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# Virtual vs. physical spaces: which facilitates greater HIV risk taking among men who have sex with men in East and South-East Asia?

**Chongyi Wei, DrPH**[1], **Sin How Lim, PhD**[2], **Thomas E. Guadamuz, PhD**[3,4], and **Stuart Koe, PharmD**[5]

[1]Department of Epidemiology and Biostatistics & Global Health Sciences, University of California – San Francisco, San Francisco, California, USA [2]Center of Excellence for Research in AIDS, University of Malaya, Kuala Lumpur, Malaysia [3]Department of Behavioral and Community Health Sciences, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA [4]Center for Health Policy Studies, Mahidol University, Bangkok, Thailand [5]ICM Pharma Pte Ltd, Singapore

## Abstract

Increasing use of the Internet to seek sex partners is accompanied by rising HIV infections among men who have sex with men (MSM) in East and South-East Asia. We examined whether the Internet facilitates greater HIV risk taking among MSM in the region. A cross-sectional sample of 9,367 MSM was recruited via the Internet in 2010. We compared socio-demographic and HIV-related behavioral characteristics among MSM who met sex partners on the Internet only, who met sex partners offline only, and who met sex partners through both. Multinomial logistic regression was used to identify independent correlates that were associated with differences in where participants met their male sex partners. Compared to MSM who met partners offline only, those who met partners online only were less likely to have multiple male sex partners, have paid for sex, have consumed recreational drugs, and have used alcohol before sex. MSM who met partners both online and offline appeared to be the riskiest group that they were more likely to have multiple male sex partners, have engaged in UIAI, and have consumed alcohol before sex. These findings suggest that social networking websites alone do not facilitate greater HIV risk taking among MSM. Rather, they provide additional venues for MSM who already engage in HIV-related high risk behaviors to seek sex partners. The Internet offers incredible opportunities to reach large numbers of MSM in East and South-East Asia for HIV prevention and research. Web-based outreach and prevention activities are needed to reach these men. In addition, mobile and application-based interventions should also be developed and disseminated.

### Keywords

HIV; men who have sex with men; Asia; Internet

Correspondence and request for reprints: Chongyi Wei, 50 Beale Street, Suite 1300, San Francisco, CA 94105, US. Phone: 1-415-597-9182; Fax: 1-415-597-9213; Chongyi.Wei@ucsf.edu.

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## Introduction

Online social networking and partner seeking have become increasingly popular as more individuals now have access to the Internet and other mobile technologies. The very first group of individuals who have utilized and popularized partner seeking on the Internet were probably men who have sex with men (MSM) in North America and Europe. From the old days of Gay.com to the most recent smart-phone application Grindr, numerous Internet-based services have catered to the needs of MSM, who now comprise one of the largest online communities in the US and Europe [1–3]. Reasons for the popularity of online partner seeking among MSM include accessibility, affordability, and anonymity [4].

This trend may be especially apparent among MSM in East and South-East Asia in recent years. As gay-related stigma and discrimination are prevalent and on-going in most countries in the region and there are limited physical venues where MSM can socialize or meet partners, virtual communities are quickly emerging among MSM throughout East and South-East Asia [5]. For instance, there were more than 250 gay-related websites in China alone in 2001 [6]. A systematic review also found that an increasing proportion of MSM in China sought sex partners online [7]. As the Internet has become a popular platform for MSM to seek romantic and sexual partners, there have also been concerns that the Internet could facilitate sexual networking and create a risk environment for MSM [8–10]. Studies conducted in the US, Europe, and New Zealand have reported that MSM who used the Internet to meet sex partners have earlier sexual debut, were more likely to engage in unprotected sex, have higher number of sex partners, and were at elevated risk for sexually transmitted infections [2, 11–14]. Several studies conducted in China/Hongkong have also reported similar findings [15–18]. For example, in a study of 901 MSM in Beijing, having had 2 or more male sex partners in the past 3 months was independently associated with seeking sex partners on the Internet [18]. These concerns may be warranted because high HIV incidence and prevalence have also been observed among MSM in East and South-East Asia during the past several years [19].

Does the Internet facilitate greater HIV risk taking among MSM in East and South-East Asia? To address this question, we compared socio-demographic characteristics and HIV-related risk behaviors among MSM who met sex partners on the Internet only, who met sex partners offline only, and who met sex partners both online and offline.

## Methods

### Study Design and Participants

Between January 1st and February 28th, 2010, a cross-sectional online survey (Asian Internet MSM Sex Survey) was conducted among MSM in East and South-East Asia. Recruitment was conducted exclusively on the Internet: A majority of participants were recruited from a popular gay-oriented social networking website (www.Fridae.asia) in the region, where banner advertisements were posted on the website and pop-up advertisements were posted in the website's chat-rooms; in addition, over 40 community partners from 12 countries including China/Hong Kong, Indonesia, Japan, Malaysia, Philippines, Singapore, Taiwan

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and Thailand sent emails to their listserv members to invite their participation in the survey. Participants were directed to the online survey after clicking on a link in the advertisement or in the email. An online informed consent was requested before participants could proceed to the survey. To be eligible, participants had to be at least 18 years old. To ensure participation from a diverse group of MSM, the survey was available in English and 9 Asian languages and dialects. Participation in the study was anonymous (personal identifying information or IP address was not collected), voluntary, and no incentives were offered. During the two-month period, 24,742 participants entered the survey and 13,883 (56.1%) completed it.

## Measures

A series of items asked participants where they have met their male sex partners in the past 6 months, including the Internet, gay sauna, gay bar or club, dance or circuit party, gym, public cruise spot, private sex parties, and through a friend. Participants who reported having met partners on the Internet but not anywhere else were categorized as the “Online only” group, conversely, those who reported having met partners at any of the physical places or through a friend but not on the Internet were categorized as the “Offline only” group. The rest of participants were categories as the “Online and Offline” group.

Detailed descriptions of other survey items and response options have been published elsewhere [20]. Briefly, measures of participants’ socio-demographics included country of residence, age, employment status, educational level, sexual orientation, marital status and relationship status. Measures of sexual risk behaviors in the past 6 months included number of male sex partners, engagement in any unprotected insertive anal intercourse (UIAI) and any unprotected receptive anal intercourse (URAI) with different types of male sex partners, having been paid for sex by another male, having paid for sex with any male, and frequency of alcohol use before sex. Participants were also asked if they used any recreational drugs in the past 6 months. Finally, participants were asked about their perceived risk of HIV infection and histories of HIV and STI testing.

## Statistical Analysis

We restricted the analysis to participants who reported having had one or more male sex partners in the past 6 months, were 18 years of age or older, were biologically and currently male, were a resident in one of the Asian countries, and reported having met male sex partners at one of the above-mentioned places/ways. This resulted in a final analytical sample of 9,367 participants.

We compared the socio-demographic and HIV-related behavioral characteristics between the three groups of MSM participants using Pearson’s chi-square tests. We then used multinomial logistic regression to identify independent correlates that were associated with differences in where participants met their male sex partners (met partner offline only [reference group], met partners online only, met partners both online and offline) after controlling for age. Only variables that were significantly associated with each group status ($p \leq .05$) in the bivariate analyses were entered into the multivariable model. All analyses

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were conducted in STATA version 12.0. The analysis was approved by the University of California – San Francisco's Committee on Human Research.

## Results

Table 1 presents comparisons of socio-demographic characteristics between the three groups of participants. Of the 9,367 participants, 2,634 (28.1%) met sex partners online only, 1,339 (14.3%) met their partners offline only, and 5,394 (57.6%) met their partners both online and offline. Socio-demographics characteristics were significantly different between the three groups of men, especially age and relationship status. It appeared that participants who met their partners online only were significantly younger than the other two groups of participants (56.9% were between the ages of 18–29 vs. 32.0% for the "offline only" group & 47.8% for the "both online and offline" group, respectively) while participants who met their partners offline only were significantly older than the other two groups of participants (30.0% were of age 40 or above vs. 12.0% for the "online only" group & 17.1% for the "both online and offline" group, respectively, $\chi^2 = 294.22$, $p < .01$). In terms of relationship status, participants who met their partners online only and those who met their partners offline only were significantly more likely to have only regular partners compared to those who met their partners both online and offline (18.5% & 17.3% vs. 9.2%, $\chi^2 = 180.02$, $p < .01$).

Table 2 presents comparisons of socio-demographic characteristics between the three groups of participants. Compared to participants who met partners online only and offline only, those who met partners both online and offline were significantly more likely to have multiple partners in the past 6 months (13.1% had one partner vs. 31.6% & 27.0% had one partner for the "online only" group and "offline only" group, respectively, $\chi^2 = 739.38$, $p < .01$). Participants who met partners online only were significantly less likely to have bought sex (9.9% vs. 21.8% for the "offline only" group and 19.6% for the "both online and offline" group, respectively, $\chi^2 = 139.54$, $p < .01$), to have consumed any recreational drugs (9.2% vs. 15.2% for the "offline only" group and 23.4% for the "both online and offline" group, respectively, $\chi^2 = 252.09$, $p < .01$), and to have used alcohol before sex (28.5% vs. 38.2% for the "offline only" group and 45.4% for the "both online and offline" group, respectively, $\chi^2 = 252.09$, $p < .01$) in the past 6 months than the other two groups of participants. Not surprisingly, they were also more likely to have a very low perception of HIV risk (38.7% vs. 34.0% for the "offline only" group and 28.4% for the "both online and offline" group, respectively, $\chi^2 = 136.80$, $p < .01$) and to have never tested for HIV (42.9% vs. 30.0% for the "offline only" group and 31.0% for the "both online and offline" group, respectively, $\chi^2 = 163.01$, $p < .01$) than the other two groups of men.

Table 3 presents independent correlates that were associated with differences in where participants met their male sex partners. Meeting partners online only was significantly associated with younger age, having a higher educational attainment, having casual partners only, having fewer male partners, having engaged in URAI and UIAI, not having bought sex, reduced frequency of alcohol use before sex, having very low perception of HIV risk, and having never been tested for HIV. Meeting partners both online and offline was significantly associated with younger age, being unemployed, having casual partners only or

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both regular and casual partners, having increased number of male partners, having engaged in UIAI, having used alcohol before sex, and having had an STI test.

## Conclusions

In this paper, we examined socio-demographic and HIV-related behavioral characteristics associated with three groups of MSM in Asia: MSM who met sex partners online only, those who met sex partners offline only, and those who met sex partners both online and offline. Previous research suggests that the Internet facilitates HIV-related risk behaviors among MSM as it is relatively easy, convenient, and quick to arrange sexual encounters through online venues [4, 8]. However, we found in this study that online environment alone does not facilitate greater HIV risk taking among MSM. Compared to MSM who met partners offline only, those who used only the Internet to meet partners were less likely to have multiple male sex partners, have paid for sex, have consumed recreational drugs, and have used alcohol before sex. Yet, they were more likely to engage in unprotected anal sex. A possible explanation is that these younger MSM who sought partners online only were less connected to gay communities and social networks, which can result in both risks (e.g. substance use) and protective effects (e.g., access to safe sex information). In addition, compared to the Internet, certain physical venues such as bathhouses and sex parties can make partners more readily available and hence increase the likelihood of having more partners.

MSM who met partners both online and offline appeared to be the riskiest group in terms of sexual risk behaviors. They were more likely to have multiple male sex partners, have engaged in UIAI, and have consumed alcohol before sex. Accordingly, they were more likely to have had any STI test in the past 6 months. Taken these findings together, we argue that social networking websites alone do not facilitate greater HIV risk taking among MSM in our study. Rather, they provide additional venues for MSM who already engage in HIV-related high risk behaviors to seek sex partners. This is especially evident from our finding that number of sex partners was least among participants who sought partners online only, higher among those who sought partners offline only and greatest among those who used both means to seek partners.

That said, the Internet offers incredible opportunities and great potential to conduct HIV prevention activities with MSM in Asia. As found in our study, a majority of MSM have met sex partners on the Internet and a third of them used only the Internet to seek partners. This latter group of MSM was probably not routinely reached by traditional venue-based prevention or surveillance activities. Despite escalating HIV epidemics being reported among MSM throughout Asia, most of these men did not perceive themselves at high risk for HIV infection. In addition, almost half reported having never been tested for HIV. Thus, web-based outreach and prevention activities are needed to reach these men. These activities can be carried out on gay-oriented social networking websites, through online social networks and popular online social media sites. In addition to web-based HIV prevention, mobile and application-based interventions, which are more interactive and may provide more tailored HIV/AIDS related information, should also be developed and disseminated as increasing numbers of individuals now have access to smart-phones in Asia. While such

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technology-based prevention interventions are important to reach subgroups of MSM, venue-based prevention activities should also be scaled up to produce synergistic effect in reducing HIV infections among MSM populations.

This study has several limitations. First, this was a convenience sample of MSM recruited on the Internet. Hence, our findings may not be generalizable to MSM who do not have access to the Internet. Second, only one of so many websites was used to recruit participants, and therefore some very high-risk men (e.g., those frequent “hook-up” websites) may have been under-represented. Third, since this was an online survey, we may have overestimated the proportion of MSM who used the Internet to seek partners. However, our results are similar to those found among samples of MSM recruited offline [18, 21]. For the same reason, men who only used physical venues to seek partners may be underrepresented. Fourth, we recognize that our sample of participants is geographically diverse and hence patterns of behavior may be different among MSM from different countries. Finally, we did not implement a system to check for multiple survey entries. But we believe that duplicate participation was minimal as the study did not offer any incentives.

In summary, the Internet itself does not create riskier environment for MSM in Asia but has provided us with a golden opportunity to reach large numbers of MSM in these countries for HIV prevention and research. Internet-based HIV interventions can be cost-effective, especially for countries with limited resources. Probably more importantly, as homosexuality remains a strong cultural taboo in most Asian countries and homosexual activities, in particular, being illegal in some countries [22, 23], the Internet provides an anonymous and safe place for MSM to participate in HIV prevention and research.

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## Table 1

Comparisons of socio-demographic characteristics between MSM participants who met partners online only, offline only, and both online and offline. (N = 9,367)

| | Offline only (N = 1,339) | Online only (N = 2,634) | Online and Offline (N = 5,394) | $\chi^2$ |
|---|---|---|---|---|
| **Country of Residence**[a] | | | | |
| China | 172 (5.4%) | 1,154 (36.5%) | 1,839 (58.1%) | 488.39** |
| Hongkong | 191 (22.0%) | 174 (20.1%) | 502 (57.9%) | |
| Indonesia | 58 (15.6%) | 74 (20.0%) | 239 (64.4%) | |
| Japan | 76 (20.0%) | 78 (20.4%) | 227 (59.6%) | |
| Malaysia | 167 (15.7%) | 279 (26.1%) | 621 (58.2%) | |
| Philippines | 54 (23.6%) | 51 (22.3%) | 124 (54.1%) | |
| Singapore | 301 (22.7%) | 327 (24.7%) | 696 (52.6%) | |
| Taiwan | 119 (12.7%) | 280 (29.9%) | 538 (57.4%) | |
| Thailand | 147 (22.5%) | 132 (20.2%) | 374 (57.3%) | |
| Other | 54 (14.5%) | 85 (22.8%) | 234 (62.7%) | |
| **Age** | | | | |
| 18 – 29 | 429 (32.0%) | 1,499 (56.9%) | 2,579 (47.8%) | 294.22** |
| 30 – 39 | 508 (37.9%) | 818 (31.1%) | 1,895 (35.1%) | |
| 40+ | 402 (30.0%) | 317 (12.0%) | 920 (17.1%) | |
| **Employment** | | | | |
| Fulltime/Student | 1,146 (85.6%) | 2,365 (89.8%) | 4,779 (88.6%) | 17.47** |
| Unemployed/Social | 83 (6.2%) | 114 (4.3%) | 237 (4.4%) | |
| Security | 110 (8.2%) | 155 (5.9%) | 378 (7.0%) | |
| Other | | | | |
| **Education** | | | | |
| High school or less | 160 (11.9%) | 205 (7.8%) | 512 (9.5%) | 24.50** |
| Technical or some college | 328 (24.5%) | 591 (22.4%) | 1,292 (23.9%) | |
| College or above | 851 (63.6%) | 1,838 (69.8%) | 3,590 (66.6%) | |
| **Marital status** | | | | |
| Single or divorced | 1,159 (86.6%) | 2,331 (88.5%) | 4,730 (87.7%) | 3.16 |
| Married | 180 (13.4%) | 303 (11.5%) | 664 (12.3%) | |
| **Relationship status** | | | | |
| Regular and casual | 426 (31.8%) | 712 (27.0%) | 1,902 (35.3%) | 180.02** |
| Regular only | 231 (17.3%) | 488 (18.5%) | 499 (9.2%) | |
| Casual only | 682 (50.9%) | 1,434 (54.4%) | 2,993 (55.5%) | |
| **Sexual orientation** | | | | |
| Gay | 1,138 (85.0%) | 2,149 (81.6%) | 4,513 (83.7%) | 8.81* |
| Bisexual/heterosexual/other | 201 (15.0%) | 485 (18.4%) | 881 (16.3%) | |

Note:

[a] Row percentages;

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* $p < .05$;

** $p < .01$.

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**Table 2**

Comparisons of HIV-related risk behaviors between MSM participants who met partners online only, offline only, and both online and offline. (N = 9,367)

| | Offline only (N = 1,339) | Online only (N = 2,634) | Online and Offline (N = 5,394) | $\chi^2$ |
|---|---|---|---|---|
| **Number of male partners past 6 mo** | | | | |
| One | 362 (27.0%) | 831 (31.6%) | 708 (13.1%) | 739.38** |
| 2–5 | 603 (45.0%) | 1,484 (56.3%) | 2,709 (50.2%) | |
| 6–10 | 199 (14.9%) | 215 (8.2%) | 1,088 (20.2%) | |
| More than 11 | 175 (13.1%) | 104 (4.0%) | 889 (16.5%) | |
| **Any URAI past 6 mo** | | | | |
| No | 594 (44.4%) | 1,010 (38.3%) | 1,890 (35.0%) | 41.57** |
| Yes | 745 (55.6%) | 1,624 (61.7%) | 3,504 (65.0%) | |
| **Any UIAI past 6 mo** | | | | |
| No | 585 (43.7%) | 923 (35.0%) | 1,861 (34.5%) | 40.68** |
| Yes | 754 (56.3%) | 1,624 (65.0%) | 3,533 (65.5%) | |
| **Sold sex past 6 mo** | | | | |
| No | 1,240 (92.6%) | 2,544 (96.6%) | 4.991 (92.5%) | 52.18** |
| Yes | 99 (7.4%) | 90 (3.4%) | 403 (7.5%) | |
| **Bought sex past 6 mo** | | | | |
| No | 1,047 (78.2%) | 2,372 (90.1%) | 4,335 (80.4%) | 139.54** |
| Yes | 292 (21.8%) | 262 (9.9%) | 1,059 (19.6%) | |
| **Any drug use past 6 mo** | | | | |
| No | 1,136 (84.8%) | 2,393 (90.8%) | 4,130 (76.6%) | 252.09** |
| Yes | 203 (15.2%) | 241 (9.2%) | 1,264 (23.4%) | |
| **Frequency of alcohol use before sex past 6 mo** | | | | |
| Never | 819 (61.2%) | 1,884 (71.5%) | 2,937 (54.5%) | 264.75** |
| Once or a few times | 386 (28.8%) | 671 (25.5%) | 1,920 (35.6%) | |
| At least monthly | 65 (4.9%) | 48 (1.8%) | 293 (5.4%) | |
| Every week | 69 (5.1%) | 31 (1.2%) | 244 (4.5%) | |
| **Perceived HIV risk** | | | | |

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| | Offline only (N = 1,339) | Online only (N = 2,634) | Online and Offline (N = 5,394) | $\chi^2$ |
|---|---|---|---|---|
| Very low | 455 (34.0%) | 1,019 (38.7%) | 1,530 (28.4%) | 136.80** |
| Low | 486 (36.3%) | 947 (35.9%) | 1,943 (36.0%) | |
| Moderate | 273 (20.4%) | 523 (19.9%) | 1,357 (25.2%) | |
| High | 76 (5.7%) | 97 (3.7%) | 353 (6.5%) | |
| Very high | 49 (3.7%) | 48 (1.8%) | 211 (3.9%) | |
| **Most recent HIV test** | | | | |
| <= 6 months ago | 404 (30.2%) | 646 (24.5%) | 1,814 (33.6%) | 163.01** |
| 6 – 12 months ago | 187 (13.9%) | 315 (12.0%) | 773 (14.3%) | |
| 1 – 2 years ago | 175 (13.1%) | 330 (12.5%) | 600 (11.1%) | |
| More than 2 years ago | 171 (12.8%) | 212 (8.1%) | 536 (9.9%) | |
| Never tested | 402 (30.0%) | 1,131 (42.9%) | 1,671 (31.0%) | |
| **Any STI test past 6 mo** | | | | |
| No | 696 (52.0%) | 1,445 (54.9%) | 2,529 (46.9%) | 47.83** |
| Yes | 643 (48.0%) | 1,189 (45.1%) | 2,865 (53.1%) | |

Note:

** $p < .01$;

URAI = unprotected receptive anal intercourse; UIAI = unprotected insertive anal intercourse; STI = sexually transmitted infection.

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## Table 3

Multinomial logistic regression: independent correlates that were associated with differences in where participants met their male sex partners (N = 9,367).

| | Online only vs. Offline only AOR (95% CI) | Online & Offline vs. Offline only AOR (95% CI) |
|---|---|---|
| **Age** | | |
| 18 – 29 | 1 | 1 |
| 30 – 39 | .53 (.45, .62)** | .59 (.51, .69)** |
| 40+ | .31 (.26, .38)** | .37 (.30, .42)** |
| **Employment** | | |
| Fulltime/Student | 1 | 1 |
| Unemployed/Social Security | .82 (.61, 1.12) | .74 (.57, .97)* |
| Other | .96 (.73, 1.24) | .97 (.78, 1.24) |
| **Education** | | |
| High school or less | 1 | 1 |
| Technical or some college | 1.28 (.99, 1.66) | 1.17 (.93, 1.46) |
| College or above | 1.57 (1.24, 1.99)** | 1.19 (.98, 1.47) |
| **Relationship status** | | |
| Regularly only | 1 | 1 |
| Regular and casual | 1.16 (.93, 1.45) | 1.55 (1.26, 1.91)** |
| Casual only | 1.44 (1.18, 1.76)** | 1.68 (1.38, 2.05)** |
| **Sexual orientation** | | |
| Gay | 1 | 1 |
| Bisexual/heterosexual/other | 1.16 (.96, 1.40) | 1.14 (.96, 1.35) |
| **Number of male partners past 6 mo** | | |
| One | 1 | 1 |
| 2–5 | 1.24 (1.04, 1.47)* | 2.08 (1.76, 2.46)** |
| 6–10 | .65 (.50, .83)** | 2.55 (2.05, 3.18)** |
| More than 11 | .43 (.32, .58)** | 2.42 (1.91, 3.07)** |
| **Any URAI past 6 mo** | | |
| No | 1 | 1 |
| Yes | 1.20 (1.01, 1.44)* | 1.16 (.99, 1.36) |
| **Any UIAI past 6 mo** | | |
| No | 1 | 1 |
| Yes | 1.39 (1.16, 1.66)** | 1.24 (1.05, 1.45)* |
| **Sold sex past 6 mo** | | |
| No | 1 | 1 |
| Yes | .79 (.57, 1.08) | .93 (.72, 1.20) |
| **Bought sex past 6 mo** | | |
| No | 1 | 1 |
| Yes | .58 (.47, .71)** | .86 (.73, 1.01) |

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| | Online only vs. Offline only AOR (95% CI) | Online & Offline vs. Offline only AOR (95% CI) |
|---|---|---|
| **Any drug use past 6 mo** | | |
| No | 1 | 1 |
| Yes | .81 (.65, 1.00) | 1.46 (1.23, 1.74) |
| **Frequency of alcohol use before sex past 6 mo** | | |
| Never | 1 | 1 |
| Once or a few times | .75 (.64, .88)** | 1.18 (1.03, 1.36)* |
| At least monthly | .39 (.26, .58)** | 1.00 (.75, 1.34) |
| Every week | .30 (.19, .47)** | .85 (.63, 1.15) |
| **Perceived HIV risk** | | |
| Very high | 1 | 1 |
| High | 1.14 (.68, 1.90) | .99 (.66, 1.50) |
| Moderate | 1.55 (1.00, 2.40) | 1.19 (.84, 1.68) |
| Low | 1.53 (.99, 2.35) | 1.04 (.75, 1.47) |
| Very low | 1.63 (1.05, 2.51)* | 1.01 (.72, 1.43) |
| **Most recent HIV test** | | |
| <= 6 months ago | 1 | 1 |
| 6 – 12 months ago | 1.05 (.83, 1.32) | 1.02 (.83, 1.25) |
| 1 – 2 years ago | 1.16 (.91, 1.47) | .89 (.72, 1.11) |
| More than 2 years ago | .96 (.74, 1.24) | .92 (.73, 1.14) |
| Never tested | 1.29 (1.06, 1.57)* | 1.06 (.89, 1.26) |
| **Any STI test past 6 mo** | | |
| No | 1 | 1 |
| Yes | 1.03 (.88, 1.20) | 1.19 (1.03, 1.36)* |

Note:

* $p < .05$;

** $p < .01$;

URAI = unprotected receptive anal intercourse; UIAI = unprotected insertive anal intercourse; STI = sexually transmitted infection.