



## Sexual Roles, Risk Sexual Behaviours, and HIV Prevalence among Men who Have Sex with Men Seeking HIV Testing in Changsha, China



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**Abstract: Background:** HIV infection is prevalent among men who have sex with men (MSM), and sexual roles may be important factors related to it. This study aims to describe the sexual roles, risky sexual behaviors and HIV prevalence among MSM, and to determine associated factors for HIV prevalence.

**Methods:** A convenient sampling method was used to recruit participants in a non-government organization in Changsha, China. The participants were asked to complete a 38-item self-administered questionnaire regarding demographic characteristics and risky sexual behaviours before collecting blood samples for HIV testing. Chi-square tests and logistic regression analysis were conducted with the Statistical Package for the Social Sciences Version 18.0 and other indexes were statistically described.

**Results:** A total of 601 MSMs who came to a local non-government organization for voluntary counseling and testing completed a pencil-and-paper survey and were tested for HIV. The overall HIV prevalence of this sample was 13.3%, and that of the bottoms (16.3%) was similar to the versatiles (15.9%) but higher than the tops (6.1%). Bivariate analyses showed that there were significant differences in age, marital status, monthly income, sexual orientation, age at first sex, sex of the first sex partner, sex with a woman in the last 6 months, oral sex with a man in the last 6 months and role of oral sex among 3 subgroups of MSM ( $p < 0.05$ ). Multivariate analyses indicated that MSMs who played the role of either the bottoms or the versatiles were more likely to be HIV positive than the tops. While MSMs who used condoms in anal sex in the last 6 months, had sex with a woman in the last 6 months or had oral sex with a man in the last 6 months were less likely to be HIV positive.

**Conclusion:** Different sexual roles are associated with high-risk sexual behaviors among MSMs and their HIV infection status. Further research should target preventive interventions, and improve the effectiveness of the intervention according to the characteristics of the subgroups to reduce the HIV transmission among Chinese MSM.

**Keywords:** Men who have sex with men, sexual roles, risky sexual behaviors, HIV, China, epidemic.

### 1. INTRODUCTION

In China, the prevalence of HIV infection among men who have sex with men (MSM) has drawn much attention from the society [1-3]. According to the Chinese Center for Disease Control and Prevention, 758,610 people were reported cases of people living with HIV/AIDS by the end of 2017 [4], a 14% increase as compared with 2016 [5] and the major route of transmission was sexual contact. HIV incidence among MSMs accounted for 25.5% of the newly

diagnosed cases [4], demonstrating a marked uptrend from 2006 [6]. Furthermore, the nationwide HIV/AIDS prevalence was 7.75% in 2016 [7], lower than that in South Africa (26.8%), Australia (18.3%), and America (14.5%). The HIV prevalence among MSMs in different areas of China ranged from 6.1% to 21.2% [8-12], so the HIV epidemic in China is still a serious problem [13]. In-depth researches on MSM's risk sexual behaviors are urgently needed to develop effective and targeted measurements to curb the epidemic of AIDS among MSMs in China [14, 15].

Researches showed that examining the anal sexual role preference might help in understanding the prevalence of AIDS in MSMs [16, 17]. Sexual roles, as an important factor of MSM's identity [18], had a great impact on sexual

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behaviors [12, 16, 18, 19]. According to the preference for insertive or receptive roles in anal intercourse, MSM are divided into different subgroups: MSM who prefer the insertive position are self-identified as the “top”; those who prefer the receptive position are self-identified as the “bottom”; while those with no strong preference as the “versatile” [18, 20, 21]. The respective proportions of men identifying with each of these roles vary by region, yet most MSMs are self-identified as versatiles [18, 22, 23].

Most studies on sexual roles among MSMs, focused on the HIV prevalence, yet two aspects need further clarification. First, the dominant opinion was that the bottoms and versatiles were more susceptible to the risk of HIV infection than the tops [24, 25], but other researchers believed that HIV prevalence had no difference among the subgroups [18, 26]. Second, previous researchers found that factors such as income, race/ethnic distribution and physical traits were different among sexual roles [18, 27-31], but few kinds of literature focused on the risky sexual behaviours of different sexual roles in the context of Chinese culture. Previous studies examined the sexual behaviours among the subgroups, but with contradictions regarding age distribution and first sex character [26, 32]. Wang Y found that different sexual roles had different demographics, social networks, sexual behaviour characteristics and HIV infection risks [33]. However, other sexual behaviors, such as oral sex, use of condom in oral sex and having sex with females were seldom mentioned in the previous studies. These gaps largely impede the formulation of comprehensive HIV prevention and control strategies targeting MSM group. In this paper, we aimed to describe the sexual roles, high-risk sexual behaviours, and HIV prevalence among MSMs in Changsha, and determine the associated factors for HIV prevalence, which could provide evidence for designing culturally appropriate interventions to reduce the HIV epidemic among MSM in China.

## 2. METHODS

### 2.1. Study Design, Site and Population

The study was conducted at a local non-governmental organization (NGO) which was established in 2008 and located in the urban area of central Changsha, the capital city of Hunan Province in south-central China. Considering the strong discrimination against MSMs in this city, the main approach to involving MSMs in free HIV testing is through NGO services for MSMs. The staff of this organization has been trained for HIV-related counseling services. With guidance and support from the Changsha Centre for Disease Control and Prevention (CDC), HIV prevention services were provided for MSMs, including peer education, condom distribution, and peer support. For MSMs who needed HIV testing service, the NGO staff would provide pre-test counseling, blood sampling, post-test counseling, referral services, as well as continuous support if needed. The NGO staff sent the blood samples to CDC for the screening test (ELISA, Enzyme-linked immunosorbent assay) and confirmatory test (WB, Western Blot). The laboratory test for HIV was free. Some MSMs chose to pay RMB 30 (approximately USD 5) for a rapid test on the site. The site successfully collaborated with the Bill & Melinda Gates and the Global AIDS Foundations and more than 1000 people received HIV testing each year.

We conducted a survey among MSMs in Changsha between April and December 2014. Participants were recruited through announcements posted on instant messaging programs (QQ and WeChat), and at clinics of Changsha CDC and local NGOs which provide free testing services for MSMs. The announcement clearly described the research objectives, participation process, responsible institutions, study site, participant eligibility, benefits and risks, and contact information. Eligibility criteria for MSMs included 16 years of age or older, and reported having sex with another man in the past 12 months. Those with a hearing impairment or mental deficiency or those who were unable to understand survey questions were excluded. Potential participants who came to the local NGO seeking for counseling and testing service were approached by members of our research group together with local NGO staff in a separate room.

The local NGO staff introduced the researchers to the potential participants first, and then the researchers briefed these MSMs as to the purpose of the study, methodology, confidentiality issue, and risks/benefits for participation. The prospective participants were told that they had an absolute freedom on whether to participate in or when to quit the study. It was guaranteed that the following service would not be affected even if they refused to enroll. Of the 720 individuals approached at the local NGO, 615 (85.4%) agreed to participate. Reasons for declining included lack of time (often those MSMs chose a rapid test) and unwillingness to disclose information about risky sexual behaviours. All but 14 questionnaires were valid (97.7%) (*i.e.* with less than 20% of data missing). After signing the informed consent in a separate room, the participants completed a self-administered questionnaire anonymously, which took approximately 10-15min.

A gift package (condoms and water-based lubricant valued at US\$7.9) rather than direct payment was given to the participants as a compensation for time and transportation after the survey. The primary researchers provided their contact information to the participants and promised medical advice and help if needed.

### 2.2. Measures

The questionnaire used in this study was self-developed in Mandarin by the researchers. Based on the literature retrieval, potential variables were selected and basic items were structured. After a pilot-testing among 20 MSMs, the questionnaire was revised, and the final version consisted of 38 questions in 3 areas: sociodemographic information (age, education status, marital status, monthly income, sexual orientation, and residence); sexual roles in anal sex; and sexual behaviours (age at first sex, sex of the first sex partner, anal sex in the last 6 months, condom use frequency for anal sex in the past 6 months, condom use at the last anal sex, sex with a woman in the last 6 months, oral sex with a man in the last 6 months, oral sex role, and use of condom in oral sex in the last 6 months).

HIV prevalence was measured by laboratory testing for HIV antibody. After the survey, blood samples of the participants were collected and HIV laboratory testing was conducted in the lab of Changsha CDC. ELISA was used for the HIV screening, and the results were confirmed with WB.

**Table 1. Sociodemographic characteristics among the MSM (n=601).**

Characteristics	Top N (%)	Bottom N (%)	Versatile N (%)	P-value	HIV-P <sup>a</sup> n (%)	P-value
<b>Age</b>						
≤20 years	3 (1.8)	14 (15.2)	17 (4.9)	<0.001	6 (7.4)	0.087
21~29 years	86 (52.4)	69 (75.0)	226 (65.5)		46 (56.8)	
30~39 years	59 (36.0)	6 (6.5)	83 (24.1)		19 (23.5)	
≥40 years	16 (9.8)	3 (3.3)	19 (5.5)		10 (12.3)	
<b>Education status</b>				0.137		0.075
High school and below	29 (17.7)	21 (22.8)	78 (22.6)		25 (30.9)	
Bachelor's degree	130 (79.3)	65 (70.7)	241 (69.9)		52 (64.2)	
Master's degree and above	5 (3.0)	6 (6.5)	26 (7.5)		4 (4.9)	
<b>Marital status</b>				<0.001		0.708
Unmarried	120 (73.2)	84 (91.3)	295 (85.5)		65 (80.2)	
Married	44 (26.8)	8 (8.7)	50 (14.5)		16 (19.8)	
<b>Monthly income<sup>b</sup></b>				0.003		0.882
≤2000RMB (≤ USD 315.0)	33 (20.1)	37 (40.2)	98 (28.4)		21 (25.9)	
2000~4000RMB (USD 315.0~629.4USD)	73 (44.5)	40 (43.5)	146 (42.3)		37 (45.7)	
≥4000RMB (≥USD629.4)	58 (35.4)	15 (16.3)	101 (29.3)		23 (28.4)	
<b>Sexual orientation</b>				<0.001		0.626
Homosexual/gay	71 (43.3)	77 (83.7)	228 (66.1)		55 (67.9)	
Bisexual	48 (29.3)	10 (10.9)	70 (20.3)		15 (18.5)	
Heterosexual	24 (14.6)	1 (1.1)	24 (6.9)		7 (8.7)	
Uncertain	21 (12.8)	4 (4.3)	23 (6.7)		4 (4.9)	
<b>Residence</b>				0.389		0.450
Hunan province	135 (82.3)	81 (88.0)	297 (86.1)		67 (82.7)	
Others	29 (17.7)	11 (12.0)	(13.9)		14 (17.3)	

a) HIV-P means HIV positive.

b) The average monthly salary of local residents in Hunan was 4,044 yuan (Hunan Statistics Bureau, 2014).

Individuals tested positive were recorded and received referral treatment by the Changsha CDC and the designated hospitals for HIV/AIDS care.

### 2.3. Data Analysis

Epi Data 3.1 was used to store and manage the data, and SPSS (version 18.0) was used for the statistical analysis. Frequencies and percentages were used to describe the sociodemographic variables. Chi-square test was used to compare the differences in variables such as sociodemographic data and risky sexual behaviors among the 3 subgroups. Logistic regression analysis was used to identify factors associated with HIV status. The dependent variable was HIV status, while the independent variables were those risky sexual behaviours, including age at first sex, sex of the first sex partner, anal sex role, anal sex in the last 6 months, condom

use frequency for anal sex in the last 6 months, condom use in the last anal sex, sex with a woman in the last 6 months, oral sex with a man in the last 6 months, oral sex role, and condom use in oral sex in the last 6 months. Backward elimination (Wald) was used to select variables for the multivariable analysis. The significance level in the study was set at 0.05.

## 3. RESULTS

### 3.1. General Information and Distribution of Sexual Roles

The average age of the 601 MSMs was  $28.2 \pm 6.6$  years; Among them, 473 (78.7%) had a college degree or above; 174 (29.0%) had a monthly income of more than 4000RMB (\$630 US dollars); 499 (83.0%) were unmarried; and 376

Table 2. Risk sexual behaviors among the MSM (n=601).

Sexual Behaviors	Top N (%)	Bottom N (%)	Versatile N (%)	P-value	HIV-P <sup>a</sup>	P-value
<b>Age at first sex</b>						
≤17 years	10 (6.1)	22 (23.9)	51 (14.8)	0.001	10	0.910
18-27 years	143 (87.2)	69 (75.0)	274 (79.4)		67	
≥28 years	11 (6.7)	1 (1.1)	20 (5.8)		4	
<b>Sex of the first sex partner</b>						
Male	105 (64.0)	87 (94.6)	278 (80.6)	<0.001	64	0.917
Female	59 (36.0)	5 (5.4)	67 (19.4)		17	
<b>Anal sex in the last 6 months</b>						
Yes	150 (91.5)	76 (82.6)	291 (84.3)	0.057	76	0.029
No	14 (8.5)	16 (17.4)	54 (15.7)		5	
<b>Condom use frequency in anal sex in the last 6 months</b>						
Never	10 (6.7)	3 (4.0)	16 (5.5)	0.381	5	0.029
Sometimes	68 (45.3)	45 (59.2)	136 (46.7)		47	
Always	72 (48.0)	28 (36.8)	139 (47.8)		24	
<b>Condom use in the last anal sex</b>						
Yes	121 (73.8)	71 (77.2)	254 (73.6)	0.779	57	0.473
No	43 (26.2)	21 (22.8)	91 (26.4)		24	
<b>Sex with a woman in the last 6 months</b>						
Yes	45 (27.4)	6 (6.5)	39 (11.3)	<0.001	6	0.050
No	119 (72.6)	86 (93.5)	306 (88.7)		75	
<b>Oral sex with a man in the last 6 months</b>				0.026		0.449
Yes	130 (79.3)	85 (92.4)	289 (83.8)		66	
No	34 (20.7)	7 (7.6)	56 (16.2)		15	
<b>Oral sex role</b>						
Giving	4 (3.1)	38 (44.7)	18 (6.2)	<0.001	8	0.947
Receiving	48 (36.9)	1 (1.2)	26 (9.0)		10	
Both	78 (60.0)	46 (54.1)	245 (84.8)		48	
<b>Condom use in oral sex in the last 6 months</b>						
Yes	9 (6.9)	5 (5.9)	27 (9.3)	0.563	4	0.256
No	121 (93.1)	80 (94.1)	262 (90.7)		62	

a) HIV-P means HIV positive.

(62.6%) were self-identified as gays (Table 1). Among them, 164 (27.3%) identified themselves as tops, 92 (15.3%) as bottoms, and 345 (57.4%) as versatiles. The bottoms were generally younger, with lower monthly income and self-identified as homosexuals. The tops were older, with higher monthly income, more were married, and self-identified as heterosexuals (Table 1).

### 3.2. Sexual Behaviors Among Different Sexual Roles

Bivariate analyses showed significant differences in risky sexual behaviours among the 3 subgroups.

Compared with the tops and the versatiles, the bottoms reported their first sexual encounter at an earlier age (with an average age at  $19.2 \pm 2.9$  years) and were more likely to

**Table 3.** Associated factors of HIV-positive status among the MSMs (n=601).

Variables	$\beta$	S.E.	Wald	P-value	OR <sup>a</sup>	95%CI <sup>b</sup>
<b>Sex roles (vs Tops)</b>						
Bottoms	1.533	0.538	8.107	0.004	4.630	1.612~13.299
Versatiles	1.197	0.479	6.234	0.013	3.309	1.293~8.468
<b>Condom use frequency in anal sex in the last 6 months</b>						
Sex with a woman in the last 6 months	-1.830	0.782	5.481	0.019	0.160	0.035~0.742
Oral sex with a man in the last 6 months	-2.771	0.951	8.497	0.004	0.063	0.010~0.403

a) OR =odds ratio.

b) CI = confidence interval.

report a male as their first sexual partner (94.6%). They were more likely to be engaged in oral sex in the past 6 months (92.4%) and mostly without using condom during oral sex (94.1%). The bottoms were less likely to report sex with a woman in the past 6 months (6.5%) (Table 2).

Compared to the bottoms and the versatiles, the tops were more likely to report a female as their first sexual partner (36.0%), and have had sex with a woman in the last 6 months (27.4%). They were less likely to report oral sex with a man in the last 6 months (79.3%), and were more likely to play a receptive role in the oral sex (36.9%) (Table 2).

The incidence of risky sexual behaviors of the versatiles was between the bottoms and the tops, and they were more engaged both in giving and receiving positions (84.8%) (Table 2).

Report of anal sex in the last 6 months (86.0% overall) did not differ by sexual roles, nor did frequency of condom use in anal sex in the last 6 months and the use of condoms at the last anal sex ( $P>0.05$ ) among the 3 subgroups (Table 2).

### 3.3. HIV Prevalence and Associated Factors

The overall HIV prevalence was 13.3% (80/601), and that for the bottoms was 16.3% (15/92) and 15.9% for the versatiles (55/345), both higher than that for the tops (6.1%; 10/164).

Predictors of HIV status were examined with a multivariate logistic regression. The final model indicated that, compared with the tops, MSM who played the role of either the bottoms (OR 4.630, 95%CI 1.612~13.299) or the versatiles (OR 3.309, 95%CI 1.293~8.468) were more likely to be HIV positive. While those who used condoms in anal sex in the last 6 months (OR 0.544, 95% CI 0.336~0.879), had sex with a woman in the last 6 months (OR 0.160, 95% CI 0.035~0.742) and had oral sex with a man in the last 6 months (OR 0.063, 95%CI 0.010~0.403) were less likely to be HIV positive (Table 3).

## 4. DISCUSSION

This study revealed that nearly one-third of the participants reported their sexual role as the tops, and more than half of them reported being versatiles, while the bottoms

were a little more than fifteen percent. It is close to the results of Wei's and Hart's studies [17, 18]. The total HIV-positive rate among the MSMs in this study was 13.3%, much higher than the national rate (7.7%), lower than the reported rate in western China (21.21%), and closely follows that in Kampala, Uganda (13.7%) [6, 12, 34].

Our study found out that anal sex role was a significant risk factor in HIV infection among the MSMs, and both the bottoms and the versatiles had a higher risk of HIV infection than the tops, which was similar to results in studies conducted in San Francisco, U.S., Australia, Central Africa and western China [12, 18, 24, 35-37], and verified by the systematic review of Zhang [38]. Use of condom in anal sex, having sex with a woman, and having oral sex with a man in the last 6 months were the protective factors, similar to results in studies conducted in India, Vietnam and China [39-41]. Our study implies that understanding the risky sexual behaviors of the 3 subgroups may help in improving the HIV prevention programs.

Both the bottoms and the versatiles prefer passive anal intercourse since the rectal mucosa is very fragile and easy to rupture or bleed without condom use, which may facilitate the invasion of HIV virus [42]. Besides, both bottoms and versatiles had their own risky sexual behaviour.

Our study showed that the bottoms were usually younger, lower income, had the first sexual encounter at an earlier age, which was similar to results in the former studies [12, 18, 43, 44]. We also found that the bottoms had more homosexual behaviors than the other two subgroups. Since the bottoms were often in a submissive position during anal sex [45], with lower income and more emotionally dependent, they enjoy being taken care of [46]. The bottoms might have less autonomy with condom use during anal sex than the tops, so their risk of HIV infection was increased [47]. Furthermore, the younger MSMs were inexperienced [16, 48], which may result in a lower awareness of HIV voluntary counseling and testing service utilization [49], suggesting that young MSM need more safe-sex education, including self-protection awareness, condom negotiation skills [50, 51] and HIV prevention knowledge.

The versatiles have a special risk of sexual behaviors because they play both receptive and insertive roles in the intercourse [52]. Because of the alternate roles, the versatiles

might engage in unprotected anal sex more frequently or have more casual sex partners [12]. As a result, the versatiles are more easily infected through unprotected receptive anal sex and may infect others through unprotected insertive anal sex [12]. So health providers should clearly state the risk of alternate sexual roles and the importance of condom use to help the versatiles with safe sexual behaviors.

Although the tops have a lower HIV incidence than that of the bottoms and versatiles, the risk of their sexual behavior could not be ignored. We found that the tops were generally older, so they tend to have more sexual partners and their risk of infection would increase too [26]. Previous studies indicated that sexual roles may also vary in gay self-identification [17, 26, 30], which was also confirmed in our research. The tops tend to identify themselves as bisexual/heterosexual/uncertain, have more heterosexual activities than the versatiles or the bottoms, which may result in HIV transmission from the tops to their male or female partners [53, 54]. What is worse, some tops believe that they are less likely to be infected owing to their insertive position [33], so they prefer sex without condoms. Therefore, interventions to the tops should focus on strengthening their understanding of the substantial risk of unprotective sexual behaviors, correcting their misconceptions, and encouraging condom use when they have sex with their male or female partners.

Condom use may protect against HIV infection, but we observed a low level of condom use during anal sex in this sample and inconsistent condom use in the last 6 months among MSM, similar to the study by Zhou Qian, *et al.* [55]; only 4.20% MSM used condoms during oral sex in the last 6 months, lower than a study conducted in Chengdu, China [56]. Inconsistent condom use is a common problem among MSM in many countries, especially in the low-income and middle-income countries [57-61]. Condom use in anal sex is associated with partner type [62-65], partner gender [66], anal sexual role [63], peer support [67], and social and culture factors [57, 68]. Another phenomenon we should pay attention to is the high prevalence of condomless oral sex. A study conducted in San Francisco reported that 8% of HIV-positive participants were affected with HIV through oral sex [69], suggesting that unprotected oral sex “carries a small but real risk” [69, 70]. Oral sex was prevalent among MSM and they usually have misconceptions about the risk of HIV infection and transmission via oral sex. Condoms can greatly reduce the risk of HIV infection, so condom use during anal sex or oral sex as an efficient measure should be promoted among all subgroups of MSM. Since many MSM believe that relationship is more important than their health concern in their sexual decision making [45, 71], they attach such symbolic meanings as exclusivity, commitment, intimacy, and possession [72] to condomless sex and internal ejaculation. Therefore, when we design HIV/AIDS prevention measures, we need to consider the culture shared by MSM, and help them minimize that risk of infections [73].

This study also found that having sex with a woman and oral sex with a man in the last 6 months protect against HIV infection. The tops reported more heterosexual activities in this study and with a lower HIV infection rate. In addition, the idea that male homosexuals are high risk for HIV

infection had been recognized worldwide [74-76], therefore, having sex with a woman is identified as a protective factor. G Phillips mentioned that oral sex may reduce the HIV transmission, but further verification is needed [77].

There are some limitations to this study. First, a snowball sampling method was used, so there is a chance that the sample may not represent the whole MSM population in this area very well. Second, although the survey was anonymous, the self-reported information was subjected to social desirability bias and recall bias. Third, a cross-sectional quantitative survey was used in this study, so further longitudinal studies on the sexual roles among MSM are needed.

## CONCLUSION

Different sexual roles are associated with high-risk sexual behaviors of MSM and their HIV infection status. Further research should target preventive interventions, combine their shared culture, and improve the effectiveness of interventions according to the characteristics of the subgroups to reduce the HIV/AIDS epidemic among Chinese MSMs.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Institutional Review Board of the Xiangya School of Nursing, Central South University.

## HUMAN AND ANIMAL RIGHTS

No animal were used in this research. All humans research procedures followed were in accordance with the standards set forth in the Declaration of Helsinki principles of 1975, as revised in 2008 (<http://www.wma.net/en/20activities/10ethics/10helsinki/>).

## CONSENT FOR PUBLICATION

After signing the informed consent in a separate room, the participants completed a self-administered questionnaire anonymously.

## CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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