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## Sexual Risk Behaviors and HIV Infection among Men Who Have Sex with Men Who Use the Internet in Beijing and Urumqi, China

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### Abstract

**Objectives**—To assess HIV and syphilis infections among men who have sex with men who use the Internet (MSMUI) and their risk behaviors.

**Methods**—In 2007, 429 MSMUI were recruited via the Internet in Beijing and Urumqi, China. A questionnaire was administered, and a blood specimen collected and tested for HIV and syphilis.

**Results**—Median age of participants was 25 years. Median number of lifetime sexual partners was 10. Ninety point seven percent ever had sex with a cyber-friend. Rates of condom use in the last oral, insertive and receptive anal sex were 9.1%, 66.3% and 60.4% respectively. Infection rates of HIV, syphilis and HIV/syphilis co-infection were 4.8%, 11.4%, and 1.7% respectively. Factors associated with HIV infection were being  $\leq 24$  years (OR=2.85, 95% CI: 1.05–7.75), syphilis positive (OR=4.78, 95% CI: 1.68–13.58), used non-water-based liquid as lubricant (OR=8.03, 95% CI: 1.03–62.52) and having bleeding gums or oral ulcers during condom-free oral sex (OR=3.17, 95% CI: 1.13–8.88).

**Conclusions**—MSMUI engage in high-risk sexual behaviors and have a high prevalence of HIV and syphilis infections. The internet is the predominant venue for the majority of MSMUI to find sexual partners. It is urgent to implement effective intervention programs targeting this group.

### Keywords

Men who have sex with men; HIV; syphilis; Internet; China

## INTRODUCTION

In most developed countries men who have sex with men (MSM) were the first group affected by HIV/AIDS and they still account for a large proportion of reported HIV/AIDS cases.<sup>1, 2</sup> China's HIV/AIDS epidemic has progressed differently with intravenous drug users and former commercial blood donors accounting for more than 62% of accumulated HIV/AIDS cases between 1985 and 2006.<sup>3</sup> HIV transmission through blood transfusion has been stopped, and methadone maintenance treatment, needle exchange programs and health education have helped reduce the spread of HIV among drug addicts in China.<sup>4, 5</sup> Studies indicated rapid rising rates of HIV infection among MSM in China. In 2005, MSM accounted for 7.3% of China's estimated 650,000 people living with HIV/AIDS, however, by 2007 this figure had increased

to 12.2% of the estimated 700,000 HIV/AIDS cases.<sup>3</sup> The proportion of MSM in reported cases of HIV/AIDS in the China national notifiable disease system has dramatically increased from 0.4% in 2005, to 3.3% in 2007.<sup>3, 6</sup>

Various determinants increase the likelihood MSM have large numbers of multiple lifetime sexual partners and engage in high-risk sexual behaviors rendering, them more vulnerable to HIV and sexually transmitted infections (STIs).<sup>7, 8</sup> If appropriate and effective actions are not taken, China may face a significant increase in HIV infection among MSM.

According to the China Internet Network Information Center, by September 2007, nearly 71 million urban adult males were using the Internet.<sup>9</sup> It is estimated 10–15% of adult males in China have had lifetime male/male sexual experiences including kissing, fondling, mutual masturbation, and oral and anal sex.<sup>10</sup>

MSM are increasingly using the Internet to look for sex, and significant associations between Internet sex-seeking and high-risk sexual behaviors have been reported.<sup>11–13</sup> There are growing numbers of international studies indicating sexual intercourse with male partners met online increases HIV/STIs risk,<sup>12, 14</sup> however the characteristics of Chinese MSMUI have not yet been well documented. The nature of the Internet makes it an ideal venue for recruiting understudied, at-risk groups,<sup>14</sup> such as Chinese MSM who might be less willing to respond to more conventional research approaches. To better understand MSMUI in China, we conducted a cross-sectional survey of 429 MSMUI in 2 cities China in 2007.

## METHODS

### Participants, Recruitment and Fieldwork Sites

In this study, MSM refers to men who have already had, or intent to have, oral or anal sex with other men and if not specified, sexual partners refers to male sexual partners. For two weeks prior to survey commencement (June 11-July 11 in Beijing; July 16-August 17 in Urumqi) and during the survey, identical banners containing information concerning our study were placed on the main pages of a national gay website and a Beijing-based MSM volunteer website inviting MSM to participate in our study. Contact information was also posted on three major national gay partner-seeking websites and one Xinjiang-based gay online chat-room for recruiting participants.

Qualified participants met the following criteria: 1) ever had, or likely to have sex with a man; 2) 18 years or older; 3) accessed gay information on the Internet in the 3 months prior to study commencement. All participants were invited to come to the 2 voluntary counseling and testing (VCT) centers between 6pm and 10pm local time during the survey period. In order to ensure cohort compliance with enrolment requirements, the survey designer and an MSM community member were present at the VCT centers to screen participants for the duration of the study.

The study was based off-line in 2 VCT site, one in Xicheng District Center for Disease Control and Prevention (CDC) in Beijing and one in Urumqi (the capital city of Xinjiang Uighur Autonomous Region) CDC.

### Survey content

Consenting participants were interviewed face-to-face by trained interviewers. Qualified HIV/STI counselors gave HIV counseling and provided referrals for social support or medical services as needed. A 5 ml of intravenous blood sample was collected for HIV and syphilis testing. All participants who completed questionnaires received 50 RMB (USD7.5) and some small gifts (condoms, lubricant, MSM health booklet) for their participation. Participants were

surveyed on their socio-demographic characteristics, Internet use and HIV-related risk behaviors.

### Specimen test

Blood samples were tested for HIV antibody using an enzyme-linked immunosorbent assay (ELISA) (Bio-Merieux, Boxtel, Netherlands) and positive results were confirmed by a HIV-1/2 Western Blot (HIV Blot 2.2 WB, Genelabs Diagnostics, Singapore). Syphilis antibodies were screened by ELISA (Shanghai Kehua Biologic Production Company, China). Reactive samples were confirmed by a passive particle agglutination test for detection of antibodies to *Treponema pallidum* (Serodia TPPA, Fuji-rebio Inc., Japan).

### Ethics

Trained investigators explained to participants the aim, process, benefits and potential risks of study participation before obtaining informed consent. Participants were informed survey participation was anonymous and voluntary, and they had the right to discontinue participation at any time. Ethical approval was obtained from the institutional review board of the National Center for AIDS/STD Control and Prevention, China CDC, Beijing.

### Data Analysis

EpiData software (EpiData 3.0 for Windows; The EpiData Association, Odense, Denmark) was used to double enter and validate the data. Statistical Analysis System (SAS 9.1 for Windows; SAS Institute Inc., NC) was used to analyze the data. A Chi-squared test was performed to assess whether proportions of key indexes between MSMUI from the two locations had any statistically significant differences. Logistic regression analysis was performed to assess potential risk factors related to HIV infection.

## RESULTS

A total of 429 MSMUI were recruited, of whom 153 were recruited from responding to the banners, 176 from collected contact details posted online, and 70 were referred by friends who had participated in the study. Of the 429 participants, 420 provided a blood specimen (of the 9 who didn't provide a blood specimen, 6 were hematophobic and 3 believed they had no risk for infection thus refused to provide a sample) and 399 completed a questionnaire (30 participants went to the VCT clinics when investigators weren't present, so they did not complete the questionnaire but provided a blood sample and basic socio-demographic information). HIV/syphilis infection rates were based on data of the 420 men who provided a blood specimen. Logistic regression of potential factors influencing HIV infection was based on data of the 390 men who both provided a blood specimen and completed a questionnaire. Other statistics were based on data of the 399 men who completed a questionnaire. Chi-squared tests showed there were no significant differences in proportions of key indexes (age,  $X^2=0.95$ ,  $P=0.33$ ; ethnicity,  $X^2=0.31$ ,  $P=0.58$ ; HIV infection rate,  $X^2=0.29$ ,  $P=0.59$ ) between samples from the two cities. Analysis was based on the data from the two cities combined together.

Most participants were young, educated, never-married and identified as homosexual (Table 1). Infection rates of HIV, syphilis and HIV/syphilis co-infection were 4.8% (20/420), 11.4% (48/420) and 1.7% (7/420) respectively. MSM who had a low education level (senior high school or less) had a higher HIV rate (11.2%) compared with those who had a high education level (having some college or above, HIV rate of 2.47%,  $P=0.001$ ). Local resident had a lower HIV infection (1.5%) compared with non-local-resident (6.6%,  $P=0.043$ ).

### Lifetime Sexual behaviors

The median number of lifetime sex partners was 10 (range: 0–1000) (Table 2). Rates of condom use in the last oral, insertive and receptive anal sex were 9.1% (35/385), 66.3% (220/332) and 60.4% (200/331), respectively. Nearly 40% of participants consistently used condoms in both insertive and receptive anal sex in the past six months. Nearly half (164/399) ever had sex with a female partner and 42.1% (69/164) used condoms in the last such sex. The average age of sexual debut was 21, and the average absolute duration between realization of sexual orientation and first sex with a male was three years. No statistical difference was found in any of sexual behavioral variables for HIV and/or syphilis infections.

### Internet-related sexual behaviors

The internet was the most popular venue to find sexual partners with 82.2% (328/399) using it, followed by cafes or bars (14.8%, 59/399), bath-houses (14.3%, 57/399), and parks and toilets (13.3%, 53/399) (Table 3). Thirteen point eight percent (55/399) did not use the internet to find sexual partners, but did use more traditional venues. Fifteen participants did not respond and 1 had never had sex with a man. Among MSMUI who were 24 years old or younger, 83.6% (143/171) used the internet to find sexual partners. The next most common venue used by this group was bars (19.9%, 34/171). Among MSMUI older than 24 years, 81.1% (185/228) used the internet to find sexual partners. The next most common venue used by this group was bath-houses (19.7%, 45/228).

Almost all (382/399) had ever met a male cyber-friend (initial contact made online) offline and (362/399) had ever had sex with a cyber-friend, with 69.1% (257/362) having 1 to 10 sexual cyber-friends and 29.0% (105/362) having 11 or more such partners. More than half (220/398) met their first male sexual partner online. Percentages of condom use in the last oral sex, insertive anal sex and receptive anal sex with cyber-friends were 7.2% (25/349), 69.6% (201/289) and 68.7% (202/294), respectively. Most (270/382) never inquired about the HIV infection status of a newly-met cyber-friend.

No statistical difference was found in any of Internet related sexual behavioral variables for HIV and/or syphilis infections.

### Perception of HIV/STIs risk, condom use and HIV/STIs testing

Nearly half (47.9%, 191/399) had ever tested for HIV and 26.3% reported at least one type of lifetime STI. A majority (59.5%, 237/399) of participants still perceived themselves to be at no or little risk of HIV infection and 21.1% (84/399) could not define their perception of risk. Within the  $\leq 24$  age group, rates of constant condom use during insertive and receptive anal sex within the past 6 months respectively were 47.1% (33/70) and 46.1% (35/75) for those who perceived no or little risk of HIV infection, 17.6% (3/17) and 9.5% (2/21) for those who perceived high or very high risk of HIV infection, and 34.8% (8/23) and 16.7% (5/30) for those who could not define their level of risk.

Nearly all (94.2%, 180/191) who ever tested for HIV knew the result of their last test, however more than half (59.4%, 237/399) believed they were at no or low risk for HIV. More than half (59.6%, 28/47) of the syphilis-positive MSM who completed the questionnaire reported no STIs. Among those reporting a history of HIV/STIs, after diagnosis, almost all (99.0%, 104/105) reported using at least one method to reduce transmission of HIV/STIs, of which 57.1% (60/105) reduced the number of sexual partners, 29.5% (31/105) decreased penetrative sexual behaviors, 83.8% (88/105) used condoms on a regular basis and 37.1% (39/105) started to test for HIV.

## Factors influencing HIV infection

Table 4 shows logistic regression analysis of risk factors for HIV infection. Being 24 years old or younger (OR=2.85, 95% CI: 1.05–7.75), being syphilis positive (OR=4.78, 95% CI: 1.68–13.58), having used saliva as a substitute for lubricant (OR=8.03, 95% CI: 1.03–62.52) and having bleeding gums or oral ulcers during oral sex (OR=3.17, 95% CI: 1.13–8.88) were associated with HIV infection. However the number of male sexual partners (OR=1.00, 95% CI: 0.995–1.01) and being circumcised (OR=0.73, 95% CI: 0.19–2.81), were not associated with HIV infection.

## DISCUSSION

MSMUI had a high level of education as nearly three quarters had an education of some college or more, this is similar to other studies surveying MSM via the Internet in China.<sup>10, 15</sup> With nearly a quarter of the MSMUI in our sample being students, education campaigns targeting student MSM websites may be valuable in controlling HIV/syphilis infection among this sub-population of MSMUI.

MSMUI in China tend to be younger than MSM samples recruited offline. The median age of this sample (25 years) was younger than non-internet samples.<sup>7, 8, 10</sup> Younger MSMUI tend to engage in more high-risk sexual behaviors than older MSM<sup>16, 17</sup> and greater frequency of high-risk sexual behaviors is related to higher rates of HIV infection.<sup>18, 19</sup> This relative youth may have implications for HIV/syphilis infection as the results indicate MSMUI  $\leq 24$  years have a higher HIV infection rate than those  $>24$  years. Reasons for this might be: 1) they are sexually active, 2) they lack awareness of the concept of self-protection while having sex and 3) they are comparatively passive in their sexual contacts with older partners and thus are in a disadvantaged position to protect themselves. China may face a widespread HIV epidemic among young MSMUI without timely interventions targeting this population. As the Internet can be used effectively to provide sex education to young people in China,<sup>20</sup> websites targeting student MSMUI may be used to provide health and sexual information.

The internet has become an important venue for MSM in China to find sex partners.<sup>15</sup> A possible reason for the popularity of the internet as a sex partner seeking venue is that it offers some anonymity, allowing them to make contact with other MSM or to find specific types of partners, without negative social consequences in a time-efficient manner.<sup>11, 13, 21</sup> This may explain why the median number of lifetime sexual partners of MSMUI was higher than that of non-internet-using MSM in China with a similar median age<sup>7, 8, 22</sup> Public health efforts to communicate with MSMUI must use the internet as this population will not be reached by traditional outreach methods.

A study in six U.S. cities found young MSM with a low-risk perception reported considerable high-risk behaviors.<sup>23</sup> This study found within the  $\leq 24$  years group, rates of constant condom use during insertive and receptive anal sex within the past 6 months were considerably higher among those who perceived no or little risk of HIV infection than among those who perceived high or very high risk of HIV infection (47.1% and 46.7% vs. 17.6% and 9.7%). MSMUI might consider more condom use equals decreased risk and therefore perceive less risk when condoms are used more often.

A study in San Francisco showed MSM continued to engage in risky sexual behaviors when diagnosed STI negative.<sup>24</sup> Most participants were unaware of their STIs status as nearly 60% of syphilis positive MSMUI reported no STIs. There are significant barriers for MSM in China to receive timely STI diagnosis and treatment: the price for diagnosis and treatment of STIs is high; MSM experience discrimination from clinic doctors and nurses; it takes days to receive test results; and the quality of clinical laboratory testing is not high and physicians often



misdiagnose STIs.<sup>25</sup> MSM in our study craved trustworthy and effective gay-friendly STIs clinics where they can receive appropriate therapy at a reasonable price. They preferred a MSM community member with a medical and psychological background to provide online HIV/STI counseling. Efforts should be made to expand coverage of HIV/STIs testing among MSMUI so as to increase their awareness of their sero-status. This may also have the effect of encouraging safer sexual practices as almost all (99.0%, 104/105) participants who reported HIV/STIs history tried to use at least one way to avoid transmitting HIV/STIs to others.

Most MSM who use the Internet are in urban areas as internet coverage in the countryside is still limited. Two thirds of participants in our study were not local residents of the study cities. This confirms the results of a qualitative study conducted in Shanghai.<sup>9, 26</sup> Non-resident MSM in China have a higher rate of sexual risk behaviors and HIV/STIs infection than resident MSM<sup>7, 10, 22</sup> which our study confirms as 85.0% (17/20) of HIV carriers and 68.8% (33/48) of syphilis carriers were non-local residents. Non-resident MSM faced difficulties in maintaining long-term relationships partly due to economic instability and the lack of a private dwelling. This subgroup is in immediate need of psychological support as well as HIV/STIs services.

Although the sampling methods used avoid the shortcomings of traditional sampling methods and surveys completed online,<sup>2, 12</sup> they have their limitations. MSM who use the Internet only represent a portion of the MSM population in China and the results of our study can not be generalized to all MSM in China. The results may not be generalizable to MSMUI in all cities in China, as it is possible there are behavioral differences in different regions. In addition, internet use behaviors change rapidly in China, so the results may only be applicable to the study period. Participants may have confused the purposes of the research with the provision of clinical care as testing for HIV/Syphilis was provided, therefore a representative sample of MSMUI may not have been obtained.

## CONCLUSION

We found that MSMUI engage in high-risk sexual behaviors and have high infection rates of HIV/Syphilis. More efforts are needed to enhance HIV/STIs counseling, testing and treatment services. Online counseling facilitated by scaled-up online public health campaigns might be an effective manner of benefiting this population.

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**Table 1**

## Socio-demographic Characteristics of MSMUI

Characteristics	Questionnaire	Biological Specimen		
	N (%) <sup>a</sup>	No. Subject	HIV+ (%) <sup>b</sup>	Syphilis (%) <sup>b</sup>
Age, years (median age=25 years)				
18–24	171 (42.9)	166	11 (6.6%)	17 (10.2)
25–29	123 (30.8)	122	2 (1.6)	15 (12.3)
30–39	88 (22.1)	86	5 (5.8)	11 (12.8)
40–56	17 (4.3)	16	1 (6.3)	4 (25.0)
Marital status				
Never married	334 (83.7)	326	14 (4.3)	38 (11.7)
Currently married	46 (11.5)	45	3 (6.7)	4 (8.9)
Separated/divorced	19 (4.8)	19	2 (10.5)	5 (26.3)
Education				
Junior high school or less	16 (4.0)	16	6 (37.5)*	5 (31.3)
Senior high school	93 (23.3)	91	6 (6.6)	8 (8.8)
Some College	244 (61.2)	238	7 (2.9)	33 (13.9)
Postgraduate or more	46 (11.5)	45	0 (0.0)	1 (2.2)
Beijing/Ururmqi local resident				
Yes	135 (33.8)	131	2 (1.5)	14 (10.7)
No	264 (66.2)	259	17 (6.6)	33 (12.7)
Ethnicity				
Han	362 (90.7)	353	17 (4.8)	41 (11.6)
Other <sup>c</sup>	37 (9.3)	37	2 (5.4)	6 (16.2)
Salary (RMB) <sup>d</sup>				
<500	84 (21.1)	83	3 (3.6)	6 (7.2)
500-	40 (10.0)	38	4 (10.5)	4 (10.5)
1000-	119 (29.8)	116	7 (6.0)	19 (16.4)
2000-	156 (39.1)	153	5 (3.3)	18 (11.8)
Self reported sexual orientation				
Homosexual	283 (70.9)	278	13 (4.7)	38 (13.7)
Bisexual	1 (0.3)	1	1 (100.0)	1 (100.0)
Heterosexual	74 (18.5)	72	3 (4.2)	5 (6.9)
Undecided	41 (10.3)	39	2 (5.1)	3 (7.7)
Occupation				
Office clerk	149 (37.3)	142	5 (3.5)	24 (16.9)
Student	93 (23.3)	92	2 (2.2)	5 (5.4)
Civil servant	20 (5.0)	20	2 (10.0)	3 (15.0)
Other	120 (30.1)	119	8 (6.7)	12 (10.1)
Unemployed	17 (4.3)	17	2 (11.8)	3 (17.6)

<sup>a</sup>Proportions were analyzed based on data of the 399 men who completed a questionnaire;



<sup>b</sup> HIV+ and syphilis refer to HIV and syphilis infection respectively, % refers to infection rate, as some participants didn't provide blood specimen, the denominators in this column do not necessarily equal to subjects who completed questionnaire survey;

<sup>c</sup> Other ethnicities included Uighur, Kazak, Hui and Man;

<sup>d</sup> The currency exchange rate was 7 RMB equaled approximately 1 USD at the time of the study.

\* Senior high school or less compared with college or above, Fisher's exact P=0.001; local resident compared with non-local resident, Fisher's exact P=0.043.

**Table 2**Lifetime sexual behaviors of MSMUI<sup>a</sup>

Characteristics	questionnaire		Biological Specimen		
	N (%) <sup>a</sup>	No. Subject	HIV (%) <sup>b</sup>	Syphilis(%) <sup>b</sup>	
No. male sex partners					
0	1 (0.3)	1	0 (0.0)	0 (0.0)	
1	16 (4.0)	15	0 (0.0)	2 (13.3)	
2–10	221 (55.4)	214	8 (3.7)	17 (7.9)	
11–500 <sup>c</sup>	161 (40.4)	160	11 (6.9)	28 (17.5)	
Condom use in last oral sex					
Yes	35 (9.1)	34	1 (2.9)	4 (11.8)	
No	350 (90.9)	343	18 (5.2)	41 (12.0)	
Condom use in last insertive anal sex					
Yes	220 (66.3)	215	12 (5.6)	34 (15.8)	
No	112 (33.7)	110	4 (3.6)	8 (7.3)	
Condom use in last receptive anal sex					
Yes	200 (60.4)	195	11 (5.6)	29 (14.9)	
No	131 (39.6)	129	8 (6.2)	13 (10.1)	
Frequency of condom use in insertive anal sex in past 6 months					
Never (=0%)	29 (10.3)	29	0 (0.0)	0 (0.0)	
Occasionally (≤50%)	55 (19.6)	55	4 (7.3)	6 (10.9)	
Often (>50%)	87 (31.0)	85	5 (5.9)	11 (12.9)	
Always (=100%)	110 (39.1)	108	4 (3.7)	17 (15.7)	
Frequency of condom use in receptive anal sex in past 6 months					
Never	32 (11.9)	32	0 (0.0)	0 (0.0)	
Occasionally	56 (20.7)	56	4 (7.1)	5 (8.9)	
Often	75 (2.8)	72	4 (5.6)	15 (20.8)	
Always	107 (39.6)	105	7 (6.7)	16 (15.2)	
Perception of risk of HIV infection					
Not at all	70 (17.5)	66	2 (3.0)	6 (9.1)	
Very low (<50%)	167 (41.9)	161	6 (3.7)	19 (11.8)	
Possibly (50%)	65 (16.3)	65	2 (3.1)	8 (12.3)	
Very likely (>50%)	13 (3.3)	13	3 (23.1)	3 (23.1)	
Don't know	84 (21.1)	84	6 (7.1)	11 (13.1)	
Ever tested for HIV					
Yes	191 (47.9)	185	8 (4.3)	34 (18.4)	
No	208 (52.1)	205	11 (5.4)	13 (6.3)	
Ever had STIs					
Yes	105 (26.3)	102	8 (7.8)	19 (18.6)	
No	294 (73.7)	288	11 (3.8)	28 (9.7)	
Ever had sex with a woman					
Yes	164 (41.1)	161	10 (6.2)	22 (13.7)	

Characteristics	questionnaire	Biological Specimen		
	N (%) <sup>a</sup>	No. Subject	HIV (%) <sup>b</sup>	Syphilis(%) <sup>b</sup>
No	235 (58.9)	229	9 (3.9)	25 (10.9)
Condom use in last vaginal/anal sex with a female partner				
Yes	69 (42.1)	66	5 (7.6)	11 (16.7)
No	95 (57.9)	95	5 (5.3)	11 (11.6)

<sup>a</sup>Proportions were based on data of the 399 men who completed a questionnaire;

<sup>b</sup>HIV+ and syphilis refer to HIV and syphilis infection respectively, % refers to infection rate, as some participants didn't provide blood specimen, the denominators in this column do not necessarily equal to subjects who completed questionnaire survey;

<sup>c</sup>Can be disaggregated into 11–20 (18.3%, 73/399), 21–50 (12.5%, 50/399) and 51–1000 (9.5%, 38/399).

**Table 3**

## Internet use and sexual risk behaviors of MSMUI

Internet use and risk behaviors	questionnaire	Biological Specimen		
	N (%) <sup>a</sup>	No. Subject	HIV (%) <sup>b</sup>	Syphilis (%) <sup>b</sup>
Ever met a male cyber-friend				
Yes	382 (95.7)	373	18 (4.8)	45 (12.1)
No	17 (4.3)	17	1 (5.9)	2 (11.8)
Met your first sexual partner via the Internet				
Yes	220 (55.8)	213	6 (2.8)	18 (8.5)
No	179 (44.2)	177	13 (7.3)	29 (16.4)
No. male sex partners known via the Internet				
0	37 (9.3)	37	3 (8.1)	3 (8.1)
1	46 (11.5)	41	2 (4.9)	2 (4.9)
2–10	211 (52.9)	208	9 (4.3)	22 (10.6)
11–380 <sup>c</sup>	105 (26.3)	104	5 (4.8)	20 (19.2)
Condom use in oral sex with a newly met cyber-friend?				
Yes	25 (7.2)	25	0 (0.0)	4 (16.0)
No	324 (92.8)	317	15 (4.7)	38 (12.0)
Condom use in insertive anal sex with a newly met cyber-friend?				
Yes	201 (70.0)	198	7 (3.5)	30 (15.2)
No	86 (30.0)	84	4 (4.8)	9 (10.7)
Condom use in receptive anal sex with a newly met cyber-friend?				
Yes	202 (68.7)	198	9 (4.5)	29 (14.6)
No	92 (31.3)	90	5 (5.6)	10 (11.1)
Frequency of watching online gay porn				
Often (once a week or more)	129 (32.3)	126	3 (2.4)	14 (11.1)
Occasionally (once a month or more)	176 (44.1)	171	11 (6.4)	21 (12.3)
Seldom (less than once a month)	94 (23.6)	93	5 (5.4)	12 (12.9)
Ever watched gay porn before meeting a male cyber-friend				
Yes	211 (53.1)	205	7 (3.4)	29 (14.1)
No	186 (46.9)	183	12 (6.6)	17 (9.3)
Watching gay porn increases the possibility of sexual risk behaviors				
Yes	135 (33.8)	132	5 (3.8)	8 (6.1)
No	264 (66.2)	258	14 (5.4)	39 (15.1)
Meeting a cyber-friend in which time to span most likely results in unsafe sex				
8–12 am	7 (1.8)	7	2 (28.6)	3 (42.9)
12–18 am	11 (2.8)	11	1 (9.1)	1 (9.1)
18–24 am	242 (61.4)	237	9 (3.8)	29 (12.2)
24–8 am	134 (34.0)	130	7 (5.4)	13 (10.0)
Do you support online HIV/STI s counseling?				
Yes	385 (96.5)	376	19 (5.1)	45 (12.0)

Internet use and risk behaviors	questionnaire	Biological Specimen		
	N (%) <sup>a</sup>	No. Subject	HIV (%) <sup>b</sup>	Syphilis (%) <sup>b</sup>
No/whatever	14 (3.5)	14	0 (0.0)	2 (14.3)
Who do you think are optimal counselors?				
Clinical doctors	187 (46.9)	182	10 (5.5)	25 (13.7)
CDC staff	219 (54.9)	214	13 (6.1)	27 (12.6)
MSM	164 (41.1)	162	11 (6.8)	25 (15.4)
Psychologist/psychiatrist	218 (54.6)	213	11 (5.2)	30 (14.1)

<sup>a</sup>Proportions were based on data of the 399 men who completed a questionnaire;

<sup>b</sup>HIV+ and syphilis refer to HIV and syphilis infection respectively, % refers to infection rate, as some participants didn't provide blood specimen, the denominators in this column do not necessarily equal to subjects who completed questionnaire survey;

<sup>c</sup>this section can be disaggregated into 11–20 (14.3%, 57/399) and 21–380 (12.0%, 48/399).

**Table 4**Potential factors related to HIV infection among MSMUI<sup>a</sup>

HIV infection				
Variable	Crude OR (95% CI)	<i>P</i>	Adjusted OR (95% CI)	<i>P</i>
Age				
>24	1		1	
≤24	1.03 (0.96–1.10)	0.45	2.85 (1.05–7.75)	0.04
Syphilis infection				
Negative	1		1	
Positive	4.83 (1.80–12.97)	0.002	4.78 (1.68–13.58)	0.003
Bleeding gums/oral ulcer during oral sex				
Never	1		1	
Ever	3.02 (1.14–7.99)	0.026	3.174 (1.13–8.88)	0.028
Used saliva as lubricant in sex				
Never	1		1	
Ever	7.68 (1.01–58.20)	0.049	8.03 (1.03–62.52)	0.047

<sup>a</sup> Analysis performed on the data of the 390 men who completed a questionnaire and provided a blood specimen;

<sup>b</sup> Number of sexual partners and circumcision were included in the logistic regression but were not associated with HIV infection and data were not shown.