	<0.001		<0.001	
	One or more	2.861	1.063	0.098		<0.001	
Sexual orientation	Homosexual	0.853	0.432	<0.001		<0.001	
	Bisexual	0.770	0.420	0.053		0.002	
	Heterosexual	0.000	0.000				
Citizenship	US citizen	0.846	0.427	<0.001		<0.001	
HIV status	Other	0.553	0.435	0.066		<0.001	
	Positive	3.627	1.120	0.068		0.001	
	Other	0.682	0.389	<0.001		<0.001	

P-value from *t*-test of mean differences, unequal variances

P-value from Wilcoxon sign ranked test of median differences

Table 3

Negative-binomial multiple regression models predicting number of unprotected anal intercourse male sexual partners (UAIMP) in total, met online and met offline, last 90 days

Variable	Value	Total UAIMP N = 2,434	UAIMP met online N = 2,431	UAIMP met offline N = 2,429
Age	18–25	Ref.		
	26–29	1.047	1.153	0.961
	30–39	1.531 **	1.529 *	1.615 *
	40 or older	1.252	1.254	1.291
Education	<12 years	Ref.		
	12–15 years	0.991	1.015	1.011
	16 years	0.779	0.816	0.743
	16+ years	0.605	0.660	0.566
Income	<20,000	Ref.		
	20,001–40,000	1.418 *	1.531 **	1.147
	40,001–60,000	1.279	1.356	1.057
	60,001–80,000	0.852	0.858	0.684
	80,000 or more	1.449	1.462	1.314
Employment	Professionals	Ref.		
	Lower skilled	1.049	1.109	0.871
	Student	1.214	1.336	0.957
	Unemployed	1.748	1.161	2.055
	Retired	0.991	1.171	0.485 *
Race/ethnicity	White	Ref.		
	Latino	1.109	1.044	1.165
	African American	1.896 ***	1.479 *	2.808 ***
	Asian American	0.854	0.905	0.730
	Other	0.999	0.802	1.325
Urban/rural	Rural	Ref.		
	Small town	0.647	0.823	0.393 *
	Medium town/city	0.792	0.936	0.610
	Suburb	0.773	1.068	0.477
	Downtown metro	0.993	1.346	0.581
Census region of country	North East	Ref.		
	Midwest	1.639 **	1.645 *	1.410
	West/Northwest	1.653 **	1.652 *	1.582 *
	South/Southeast	1.775 **	1.817 **	1.650 *
Religion of origin	Catholic	Ref.		
	Protestant	0.958	1.058	0.823
	Evangelical	0.837	0.933	0.702
	Muslim, Jew, Other	0.986	0.960	0.961

Variable	Value	Total UAIMP N = 2,434	UAIMP met online N = 2,431	UAIMP met offline N = 2,429
Religiosity	Atheist/Agnostic	0.977	1.088	0.637
	Low	Ref.		
	Moderate	0.910	0.844	1.057
Has children	High	1.338	1.485	1.065
	No	Ref.		
	Yes	2.822 **	3.943 ***	1.225
Married to woman	No	Ref.		
	Yes	1.014	0.850	1.600
Married to man	No	Ref.		
	Yes	0.999	1.003	1.104
Sexuality	Homosexual	Ref.		
	Bisexual	1.134	1.373 *	0.889
Citizenship	No	Ref.		
	Yes	1.072	1.241	0.815
HIV positive	No	Ref.		
	Yes	3.748 ***	4.053 ***	2.575 ***
Log likelihood		-3,018.840	-2,365.376	-1,711.211
BIC		6,341.774	5,034.798	3,726.437

* $P < .05$;

** $P < .01$;

*** $P < .001$