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HIV Risk and the Internet: Results of the Men's INternet Sex (MINTS) Study

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Abstract

This study assessed the feasibility of online recruitment of high-risk Latino men who have sex with men (MSM) for HIV prevention survey research and investigated the relationship between Internet use and unsafe sex. Participants ($N=1,026$) were Internet-using Latino MSM living in the U.S. recruited using online banner advertisements. Respondents completed a cross-sectional, online survey in English or Spanish. Sample characteristics reflected national statistics within 5%. Nearly all (99%) reported having used the Internet to seek sex with another man. Two-thirds of respondents reported having unprotected anal sex with ≥ 1 man in the last year, 57% of these with multiple partners. Participants reported engaging in anal sex and unprotected anal sex with nearly twice as many men first met online versus offline, but risk proportions did not differ. Internet-based HIV prevention research is possible even with geographically-dispersed minority populations. Efficiency appears the primary risk associated with meeting partners online.

Keywords

HIV prevention; Internet sex; Latino; men who have sex with men; Men who use the Internet to seek Sex with Men; MSM

Introduction

In the U.S., men who have sex with men (MSM) remain the population at greatest risk for HIV (Centers for Disease Control and Prevention, 2005). Since 1995, increases in MSM's risk behavior have been reported across all races/ethnicities and age groups (Centers for Disease Control and Prevention, 2004, 2001a,b,c; Gross, 2003) Coincident with these increases is

MSM's burgeoning Internet use (Benotsch et al., 2000; Gross, 2003; Simon's 2000; Simmons-Mulryan/Nash, 2000). MSM were early adopters of the Internet, with a recent review concluding at least 35-45% of MSM now access the Internet to seek sexual partners (Liau, Millett and Marks, 2006). In the U.S., Gay.com, is easily the largest gay-oriented portal website, swamping all non-Internet gay venues combined. At most recent count, Gay.com reports 3 million members in the USA, with 6,000 new members per day (Meghan Latham, personal communication), and thus, represents a gay environment roughly the same size as the general population of Chicago, Boston or any of the larger US cities. From an HIV prevention risk perspective, it is urgent that we understand the demography and risk characteristics of this new gay environment.

Similar to bars, clubs, and organizations, the Internet can be considered a unique risk "environment" even if the sex occurs elsewhere (McFarlane et al., 2000; Ross et al., 2003). Although cybersex (virtual sex) poses no intrinsic risk of disease transmission, sex with partners met via the Internet may increase HIV/STD risk. In 2000, seven syphilis cases in San Francisco MSM were traced to an Internet chat room (Klausner et al., 2000); while others have reported HIV transmission cases in MSM who had met online (Tashima et al., 2003). A Denver STI clinic study identified Internet sex seekers as more likely to be MSM and to have more histories of STIs, sexual partners, HIV positive partners, and anal sex compared to non-Internet sex seeking men (McFarlane et al., 2000); while a San Francisco STI clinic study of Men who used the Internet to seek Sex with Men (MISM) reported significantly more receptive anal sex, less condom usage, and more rectal gonorrhea compared to MSM who did not seek sex online. MISM were also disproportionately Latino (Kim et al., 2000). However, both studies identified the Internet as an HIV risk for MISM using clinic-based populations, so it remains unclear from these studies whether it is some aspect of the Internet environment which increases risk, or whether the Internet is attracting those who engage in greater risk.

In response to reported correlations between being MISM and engaging in HIV risk behavior (Benotsch et al., 2000; Bull and McFarlane, 2000; Elford et al., 2000; Halkitis and Parsons, 2003; Reitmeijer et al., 2003) we initiated the Men's INternet Study (MINTS), a Web-based, cross-sectional study to investigate the dynamics of Internet use and HIV risk. We focused on Latino MSM – one of the highest HIV risk populations (Centers for Disease Control and Prevention, 2004; Díaz, 1998; Marín et al., 1998; Thometz et al., 2000) and one with identified cultural barriers to HIV prevention including machismo and negative conceptualizations of homosexuality (Díaz, 1998; Marín et al., 1998; Thometz et al. 2000; Seibt et al., 1995). When we began our research in 2002, only one report (from Sweden) had been published. This study used convenience samples collected online (N=716) and offline (N=678) to compare how samples of MSM differed (Ross et al., 2000). While an important first study, such a design is vulnerable to sampling bias, and the reliability and generalizability of these findings was unknown. Thus, our study had three aims:

First, to describe the sexual risk behavior of an Internet-based sample of Latino MSM. Non-Internet MSM samples typically identify 20-40% MSM as engaging in high risk sexual behavior within the last year (Centers for Disease Control and Prevention, 2001a,b). To examine whether our Internet sample was high risk, a priori we defined high-risk behavior as most (>50%) participants reporting unprotected anal sex with another man in the preceding 12 months (partner met online or offline); a high risk environment as > 25% of participants reporting unprotected anal sex with the last man they met for sex, online; and a high-risk sample by HIV risk co-factors (based on the Swedish study findings) as the majority of our participants being young (<30 years), single, sexually active with multiple partners (defined as engaging in anal sex with more than one male partner in the preceding 12 months), somewhat-to-totally closeted about their sexuality, not members of a gay organization; disproportionately (>33%)

bisexual or non-gay identified; under-tested for HIV (<70%), worried they were infected or had infected others (>33%), and wanting to discuss sex with an HIV expert (>33%).

Second, to investigate the relationship between the Internet as a risk environment and unsafe sex. Based on Bandura's (1994) principle of reciprocal determinism, risk behavior should be influenced by both "person" characteristics and "environmental" characteristics. To explore how person and environment characteristics may influence risk behavior, a priori, we hypothesized that if person characteristics were the main factor influencing risk behavior, then there should be no differences between sexual behavior with men met in different environments (online or offline). However, if environmental characteristics were the main factor influencing risk, significantly more unprotected anal sex partners (both numerically and proportionately) would be reported in online-compared to offline-mediated sexual liaisons (last 3 months).

Third, to assess the feasibility of online survey research of Internet-using Latino MSM, we sought to identify participants' language preferences and test protocols to confirm survey validity and uniqueness. As one of the first NIH-funded trials using the Internet, there appeared a clear need to assess the feasibility of conducting rigorous trials, which includes publishing demography, with bilingual samples, language preferences, and methodologies developed to confirm validity and uniqueness of subjects.

Methods

Participants

Participants were Internet-using Latino MSM, recruited November-December 2002 via banner advertisements in Spanish and English placed on Gay.com. At that time, Gay.com reported 2.56 million unique site visitors including 157,000 unique visitors on their Latino.gay.com subsite, monthly (Meghan Latham, personal communication). The site has sexually- and non-sexually-oriented components and chat rooms in English and Spanish. By clicking on the bilingual banner advertisements ("University of Minnesota Latino Men's Internet Sex Study, Click here and earn \$20"), potential participants were portalled to the study's welcome screen and requested to click "Continua en Español" or "Continue in English." Study eligibility was assessed by their responses ("yes/no") to six inclusion criteria: male, Latino, eighteen years or older, had had sex with at least one other man, a United States resident, and new to the survey. Criteria were cross verified: "Internet-use" was inherent, as the survey was exclusively offered online; "MSM" was validated by recruiting exclusively from sites targeting MSM and cross-validating survey responses on number of male sexual partners; "Latino" was verified using algorithms of subjects' and subjects' parents' countries of origin, measures of Spanish-English acculturation, and ethnic identification.

Informed consent was obtained using a "chunked" consent procedure (Shneiderman, 1987) approved by the University of Minnesota Institutional Review Board. Information describing the study, its risks and benefits, confidentiality, no deception, and how to contact the investigators were presented separately, followed by a "consent/do not consent" option. Potential participants were given the option of contacting the investigators before enrolling and browsing the study without participating. Enrollees indicated their preferred payment option (e-money, conventional check, donation to a named charity, or to decline payment).

Measures

Demographics—To study the characteristics of a Latino sample recruited online, the wording of demographic questions were taken from the Census (2000) for Hispanics. 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 response options

including either no Latino background or heritage divided into the three predominant areas of origin of Latinos in the USA (Mexico, Puerto Rico, Cuba, or other); income (“What is your annual income?” defined as amount of gross, pre-tax income earned in 2001, the year immediately predating the survey); and citizenship (“Are you a citizen of the United States?” with response options as listed in Table 1). State of residence and region of the USA were obtained indirectly by converting zip code of residence into these units. Age was asked by birthdate in the inclusion criteria and cross validated with age in years later in the survey. Education was asked as “years in school” defined as the “number of full years completed starting from grade 1” to ensure those who were educated in different countries (using different benchmarks) could answer this question. 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 Men who have Sex with Men, legal marital status categories from the Census (2000) were modified by adding “to/from a woman” to each response option. *Ethnic acculturation* was measured using 4 questions taken from the *Short Acculturation Scale for Hispanics* (Marín, Sabogal, Marín, Otero-Sabogal and Perez-Stable, 1987)

E-demographics or measures of Internet use would appear a critical mediating variable in online studies, however no standardized measures of Internet use in online samples exist. Counts of number of impressions of banner advertisements were obtained from Gay.com, while number of clicks onto our site, completes and incomplete surveys were automated. Experience in Internet use was investigated by asking “In what year did you first start using the Internet for any task?” while current computer usage was asked as follows: “Please think back over the last 7 days. Approximately how many hours did you spend in front of a computer that was connected to the Internet?” with response options separating “at work,” “at home,” and “at other places” measured in number of hours. Our computer program then calculated a total to ask, “Of the <<XX>> hours you spent actively using the Internet, how much of this time was spent on: “work and/or education related activities,” “sex related activities,” and “person activities (not related to work/education or sex, e.g. friends and family)” calculated in hours.

Sexual demographics—Sexual orientation was asked by adapting the 7-point Kinsey scale to measure behavior with the introduction “In the last 3 years, in terms of my sexual behavior, I have had sex with” with response anchors being “0 = only men,” “3 = equally men and women,” and “6 = only women.” 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 avoid possible response bias associated with the word homosexual in either English or Spanish. Sexual identity was asked directly (i.e., “I identify as:”) with response categories being “gay/homosexual,” “bisexual,” “straight/heterosexual,” and “other, please specify.”

Sexual risk measures—For the primary dependent variable, two questions were asked: “In the last 3 months, how many persons have you met via the internet/not via the internet with whom you had sex?” then “In the last 3 months, how many persons have you met via the internet/not via the internet with whom you had unprotected anal and/or vaginal sex?” Response categories were divided by males, females, transgender, and a none category. Total male partners was the summation of those met via the Internet plus those met not via the Internet. A computer algorithm randomized question presentation so that half received the questions on “via the Internet” first, while the other half received “not via the Internet” first.

To enable comparison between this study and the Ross et al.’s Swedish study described above, we reviewed English translations of the Swedish questions and adapted them as necessary for our study. Thus, screening questions for online and offline activities asked, “When was the last time you met a man on the Internet and later in person for sex?” with click buttons to denote

days, months or years and a separate response category listing “Never. I have never met a man for sex via the Internet” for the online sex inquiry and “Never. I have never met a man for sex (except possibly via the Internet)” for the offline question.

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 unprotected anal sex, 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.

Spanish Translation and Internet Adaptation of the Instrument

Survey items (455) were developed in English then forward- and back-translated into Spanish. Pilot testing established test-retest and bilingual equivalency. The survey was adapted for the Internet by a specialist in Web-human factors design. Pilot testing involved “black box” debugging (to verify that software is behaving according to specifications when provided with a range of input values) and “white box” debugging (which uses test cases that exercise each component and logic path through the system's internal design; see Beizer, 1990). The survey was designed so that participants could skip questions by clicking “refuse to answer.” After completion of each screen, the program checked for missed responses. If any were found, respondents were returned to the incomplete item before data were automatically forwarded to a server and the next screen presented. Most respondents spent 20-40 minutes completing the survey in one sitting.

De-duplication Protocol—To address validity concerns about repeat participation, we developed and applied a de-duplication protocol (Konstan et al., 2005). Key variables were checked to cross-validate eligibility criteria. Age/birth date, and zip code were cross-checked to verify reliability. IP address, IP stem, completion time, and start/end times were cross-referenced against other surveys to check for suspicious patterns. Discrepancies in key data, unusually fast completion times (< 12 minutes), or sequential survey completion patterns were flagged for further checks. Non-suspicious surveys were forwarded for payment. Prior to payment by check, names and addresses were compared to ensure unique participation. For e-payment, prior investigation checked unique email address while post-hoc investigation confirmed uniqueness using information from PayPal, which generates post-payment validation of each payment collected together with information on all related e-accounts. Whenever duplicates were identified, payment was halted (if possible), and secondary surveys were removed from the final database.

Analyses

We determined a priori to only analyze completed surveys (i.e., final question was answered). Participants had the option to “refuse to answer” any question (thus n's on items may differ slightly). Participants who reported never having sought male partners either online ($n=15$; <1%) or offline ($n=140$; 14%), were included in the general description of the sample (see Tables I-IV). However, they were excluded a priori from tests comparing sexual behavior across Internet and conventional environments, conducted using paired *t*-tests comparisons (see Results section). For each environment, a sexual risk ratio was computed by dividing the number of reported unprotected male sexual partners by the total male sexual partners, in the last 3 and 12 months, respectively. Multi-level logistic regression assessed, first, the contribution of person factors, second, the environmental factors' effects (while controlling for person factors) in predicting unsafe sexual behavior. Analyses reporting differences between HIV positive and non-HIV participants are reported separately (Carballo-Diéguez et al., in press).

Results

Recruitment

Over a three-week period, 47,495,771 advertising impressions yielded 33,024 (.07%) clicks to our Web site and 1,742 (5%) enrollments (Figure 1). The recruitment rate differed according to type of Web page ($\chi^2(3)=161.00$, $p<.001$): Click-through rates for chatrooms were 30,196 clicks from 42,857,487 banners (0.07%); for Personals, 2,294 clicks from 4,282,275 banners (0.05%); and for Run of Service (random site placement of banners), 534 clicks from 356,009 banners (0.15%).

Survey Validation

We rejected 124 (11%) of the 1150 completed surveys: 119 were identified as duplicates, and 5 were of suspect validity (not Latino or non-US residence). Eighteen surveys were retained despite being “first completions” by men who later submitted additional surveys (the duplicates, however, were excluded). Of the 1,026 (66%) surveys deemed valid and completed by unique persons, 161 (16%) were completed in Spanish, 865 (84%) in English. Participants resided in all U.S. states and territories – including Europe and Pacific Military zip codes – except Vermont, Virgin Islands, Non-Hawaiian Pacific Islands, and the Atlantic Military zip code. The MINTS sample approximated the 2000 U.S. Census for Hispanics on key demographics (Table I). Comparison of completers and non-completers (Ross et al., 2004), the exact validation and de-duplication criteria (Konstan et al., 2005), and an account of the vulnerability of Internet studies to one over-enthusiastic subject (Konstan et al., 2005) have been published separately.

Person Characteristics

Participants' demographic and psychosexual characteristics are summarized in Tables II and III. As predicted, most were young (63% < 30 years), HIV negative (94%), single (64%), behaviorally bisexual (51%), and not a member of a gay organization (62%). Nearly all (99%) had sought sex with a man online. Half (51%) reported being worried about HIV infection in the last year, and 34% wanted contact with an HIV expert. Against prediction, only 27% reported being somewhat-to-totally closeted about their sexuality, 16% identified as “bisexual” or “heterosexual,” and an unexpectedly high 83% reported having had an HIV test. Two thirds of the sample (645 of 975) reported having engaged in unprotected anal sex with men in the last 12 months.

Risk Behavior Characteristics in the Online Environment

For sex with men met *online* in the last 3 months, 339 of 797 participants (43%) reported unprotected anal intercourse with at least one man; 206 of these reporting unprotected anal intercourse with multiple (2-200) male partners. By comparison, for sex with men met *offline* in the last 3 months, 268 of 678 participants (40%) reported unprotected unprotected anal intercourse with at least one man; 139 of these reporting unprotected anal intercourse with multiple (2-46) male partners.

Internet Environment Characteristics

Only 15 participants (1%) reported never having sought sex with another man over the Internet. This prevented comparison with Internet sex seekers. The mean number of male partners with whom participants engaged in unprotected anal sex (last 3 months) was 2.0 (SD=9.3) for sexual contacts made via the Internet and 1.1 (SD=3.9) for other contacts, a significant difference ($t_{990}=3.2$; $p<.001$; $r=.29$; $p<.001$). Similarly, the mean number of all male partners with whom participants engaged in anal sex (last 3 months) was 5.8 (SD=11.0) for contacts via the Internet and 3.7 (SD=7.5) for other contacts ($t_{1009}=6.8$; $p<.001$; $r=.49$, $p<.001$). The proportion of total

male sex partners with whom participants reported engaging in unprotected anal sex was .26 (SD=.37) for partners met online and .25 (SD=.38) for partners met offline ($t_{554}=-.20$; ns).

To determine the relative effects of person and environmental variables on unsafe sex, we performed a bivariate logistic regression on a subsample of participants who had engaged in at least one incident of anal sex with a man in the last three months. Step 1, which involved entering person variables to predict whether participants had engaged in any unsafe sex with a man over the last 3 months, was significant, χ^2 ($N=694$, $df=8$)=46.7, $p<.001$, -2LL=915.3, $R^2=.065$; see Table IV. In step 2, entering the environmental variables significantly improved the fit of the model, χ^2 ($N=694$, $df=4$)=39.5, $p<.001$, -2LL=875.8, $R^2=.12$. This model is only marginally useful in predicting unsafe sex, in that using the complete model 64% of participants were correctly classified as either having had or not had unsafe sex. Seventy-one percent of those engaging in unsafe sex with a man were correctly classified, while only 57% of those not engaging in unsafe sex with a man in the last three months were correctly classified. As can be seen in Table IV, only higher total scores on the compulsive sexual behavior inventory scale and the amount of time seeking sex on the internet showed significant independent associations with unsafe sex. Therefore, we entered these two factors into a logistic regression and found that this two factor model predicted engaging in unsafe sex about as well as the complete model, χ^2 ($N=753$, $df=2$)=86.9, $p<.001$, -2LL=956.3, $R^2=.11$. Again, the model was only marginally useful in predicting unsafe sex. That is, 64% of participants were correctly classified as either having engaged in unsafe sex with a man or not, with 69% of those who had engaged in unsafe sex with a man correctly classified and 58% of those who had not engaged in unsafe sex correctly classified.

Discussion

This study advances our understanding of Internet-mediated sexual liaisons between men. In our sample of Latino MSM, nearly all (99%) reported having sought sex with another man over the Internet at least once. A striking 14% reported meeting men for sex exclusively via the Internet (Table III); this previously unidentified HIV/STI risk population, who appear only accessible online, warrants further study.

The primary factor fueling HIV/STI risk in online sexual liaisons is the high rate of unprotected sex reported by MSM: two-thirds reported at least one male partner with whom they had unprotected anal intercourse within the last 12 months, and over half of these reported unprotected anal sex with two or more partners. While our sample appears high risk based on most of the risk co-factors investigated, the primary way the Internet increases HIV/STI risk, at least for Latino MSM, is by enhancing *efficiency* of initiating sexual liaisons.

Using only the Internet, we successfully recruited a large, geographically diverse and high risk sample of Latino MSM (a group underrepresented historically in studies of MSM but at disproportionate risk for HIV). However, our analysis of the factors that predict sexual risk behavior provided only modest evidence that these specific person and environmental factors influence sexual risk behavior (Table IV).

Our results suggest it is important to consider where on a Web site recruitment takes place. Rate of recruitment was inversely proportional to the Web page interactivity or sexual explicitness, with run-of-service ads most successful and chatrooms least successful. Online environments may mirror other high risk environments such as bathhouses, where study recruitment is more successful when it is less prone to disturbing conversations or proximal to sexual negotiation.

We observed a high degree of consistency between the U.S. Census data for Hispanics and our convenience sample. Rankings matched for the top four countries of heritage and top six states

of residence. For racial identification, the sample characteristics reflected national statistics within 5%. We appear to have recruited disproportionately more MSM from the Midwest, less from the West and Northeast. It is unknown if this reflects a genuine difference between the distribution of Latino MSM and all Latinos, a difference between Internet-using and non-Internet using Latino MSM, the impact of the study sponsor being located in the Midwest, bias, or some combination of factors. Of note, this study accessed men normally precluded from participation; including Latino MSM who by zip code were on active military duty in the Pacific and Europe.

Similar to marketing surveys of online Latino populations (Pongritz et al., 1999), most Latino MSM in this study chose to answer the survey in English. This is consistent with our sample demographics; 70% were born in the U.S., and 66% reported being dominant/exclusive English speakers.

Although not unique to online studies, subject validity is perhaps more challenging in online than conventional studies. In MINTS, we addressed this challenge in three ways. First, where possible, we made participation contingent on performance. By only offering the study online, we ensure all subjects are “Internet users.” Second, recruiting from websites catering exclusively to the subject population yields a low probability of non-eligible subjects entering the study. Third, in addition to questions on inclusion and exclusion criteria during enrollment, we developed cross-validation protocols based on survey responses. Thus, for “Latino,” we placed early in the survey, questions on language, acculturation, ethnic identification, country of origin, and parental heritage that were checked for internal consistency; for “MSM,” participants had to report in different parts of the survey, both being male and having male sex partners.

In Internet-based research, representative sampling is a standard of rigor currently beyond the state of research; hence, we recruited a convenience sample. The lack of comparative MSM Internet-based studies prevents us from estimating how typical or atypical this sample is of the Internet-using Latino MSM population. As studies report in detail the demographic and sexual characteristics of MSM, we trust a picture of what a typical Internet MSM sample looks like will emerge. Comparison of this sampling frame with two other studies of Internet-using MSM in Sweden (Ross et al., 2000, 2005) indicate common characteristics, including all three samples being young, students, well educated, and non-monogamous. However, other previously reported findings were not replicated in this US-based sample, for example, most men reported being “out” about their sexuality and tested for HIV. We recommend that future research focus on determining the generalizability of findings from this and similar studies, for example across country and race/ethnicity, their temporal stability, and their implications for development of online interventions.

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