Published in final edited form as:

AIDS Behav. 2014 October ; 18(10): 2030–2039. doi:10.1007/s10461-014-0787-y.

Socialization Patterns and Their Association with Unprotected Anal Intercourse, HIV, and Syphilis Among High-Risk Men Who Have Sex with Men and Transgender Women in Peru

MC Verre¹, J Peinado², ER Segura¹, JC Clark¹, P Gonzales², C Benites², R Cabello³, J Sanchez², and JR Lama²

¹University of California, Los Angeles Geffen School of Medicine

²Asociacion Civil Impacta Salud y Educacion

³Asociacion Civil Via Libre

Abstract

The association of socialization patterns with unprotected anal intercourse (UAI) and HIV/STI prevalence remains underexplored in men who have sex with men (MSM) and transgender women (TW) in developing country settings. We evaluated the correlation of UAI, HIV, and syphilis with MSM/TW venue attendance and social network size among high-risk MSM and TW in Peru according to self-reported sexual identity. Frequency of venue attendance and MSM/TW social network size were lowest among heterosexual MSM and highest among TW respondents. Attendance (frequent or occasional) at MSM/TW venues was associated with increased odds of insertive UAI among heterosexual participants. Frequent venue attendance was associated with increased odds of receptive UAI among gay/homosexual, bisexual, and TW participants. Further investigation of the differing socialization patterns and associations with HIV/STI transmission within subgroups of Peruvian MSM and TW will enable more effective prevention interventions for these populations.

Keywords

Men who have sex with men; transgender women; unprotected anal intercourse; HIV; socialization patterns

INTRODUCTION

Men who have sex with men (MSM) and transgender women (TW) in Peru are disproportionately affected by HIV and other sexually transmitted infections (STIs). HIV prevalence remains high within these populations (approaching 18% in MSM and 33% in TW) despite numerous governmental and non-governmental organization-funded targeted initiatives. (1–3) Developing new approaches to controlling the HIV epidemic in Peru

requires a thorough understanding of the many factors influencing disease transmission, including the socialization patterns of at-risk individuals within the affected populations.

Given the interpersonal spread of HIV and STIs, there has been considerable interest in mapping sexual and social networks involved in disease transmission. (4) Network structure has been shown to have considerable influence on infectious disease transmission within a population. (5) Key contact tracing projects (6, 7) have used both sociometric and egocentric network analysis to describe risk factors for acquiring HIV/STIs, and network-based interventions have been identified as capable of reducing transmission. (8,9) Recording an individual's number of MSM social contacts (10, 11) can help to predict their risk for sexual risk behavior and HIV acquisition (12), and has been explored in situations where obtaining sexual network data is not feasible. Evaluating the venues where people report meeting sexual partners has also been described as a way to capture indirect, yet valuable, information on social and sexual networks. (13, 14) Utilizing measures that draw from both social network and venue-based socialization patterns can help to assess comprehensive patterns of sexual and social interaction and their implications for HIV/STI transmission among MSM and TW.

Currently little is known about socialization among MSM and TW in Peru. Knowledge of the link between sexual risk behavior, HIV/STI prevalence, and socialization in MSM/TW communities, as measured by venue attendance and social network size, can help to refine definitions of target populations for prevention research, trace patterns of behavioral influence and disease transmission within MSM/TW sub-populations, and provide a roadmap for the application of future, context-specific prevention interventions. In this study we assessed whether there was an association between high-risk sexual behavior (insertive and/or receptive unprotected anal intercourse [UAI]), HIV, and syphilis infection with (i) the frequency of attendance at MSM/TW venues and (ii) size of MSM/TW social networks in order to investigate the association between these measures of socialization and HIV/STI transmission among Peruvian MSM and TW.

METHODS

Study design

We conducted a secondary analysis of data collected during a cross-sectional, sentinel surveillance survey of HIV and STIs among MSM and TW in the Peruvian cities of Lima (including neighboring Callao), Ica, Iquitos, Piura, and Pucallpa between June and November 2011. (15) Sentinel surveillance studies have been conducted with MSM and TW at high risk for infection in Peru at periodic intervals since 1996 to assess emerging national trends in the HIV and STI epidemics. (2)

Participant selection

A convenience sample of high-risk MSM and TW was recruited through referrals by individuals already participating in the study, and outreach by recruiters and peer educators (*promotores*) representing diverse subcultures of MSM and TW in the cities where the study was implemented. The recruiters and peer educators visited different and previously-mapped

venues (including saunas, pornographic movie theaters, pornographic video arcades, prostitution areas, discotheques, bars, beauty parlors, transvestite houses, MSM- and TW-specific sport events, and others) to contact potential participants and to refer them to the study clinics acting as sentinel sites. To refer participants, recruiters and peer educators used diverse methods, including posters, flyers, and informational meetings, depending on where recruitment activities were conducted. Potential participants were then referred to study sites for eligibility screening, informed consent, and enrollment. Condoms, lubricant packets, and money to cover transportation costs (approximately \$4 USD in local currency) were provided as reimbursement for participation.

Enrollment was limited to anatomically born males 18 years old who met the following inclusion criteria: anal or oral intercourse with one or more male or TW partner during the preceding 12 months; self-reported HIV-negative or unaware of their HIV serostatus, with their most recent HIV test at least twelve months before study participation; and who reported at least one of the following HIV acquisition risk factors: (i) no condom use in the last anal intercourse, (ii) anal intercourse with more than 5 sex partners in the preceding 6 months, (iii) self-identification as a sex worker, (iv) STI diagnosis in the preceding 6 months, or (v) an HIV-positive male or TW partner.

Individuals were excluded from participating if they were HIV-positive by self-report or were determined to have a psychiatric or mental condition that could impair their ability to provide informed consent.

Data collection

All participants provided anonymous survey responses using a computer assisted self-interview (CASI) program. Survey data used for our analyses included sections covering basic demographics, self-reported sexual identity and role, sexual behavior with men and women, and social network characteristics. Rapid and confirmatory tests determined HIV and syphilis serostatus (Determine HIV-1/2 Rapid Antibody Test, Abbott Diagnostics, Abbott Park, IL, USA; Western blot, Biorad Laboratories, Hercules, CA, USA; RPR and MHA-TP, Organon Teknika, Durham, NC, USA).

The National Strategy for Control of Sexually Transmitted Infections and AIDS (*Estrategia Sanitaria Nacional de Control de Infecciones de Transmisión Sexual y SIDA*) at the Peruvian Ministry of Health and the institutional bioethics committees at public health organizations Asociación Civil Impacta Salud y Educación and Vía Libre approved the surveillance protocol, informed consent forms, and recruitment materials. This secondary analysis of previously collected, de-identified data was exempt from review by the University of California, Los Angeles Office of Human Research Protection Program.

Outcomes and variables

Our analysis considered four distinct binary primary outcomes: self-report of i) insertive and/or ii) receptive unprotected anal intercourse, and laboratory diagnosis of iii) HIV and/or iv) syphilis. The insertive and receptive UAI variables were created based on a non-zero response concerning the number of episodes of unprotected insertive or receptive anal

intercourse with a male or TW in the previous 3 months. Participants not reporting any sexual contact in the previous 3 months (including but not limited to anal intercourse) were not asked about UAI and excluded from the analyses involving the behavioral outcomes. HIV infection was diagnosed by rapid test screening with confirmatory Western Blot analysis. Diagnosis of syphilis was limited to participants with an RPR 1:16 and positive MHA-TP.

We assessed the associations of the four behavioral and biological outcomes with two measures of socialization with MSM/TW communities. Attendance at MSM/TW venues was determined by the response to the question “In the last 6 months, how frequently have you gone out to socialize with other MSM and/or transgender women (e.g. to bars, discotecas, parties, parks, theaters, bathhouses or other public places)?” We converted participant responses to one of three categories: Never; Occasional attendance (“Every 6 months,” “Every 2–3 months,” or “Every month”); or Frequent attendance (“Every week” or “Every day”). Social network size was analyzed as a continuous variable based on participant report of the number of MSM/TW (“whether friends, partners, hook-ups, brothers, cousins, neighbors, etc”) with whom they had recently been in contact: “With how many [of these MSM or TW] have you communicated in the past 6 months (whether in person, by phone, or by email)?”

Analyses were stratified according to participants’ self-reported sexual identity due to previously described differences in sexual risk behavior and HIV/STI prevalence between subgroups of MSM and TW. (2)

Statistical analysis

We analyzed the association between venue attendance and social network size with each of the four main outcomes (insertive UAI, receptive UAI, HIV, and syphilis), stratified by sexual identity group. For venue attendance we used a Chi-square test for proportion trends to evaluate associations between increasing venue attendance and each outcome. For social network size we performed the Wilcoxon-Mann-Whitney test to compare differences in median and distribution (reported as interquartile range, IQR) of the continuous variable.

To assess the strength of association between the outcomes and exposure variables, adjusted odds ratios (AOR) with 95% confidence intervals (CI) were computed using multivariate logistic regression. Prior to performing the multivariate analysis, we developed a conceptual justification for adjusting for the exposure variables and covariates (city, age, commercial sex involvement, and primary anal sexual role) in all of our models, even if they did not meet significance in bivariate analyses. Commercial sex involvement was defined as reporting either giving or receiving “money, gifts, favors, or a place to sleep in exchange for anal sex” with a man or transgender woman in the past 6 months. Sexual identity was used to stratify the models and therefore not included as a covariate. All data analyses consider a two-sided p -value of <0.05 to be statistically significant, and were conducted using Stata 12.1 (College Station, TX, USA).

RESULTS

Participant characteristics

Our analysis included all of the 5,148 Peruvian MSM and TW who participated in the 2011 Sentinel Surveillance. A total of 2,277 participants (44.4%) self-identified as gay/homosexual, 1,504 (29.3%) as bisexual, 631 (12.3%) as heterosexual, and 714 (13.9%) as transgender. The reported primary anal sexual role was insertive (“*activo*”) for 1,990 (38.8%), receptive (“*pasivo*”) for 1,756 (34.3%), and both insertive and receptive (“*moderno/versatil*”) for 1,380 (26.9%). More than half (2,760; 53.6%) of participants lived in the Lima/Callao region. Table I displays the participant characteristics, outcomes, and socialization patterns by city.

Socialization patterns

Overall, 878 (17.2%) participants reported never attending MSM/TW venues, while 1,766 (34.6%) attended occasionally (once per month or less) and 2,455 (48.2%) frequently (once per week or more) in the past 6 months. Heterosexually-identified participants had the highest proportion that reported never attending MSM/TW venues (31.7%), and the lowest proportion reporting frequent attendance (30.1%). Transgender women attended venues the most, with 61.6% reporting frequent attendance and 11.7% never attending (Figure 1).

The median MSM/TW social network consisted of 5 people (IQR 2–12). Transgender women had the largest networks (median 10, IQR 2–20), and heterosexual MSM the smallest (median 3, IQR 1–6) (Figure 2). Network sizes were larger with increasing venue attendance, so that never-attenders reported the smallest number of contacts (median 2, IQR 0–5), followed by occasional-attenders (median 5, IQR 2–10), and frequent-attenders (median 9, IQR 3–20).

Behavioral and biological outcomes

Among the 3,722 participants reporting sexual relations with men or TW in the past 3 months (72.3% of the total sample), 1,990 (53.5%) reported insertive and 2,052 (55.1%) receptive UAI. The seroprevalences of HIV and syphilis in the overall sample were 8.2% (420/5148) and 5.1% (261/5101) respectively.

The 1,426 (27.7%) participants excluded from the insertive and receptive UAI analyses for reporting no sexual relations with men or TW in the past 3 months differed from the included participants in several ways. Reporting recent sexual activity with another male or TW was associated with more frequent venue attendance (Frequent: 53.4% vs. 36.8%; Occasional: 36.5% vs. 29.6%; Never: 11.1% vs. 33.6%, $p < 0.001$), HIV (8.6% vs 6.8%, $p = 0.030$) and syphilis (5.6% vs. 3.9% $p = 0.014$) seropositivity (compared using Chi-square test). The participants reporting sexual activity with MSM/TW in the past 3 months also had significantly larger median social network size (6, IQR 3–15 vs. 2, IQR 0–6, $p < 0.001$; Wilcoxon-Mann-Whitney test).

Associations between socialization patterns and UAI, HIV, and syphilis

When analyzing the associations between each outcome and the exposure variables, different patterns emerged between the four sexual identity subgroups (Table II). The Chi-square trend of venue attendance was significantly associated with HIV and receptive UAI in the gay/homosexual group, whereas venue attendance was only associated with receptive UAI in the bisexual and TW samples. Venue attendance was not significantly associated with any outcome among heterosexual participants.

Association of social network size with behavioral factors varied between the different sexual identity subgroups. Within the gay/homosexual and TW groups, participants reporting insertive UAI had smaller networks than those who did not. For bisexual participants, receptive UAI was associated with a larger network. The only statistically significant association between network size and biological outcomes was found among the bisexual subgroup, in which HIV-positive participants had a larger median network size than their HIV-negative counterparts.

Multivariate logistic regression

After adjusting for the exposure variables (venue attendance and social network size) and covariates (age, city, commercial sex involvement, education level, and primary anal sexual role) in multivariate logistic regression, several associations between behavioral and biological outcomes and socialization patterns became apparent (Table III).

Among the heterosexual subgroup, any attendance at MSM/TW venues was associated with an increased likelihood of insertive UAI. Occasional (AOR 3.51, 95%CI [1.60–7.70], $p = 0.002$) and frequent (AOR 3.14, 95%CI [1.43–6.87], $p = 0.004$) venue attenders were more likely to report insertive UAI when compared to non-attenders. For gay/homosexual respondents, occasional attendance was associated with a decrease in insertive UAI (AOR 0.54, 95%CI [0.35–0.82], $p = 0.004$), while frequent attendance suggested the same but did not meet significance. Frequent venue attendance was associated with increased odds of receptive UAI among gay/homosexual (AOR 1.76, 95%CI [1.19–2.61], $p = 0.005$), bisexual (AOR 2.16, 95%CI [1.35–3.45], $p = 0.001$), and TW (AOR 2.47, 95%CI [1.26–4.86], $p = 0.009$) participants.

Social network size was significantly associated with HIV infection among bisexual participants, with an increased odds of HIV (AOR 1.011, 95%CI [1.002–1.021], $p = 0.019$) for each additional reported social network member.

DISCUSSION

Our study aimed to describe MSM/TW venue attendance and social network size among Peruvian MSM and TW and explore the associations of these socialization patterns with insertive and receptive UAI, and HIV and syphilis prevalence. We found that the patterns varied considerably by self-reported sexual identity subgroup, with TW and heterosexual-identified MSM having the greatest and the lowest degrees of socialization, respectively. Prior work in Peru has shown that a complex combination of sexual identities (gay/homosexual, bisexual, or heterosexual) and sexual roles (insertive, receptive, or both) (16,

17) shape sexual behaviors, HIV/STI burdens, and rates of disease transmission. (18) Our analysis expands this understanding by demonstrating that MSM and TW populations are also heterogeneous in venue attendance and social network size, and that patterns of socialization are associated with sexual risk behavior and HIV/STI prevalence in different ways within these distinct MSM subgroups and TW.

Attending MSM/TW venues carried higher risk of UAI within each of the four sexual identities. The most marked result was among heterosexual-identified participants, for whom both frequent and occasional venue attendance in the past 6 months was associated with a greater than 3-fold increase in the odds of reporting insertive UAI compared with never-attenders. Venue attendance could influence insertive UAI risk in this population through an association between increased attendance at MSM/TW venues and increased frequency of intercourse with male or transgender partners. It is important to note, however, that our variables consider only *unprotected* anal intercourse as a sexual risk behavior, and are not a general marker for all sexual activity with male or TW partners. Interestingly, venue attendance had the opposite association among self-identified gay/homosexual MSM, in that participants who were occasional attenders were *less* likely to report recent insertive UAI than non-attenders. The reason for this association is unclear but may result from increased exposure to HIV/STI prevention efforts (such as promotion of condom use) among gay-identified MSM with strong community ties. (16, 19). That gay/homosexual-identified MSM and TW participants reporting insertive UAI had *smaller* social networks is noteworthy, and may reflect the fact that insertive UAI is less common among these identities (17) and is therefore practiced more frequently by individuals with a decreased connection to gay or trans communities who are less likely to share their sexual norms. (20)

For the two biological outcomes, only HIV seropositivity was associated with MSM/TW social network size among bisexual MSM. The increase in OR was very small, reflecting the slight incremental increase (1.1%) in odds of having HIV per additional social network member, and the analyses were not originally designed to detect this association. Venue attendance was not associated with HIV or syphilis prevalence for any of the sexual identities. While it is not immediately clear from our data why the results were statistically significant only for HIV in the bisexual subgroup, it may be due to the fact that the socializing factors we considered are closer to sexual risk behavior (UAI) than to the biological outcome of infection in the causal chain of HIV/STI transmission. (21)

Taken together, our results provide a preliminary understanding of MSM/TW socialization patterns that could have important implications for network-based HIV/STI prevention efforts. Social network-based behavioral change programs have been effective for reduction in sexual risk behavior in some studies (8, 22) but had no observable impact when applied to the Peruvian context. (23) Improved understanding of how socialization patterns influence risk behavior and the spread of HIV/STIs in local contexts will help in the development and refinement of interventions tailored to local circumstances. For non-gay identified MSM (heterosexual and bisexual subgroups), there is a question of whether socialization with gay/homosexual MSM and TW improves knowledge of behavioral risk reduction (due to educational efforts directed to MSM and TW communities) or increases their risk of

infection (due to increased likelihood of exposure to HIV/STIs through sexual contact with men or TW).

More research is necessary to determine the most effective ways to design interventions that make use of differential risks based on sexual identities and socialization patterns. Venue attendance and social network size are only two aspects of social interaction, and future work should expand upon the differing forms of network formation and socialization within subgroups of MSM and TW. Furthermore, the Internet has been implicated in increased MSM venue attendance (24, 25) and it would be important to understand the relationships between online and “real-life” socialization patterns.

Limitations

The present study has several limitations, including the inherent biases of self-reported survey data and a cross-sectional, secondary analysis design. Most importantly, the variables of venue attendance and social network size are very non-specific. We attempted to use the most appropriate items available from the sentinel surveillance survey, but recognize that some topics need clarification in forthcoming studies. For example, our data did not distinguish between sexual and non-sexual contacts (or clients and non-clients), attempt to qualify the strength of other relationships (such as friends or relatives), or consider the role of neighborhood. This imprecision may explain why we found social network size to have only minimal associations with our outcomes of interest, and limits any conclusions drawn about network size from our analyses. Questions covering venue attendance would be improved by specifying the venue type (gay bars, discos, pornographic theaters, bathhouses, public cruising sites, etc.) as location can be associated with different risk behaviors. (26) The primary motivation for visiting the venue (searching for an anonymous sexual partner, going out to see friends, getting drunk/high, etc.) might also be an important risk factor that was not explicitly asked in our MSM/TW populations. It would have also been interesting to evaluate and control for the effect of recruitment site, had these data been recorded.

It is important to note that the study’s findings cannot be generalized to the overall Peruvian MSM and TW populations. Given the eligibility criteria, the study sample represents MSM and TW with high-risk sexual behavior and who are unaware of their HIV serostatus. The fact that some recruitment took place at MSM/TW venues likely influenced the socialization patterns of the sample by preferentially reaching individuals who attend venues more frequently and/or have larger social networks. The exclusion of self-reported known HIV-positive individuals introduces an additional bias to the study population and therefore any conclusions cannot include high-risk MSM/TW who are unaware of their HIV status or address possible modifications in socialization patterns after seroconversion. Furthermore, convenience-based sampling was conducted. Although all surveys followed standard guidelines and recruited large samples of diverse participants representing the diverse MSM and TW subcultures in Peru, sampling may have been biased by the recruiters’ knowledge of, and access to, different subgroups of MSM and TW. This is reflected in the variable study population composition based on self-reported sexual identity across cities (Table I). Lastly, the analyses involving insertive and receptive UAI required could not include participants who denied having sexual activity with men or TW in the past 3 months, a sub-

population with significantly different socialization patterns, and HIV and syphilis prevalences.

CONCLUSIONS

Socialization patterns differ between subgroups of high-risk MSM and TW. Attending an MSM/TW venue was associated with increased risk of insertive UAI among heterosexual-identified MSM, and receptive UAI among gay/homosexual, bisexual, and TW subgroups. Bisexual-identified MSM with larger MSM/TW social networks had higher odds of testing positive for HIV for each additional network member. The results suggest that increased connection to MSM/TW communities plays a role in sexual risk behaviors and possibly disease prevalence, but that the effects vary depending on sexual identity. More research is needed to understand the connection between socialization patterns and HIV/STI transmission in order to develop more effective context-specific interventions for these populations.

REFERENCES

1. Peru: epidemiological fact sheet on HIV and AIDS – core data on epidemiology and response, 2008 update. Geneva: UNAIDS;
2. Sanchez J, Lama JR, Kusunoki L, et al. HIV-1, sexually transmitted infections, and sexual behavior trends among men who have sex with men in Lima, Peru. *J Acquir Immune Defic Syndr*. 2007 Apr 15; 44(5):578–585. [PubMed: 17279049]
3. Silva-Santisteban A, Raymond HF, Salazar X, et al. Understanding the HIV/AIDS epidemic in transgender women of Lima, Peru: results from a sero-epidemiologic study using respondent driven sampling. *AIDS Behav*. 2012 May; 16(4):872–881. [PubMed: 21983694]
4. Klov Dahl ASA. Social networks and the spread of infectious diseases: the AIDS example. *Soc Sci Med*. 1985; 21(11):1203–1216. [PubMed: 3006260]
5. Smith AMA. Associations between the sexual behaviour of men who have sex with men and the structure and composition of their social networks. *Sex Transm Infect*. 2004 Dec; 80(6):455–458. [PubMed: 15572613]
6. Klov Dahl AS, Potterat JJ, Woodhouse DE, Muth JB, Muth SQ, Darrow WW. Social networks and infectious disease: the Colorado Springs study. *Soc Sci Med*. 1994 Jan; 38(1):79–88. [PubMed: 8146718]
7. Friedman SR, Neaigus A, Jose B, et al. Sociometric risk networks and risk for HIV infection. *Am J Public Health*. 1997 Aug; 87(8):1289–1296. [PubMed: 9279263]
8. Amirkhanian YA, Kelly JA, Kabakchieva E, et al. A randomized social network HIV prevention trial with young men who have sex with men in Russia and Bulgaria. *AIDS*. 2005 Nov; 19(16): 1897–1905. [PubMed: 16227798]
9. Wohlfeiler D, Potterat JJ. Using gay men's sexual networks to reduce sexually transmitted disease (STD)/human immunodeficiency virus (HIV) transmission. *Sex Transm Dis*. 2005 Oct; 32(10 Suppl):S48–S52. [PubMed: 16205293]
10. Youm Y, Laumann EO. Social network effects on the transmission of sexually transmitted diseases. *Sex Transm Dis*. 2002 Nov; 29(11):689–697. [PubMed: 12438906]
11. Drumright LN, Frost SDW. Rapid social network assessment for predicting HIV and STI risk among men attending bars and clubs in San Diego, California. *Sex Transm Infect*. 2010 Dec. 86 Suppl 3:iii17–iii23. [PubMed: 20966457]
12. Schneider JA, Cornwell B, Ostrow D, et al. Network mixing and network influences most linked to HIV infection and risk behavior in the HIV epidemic among black men who have sex with men. *Am J Public Health*. 2013 Jan; 103(1):e28–e36. [PubMed: 23153147]

13. Frost SDW. Using sexual affiliation networks to describe the sexual structure of a population. *Sex Transm Infect.* 2007 Aug;(83 Suppl 1):i37–i42. [PubMed: 17664363]
14. Latkin C, Yang C, Tobin K, Roebuck G, Spikes P, Patterson J. Social network predictors of disclosure of MSM behavior and HIV-positive serostatus among African American MSM in Baltimore, Maryland. *AIDS Behav.* 2012 Apr; 16(3):535–542. [PubMed: 21811844]
15. Sanchez, JL.; Peinado, JE.; Lama, JR. Estudio de vigilancia epidemiológica de ITS y VIH en hombres que tienen sexo con hombres comparando las metodologías de reclutamiento: muestreo por conveniencia, muestreo por tiempo y espacio y muestreo dirigido por participantes. Lima (Peru): Coordinadora Nacional Multisectorial en Salud; 2011 Nov. Final Report. Sponsored by the Global Fund to Fight AIDS, Tuberculosis and Malaria. Available from: http://www.care.org.pe/websites/fondomundial/CERRANDOBRECHAS/PDFsEstudios/VIH/VC11_InformeFinal_28Nov11.pdf
16. Clark J, Salvatierra J, Segura E, et al. Moderno love: sexual role-based identities and HIV/STI prevention among men who have sex with men in Lima, Peru. *AIDS Behav.* 2013 May; 17(4): 1313–1328. [PubMed: 22614747]
17. Goodreau SM, Goicochea LP, Sanchez J. Sexual role and transmission of HIV Type 1 among men who have sex with men, in Peru. *J Infect Dis.* 2005 Feb; 1(191 Suppl 1):S147–S58. [PubMed: 15627225]
18. Vittinghoff E, Douglas J, Judon F, McKim D, MacQueen K, Buchinder SP. Per-contact risk of human immunodeficiency virus transmission between male sexual partners. *Am J Epidemiol.* 1999 Aug 1; 150(3):306–311. [PubMed: 10430236]
19. MINSA [Peruvian Ministry of Health]. Informe nacional sobre los progresos realizados en el país Perú: período enero 2010-diciembre 2011 [National report on progress made in the country Peru: January 2010-December 2011]. Presented 27 Apr 2012.
20. Kraft JM, Beeker C, Stokes JP, Peterson JL. Finding the “community” in community-level HIV/AIDS interventions: formative research with young African American men who have sex with men. *Health Educ Behav.* 2000 Aug; 27(4):430–441. [PubMed: 10929751]
21. Chapter two: Defining and assessing risks to health. *World Health Report 2002: Reducing risks, promoting healthy life.* Geneva: World Health Organization; 2002.
22. Kelly JA, Murphy DA, Sikkema KJ, et al. Randomised, controlled, community-level HIV-prevention intervention for sexual-risk behaviour among homosexual men in US cities. *Lancet.* 1997 Nov 22; 350(9090):1500–1505. [PubMed: 9388397]
23. NIMH Collaborative HIV/STD Prevention Trial Group. Results of the NIMH collaborative HIV/sexually transmitted disease prevention trial of a community popular opinion leader intervention. *J Acquir Immune Defic Syndr.* 2010 Jun; 54(2):204–214. [PubMed: 20354444]
24. Garofalo R, Herrick A, Mustanski BS, Donenberg GR. Tip of the Iceberg: young men who have sex with men, the Internet, and HIV risk. *Am J Public Health.* 2007 Jun; 97(6):1113–1117. [PubMed: 17463378]
25. Downing MJ. Using the internet in pursuit of public sexual encounters: is frequency of use associated with risk behavior among MSM? *Am J Mens Health.* 2012 Jan; 6(1):18–27. [PubMed: 21659354]
26. Binson D, Woods WJ, Pollack L, Paul J, Stall R, Catania JA. Differential HIV risk in bathhouses and public cruising areas. *Am J Public Health.* 2001 Sep; 91(9):1482–1486. [PubMed: 11527785]

Figure 1.
Venue attendance by sexual identity

Figure 2.
Social network size by sexual identity: Median and IQR

Table 1

Participant demographics, outcomes, and socialization patterns by city

N (%)	Lima/Callao	Ica	Iquitos	Piura	Pucallpa	Total
	2760 (53.6)	596 (11.6)	597 (11.6)	598 (11.6)	597 (11.6)	5148 (100)
Age ^a	26 (21–33)	24 (19–32)	24 (20–31)	29 (23–37)	24 (20–30)	26 (21–33)
Education						
None	15 (0.55)	6 (1.0)	1 (0.2)	24 (4.0)	0 (0)	46 (0.9)
1–6 yrs	537 (19.5)	47 (7.9)	38 (6.4)	135 (22.6)	30 (5.0)	787 (15.3)
7–11 yrs	1,175 (42.7)	278 (46.7)	404 (67.7)	273 (45.7)	354 (59.3)	2,484 (48.4)
> 11 yrs	1,023 (37.2)	264 (44.4)	154 (25.8)	166 (27.8)	213 (35.7)	1,820 (35.4)
Monthly income ^b	200 (147–312)	183 (110–275)	100 (51–183)	194 (110–294)	220 (147–294)	220 (110–294)
Sexual identity						
Heterosexual	244 (8.9)	18 (3.0)	122 (20.4)	184 (30.8)	63 (10.6)	631 (12.3)
Bisexual	886 (32.3)	164 (27.7)	118 (19.8)	167 (27.9)	169 (28.3)	1,504 (29.3)
Gay/Homosexual	1,163 (42.4)	327 (55.2)	320 (53.6)	194 (32.4)	273 (45.7)	2,277 (44.4)
Transgender	449 (16.4)	83 (14.0)	37 (6.2)	53 (8.9)	92 (15.4)	714 (13.9)
Primary anal sexual role						
Insertive	1,010 (36.8)	189 (31.9)	253 (42.4)	367 (61.4)	171 (28.6)	1990 (38.8)
Receptive	833 (30.4)	197 (33.3)	277 (46.4)	156 (26.1)	293 (49.1)	1756 (34.3)
Both	899 (32.8)	206 (34.8)	67 (11.2)	75 (12.5)	133 (22.3)	1380 (26.9)
Outcomes						
Insertive UA ^c	1327 (62.9)	247 (49.3)	98 (35.3)	143 (43.5)	175 (34.8)	1990 (53.5)
Receptive UA ^c	1168 (55.3)	265 (52.9)	161 (57.9)	131 (39.2)	327 (65.0)	2052 (55.1)
HIV (+)	333 (12.1)	20 (3.4)	30 (5.0)	20 (3.3)	17 (2.9)	420 (8.2)
Syphilis (+)	190 (7.0)	8 (1.6)	29 (4.9)	21 (3.5)	13 (2.20)	261 (5.1)
Venue attendance						
Never	484 (17.8)	8 (1.4)	142 (23.8)	170 (28.4)	74 (12.5)	878 (17.2)

<i>Occasional</i> <i>Frequent</i>	Lima/Callao	Ica	Iquitos	Piura	Pucallpa	Total
	1,071 (39.4) 1,165 (42.8)	196 (33.2) 387 (65.5)	170 (28.5) 285 (47.7)	205 (34.3) 223 (37.3)	124 (20.9) 395 (66.6)	1766 (34.6) 2455 (48.2)
<hr/>						
Social network size^a	5 (2–10)	10 (4–20)	5 (2–10)	3 (0–8)	10 (5–25)	5 (2–12)

^aMedian (25%tile-75%tile)

^bSelf-reported monthly income, in USD

^cAmong 3722 participants reporting sex with men or TW in past 3 months

Table II
Associations of outcomes with MSM/TW venue attendance and MSM/TW social network size

Heterosexual		HIV		Syphilis		Insertive UAI		Receptive UAI	
N = 631	(+)	(-)	<i>p</i>	(+)	(-)	<i>p</i>	Yes	No	<i>p</i>
Venue attendance^a			0.589			0.156			0.077
<i>Never</i>	7(41.2)	191(31.4)		5(41.7)	192(31.4)		37(18.1)	29(28.4)	12(24.0)
<i>Occasional</i>	5(29.4)	234(38.5)		6(50.0)	233(38.1)		85(41.7)	38(37.3)	19(38.0)
<i>Frequent</i>	5(29.4)	183(30.1)		1(8.3)	187(30.6)		82(40.2)	35(34.3)	19(38.0)
<i>Total</i>	17(100)	608(100)		12(100)	612(100)		204(100)	102(100)	50(100)
									0.785
Social network size^b	3(2-4)	3(1-6)	0.943	4(1.5-8)	3(1-6)	0.530	4(2-8)	4(1-6)	3(1-5)
									0.147
Bisexual		HIV		Syphilis		Insertive UAI		Receptive UAI	
N = 1504	(+)	(-)	<i>p</i>	(+)	(-)	<i>p</i>	Yes	No	<i>p</i>
Venue attendance			0.424			0.326			0.109
<i>Never</i>	17(23.6)	298(20.9)		10(25.6)	298(20.7)		103(12.5)	48(16.3)	45(11.1)
<i>Occasional</i>	30(41.7)	550(38.6)		16(41.0)	562(39.0)		349(42.3)	124(42.2)	138(34.2)
<i>Frequent</i>	25(34.7)	557(40.5)		13(33.3)	583(40.4)		373(45.2)	122(41.5)	221(54.7)
<i>Total</i>	72(100)	1425(100)		39(100)	1443(100)		825(100)	294(100)	404(100)
									715(100)
									<0.001
Social network size	8(3-15)	4(2-10)	0.004	5.5(2-20)	10(3-20)	0.218	5(2-10)	5(2-10)	6(3-15)
									4(2-10)
									<0.001
Gay/homosexual		HIV		Syphilis		Insertive UAI		Receptive UAI	
N = 2277	(+)	(-)	<i>p</i>	(+)	(-)	<i>p</i>	Yes	No	<i>p</i>
Venue attendance			<0.001			0.263			0.067
<i>Never</i>	31(14.0)	251(12.3)		14(10.5)	262(12.4)		78(10.3)	71(7.3)	92(7.8)
<i>Occasional</i>	94(42.5)	662(32.4)		58(43.6)	692(32.8)		262(34.6)	336(34.7)	374(31.6)
<i>Frequent</i>	96(43.4)	1131(55.3)		61(45.9)	1155(54.8)		418(55.2)	561(58.0)	719(60.7)
<i>Total</i>	221(100)	2044(100)		133(100)	2109(100)		758(100)	968(100)	1185(100)
									541(100)
									<0.001
Social network size	6(3-20)	7(2-15)	0.893	6(2-19)	7(3-15)	0.887	8(3-18)	10(4-20)	10(3-20)
									0.260
Transgender women		HIV		Syphilis		Insertive UAI		Receptive UAI	
N = 1504	(+)	(-)	<i>p</i>	(+)	(-)	<i>p</i>	Yes	No	<i>p</i>

Heterosexual N = 631	HIV		Syphilis		Insertive UAI		Receptive UAI	
	(+)	(-)	(+)	(-)	Yes	No	Yes	No
N = 714	(+)	(-)	(+)	(-)	Yes	No	Yes	No
Venue attendance								
Never	16(15.7)	67(11.0)	10(13.3)	71(11.3)	16(8.3)	29(8.0)	25(6.1)	20(13.2)
Occasional	28(27.5)	161(26.5)	25(33.3)	163(26.0)	56(28.9)	105(28.9)	117(28.8)	44(29.0)
Frequent	58(56.9)	379(62.4)	40(53.3)	392(62.6)	122(62.9)	230(63.2)	256(65.1)	88(57.9)
Total	102(100)	607(100)	75(100)	626(100)	194(100)	364(100)	398(100)	152(100)
Social network size	5.5(2-20)	10(3-20)	8(4-20)	10(2-20)	7(3-20)	10(5-30)	10(4-45)	10(3-20)
		0.145		0.865		0.002		0.699

^aVenue attendance reported as N (%). Associations tested with Chi-square test for proportion trends.

^bSocial network size reported as Median (25%tile-75%tile). Medians and distributions compared with Wilcoxon-Mann-Whitney test.

Tests reaching significance of $p < 0.05$ presented in bold.

Table III

Multivariate analysis of outcomes vs. frequency of MSM/TW venue attendance and MSM/TW social network size

<i>Heterosexual</i>		HIV		Syphilis		Insertive UAI		Receptive UAI	
		N= 522	p	N= 493	p	N= 306	p	N= 306	p
Venue attendance									
<i>Never</i>		Ref.	-	Ref.	-	Ref.	-	Ref.	-
<i>Occasional</i>		0.48 (0.13–1.77)	0.272	1.12 (0.28–4.45)	0.873	3.51 (1.60–7.70)	0.002	0.69 (0.27–1.74)	0.428
<i>Frequent</i>		0.57 (0.16–2.13)	0.410	0.23 (0.02–2.28)	0.210	3.14 (1.43–6.87)	0.004	0.91 (0.36–2.29)	0.846
Social network size		1.000 (0.985–1.015)	0.978	0.994 (0.92–1.07)	0.882	1.006 (0.969–1.044)	0.763	0.964 (0.913–1.018)	0.185
<i>Bisexual</i>		HIV		Syphilis		Insertive UAI		Receptive UAI	
		N= 1497	p	N= 1482	p	N= 1119	p	N= 1119	p
Venue attendance									
<i>Never</i>		Ref.	-	Ref.	-	Ref.	-	Ref.	-
<i>Occasional</i>		0.81 (0.42–1.54)	0.521	0.72 (0.31–1.68)	0.450	1.21 (0.80–1.84)	0.363	1.09 (0.68–1.74)	0.720
<i>Frequent</i>		0.64 (0.32–1.30)	0.224	0.53 (0.21–1.32)	0.169	1.49 (0.97–2.29)	0.066	2.16 (1.35–3.45)	0.001
Social network size		1.011 (1.002–1.021)	0.019	1.009 (1.000–1.018)	0.052	0.996 (0.990–1.003)	0.240	1.002 (0.994–1.009)	0.694
<i>Gay/homosexual</i>		HIV		Syphilis		Insertive UAI		Receptive UAI	
		N= 2265	p	N= 2242	p	N= 1726	p	N= 1726	p
Venue attendance									
<i>Never</i>		Ref.	-	Ref.	-	Ref.	-	Ref.	-
<i>Occasional</i>		1.03 (0.66–1.61)	0.883	1.66 (0.90–3.05)	0.104	0.54 (0.35–0.82)	0.004	1.09 (0.73–1.61)	0.680
<i>Frequent</i>		0.8 (0.51–1.26)	0.337	1.17 (0.64–2.15)	0.617	0.70 (0.46–1.06)	0.090	1.76 (1.19–2.61)	0.005
Social network size		1.000 (0.998–1.003)	0.503	1.002 (1.000–1.004)	0.110	1.001 (0.999–1.003)	0.425	0.998 (0.996–1.000)	0.061
<i>Transgender women</i>		HIV		Syphilis		Insertive UAI		Receptive UAI	
		N= 709	p	N= 664	p	N= 558	p	N= 559	p
Venue attendance									

<i>Heterosexual</i>	HIV		Syphilis		Insertive UAI		Receptive UAI	
	N= 522	p	N= 493	p	N= 306	p	N= 306	p
<i>Never</i>	Ref.	-	Ref.	-	Ref.	-	Ref.	-
<i>Occasional</i>	0.82 (0.41–1.66)	0.588	1.11 (0.50–2.51)	0.789	1.03 (0.49–2.15)	0.934	2.21 (1.09–4.47)	0.027
<i>Frequent</i>	0.89 (0.46–1.71)	0.733	0.83 (0.38–1.81)	0.646	1.32 (0.65–2.68)	0.434	2.47 (1.26–4.86)	0.009
Social network size	0.998 (0.992–1.004)	0.558	0.997 (0.990–1.004)	0.477	0.999 (0.994–1.003)	0.604	1.000 (0.996–1.005)	0.983

Adjusted odds ratios reported as AOR (95%CI). All models adjusted for venue attendance, social network size, city, age, commercial sex activity, and primary anal sexual role. Tests reaching significance of $p < 0.05$ presented in bold.