

Analysis of homosexual behavior characteristics and influencing factors of male college students in Zhejiang Province

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Abstract

The purpose of this study was to understand the homosexual behavior characteristics and influencing factors of male college students and to provide scientific evidence for the prevention of HIV infection in college students.

A self-made online questionnaire was used to collect information on demographic characteristics, sexual attitudes, sexual behaviors, and interventions of the respondents. The χ^2 test was performed on the constituent ratios of different groups, and whether homosexual behavior occurred was the dependent variable. Logistic regression was subsequently used to analyze the influencing factors of male homosexual behavior.

A total of 2665 students were surveyed, including 219 men who have sex with men, accounting for 8.22% of the sample population. Multivariate analysis revealed the following independent influencing factors of homosexual behavior among male college students: the student's household registration was Zhejiang Province, the hometown was in the city, accepted male homosexual sex, had temporary sex in the last year, and awareness that the correct use of condoms can reduce the spread and risk of acquired immunodeficiency syndrome.

Various measures should be enacted to promote human immunodeficiency virus/acquired immunodeficiency syndrome education and intervention among college students, especially emphasizing making friends and advocating safe sex to prevent the spread of the disease.

Abbreviations: 95% CI = 95% confidence interval, AIDS = acquired immunodeficiency syndrome, CDC = Center for Disease Control and Prevention, HIV = human immunodeficiency virus, MSM = men who have sex with men, OR = odds ratio, RMB = Renminbi.

Keywords: HIV, homosexual behavior, male college students, MSM, regression analysis

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1. Introduction

Men who have sex with men (MSM), referred to as men who have had oral or anal sex with men, can be divided into homosexual men, bisexuals, and heterosexuals.^[1,2] MSM is a high-risk group for human immunodeficiency virus (HIV) infection,^[3] representing an important challenge for the prevention and control of the global HIV/acquired immunodeficiency syndrome (AIDS) epidemic.^[4] Studies have shown that the National Health and Nutrition Examination Survey conducted by the United States from 1999 to 2006 found that the HIV infection rate in MSM was 9.4%.^[5] According to the results of a retrospective cohort study in Rome, Italy, the HIV infection rate of MSM in 2009 was 11.7%,^[6] and the HIV infection rate for MSM in sub-Saharan Africa, Caribbean, and Southeast Asia is 17.9%, 25.4%, and 14.7%, respectively.^[7] A cross-sectional survey of 47,231 MSM in 61 cities in China from 2008 to 2009 showed that the HIV infection rate was 4.9%.^[8]

Young MSM are in the sexually active period and represent a major group with homosexual behavior. A cohort study of 494 young MSM in Bangkok, Thailand showed that the HIV infection rate was 7.4%.^[9] An MSM study with 247 mostly young people in Mumbai, India showed an HIV infection rate of 3.2%.^[10] A meta-analysis in China shows that the HIV infection rate of young student MSM is 4.4%,^[11] and those who had unprotected anal intercourse in the last 6 months reached 65.2%

of student MSM.^[12] Studies have shown that MSM accounts for 92% of American college students with HIV infection.^[13] In recent years, the AIDS epidemic among Chinese students has rapidly increased, and a large proportion of young students have been infected with HIV through homosexual behavior.^[14] Chinese sentinel surveillance shows that the HIV antibody positive rate of MSM has remained at about 8% and that HIV-infected persons in the student population have acquired HIV through MSM account for 80% of cases.^[15,16] Therefore, AIDS prevention and control for MSM college students requires urgent attention. This study is based on a large-scale baseline survey of 13 colleges and universities across the province of Zhejiang and explores the characteristics and influencing factors of homosexual behaviors of male college students to provide a scientific basis for formulating health education intervention strategies for college students.

2. Materials and methods

2.1. Participants

In 2018, a survey was conducted among college students from 13 colleges and universities in 11 districts and cities in Zhejiang Province, including 3 in Hangzhou and 1 in other 10 cities. The choice of colleges and universities was recommended by the local Center for Disease Control and Prevention (CDC). This was a province-wide baseline survey of college students. A total of 31,674 students accepted the survey. The survey adopted a stratified cluster sampling method. First of all, the random number table method was used to sample 3 departments in each university. Subsequently, each department was divided into 4 layers according to grades 1–4. The random number table method was used to select classes in each layer for a total of 1241 classes. Using the cross-sectional survey method, students in the school were organized by teachers to fill in the online electronic questionnaires. The students outside the school would be sent the questionnaire network link by the investigator, and they would be asked to complete the questionnaire independently according to the heading of the questionnaire.

The investigators included professionals from the local CDC and counselors from the investigated classes in various universities. They underwent unified training before conducting anonymous surveys using a unified questionnaire. Before the investigation, investigators explained the purpose, significance, investigation method, and privacy protection policy of the research object by placing this information in the opening remarks of the questionnaire. Research subjects were told that the purpose of the survey was to formulate student AIDS and sexually transmitted disease prevention strategies. The survey was anonymous. The survey only analyzed group data, not personal data. This study was reviewed and approved by the Ethics Committee of the Zhejiang Provincial Center for Disease Control and Prevention, and the batch number is 2018-036. All survey subjects signed an informed consent form.

The questionnaire was revised and formulated based on reading domestic and foreign literature and discussed by the research team before performing a preliminary survey among students in a class of a school. The primary content of the questionnaire included general population sociological characteristics, knowledge of AIDS and sexually transmitted diseases, the occurrence of sexual behavior, and acceptance of interventions.

Measurement of condom use efficacy included 3 questions: do you have the confidence to discuss condom use with your partner before you have sex; if your partner refuses to use or does not carry a condom, are you confident not to have sex; and are you confident to prepare condoms before you have sex. There are 5 answer options for each of the 3 questions: extremely confident, very confident, confident, unconfident, and very unconfident, respectively, 3, 2, 1, 0, and –1. The measurement score was divided into 3 groups: 9 points indicate very confident, 5–8 points are confident, and 4 points or less are unconfident. The measured Cronbach alpha coefficient was 0.785.

2.2. Statistical analysis

SPSS software, version 19.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Age, grade, hometown, household registration, family relationship, and sexual behavior characteristics were all expressed by composition ratio or rate. The χ^2 test was used to compare demographic characteristics among young men with different sexual behaviors. The dependent variable was whether self-reported male-to-male behavior had occurred. Independent variables included demographic characteristics, sexual attitudes, acceptance of interventions, and self-efficacy of safe sex practices. Single-factor logistic regression was used to analyze influencing factors of male homosexual behavior. With the occurrence of same-sex sexual behavior as the dependent variable, variables with $P < .1$ in the results of single-factor analysis and demographic characteristics were included as independent variables in the model, and multivariate logistic regression analysis was performed. $P < .05$ was considered statistically significant.

3. Results

3.1. General characteristics of participants

A total of 14,320 male college students were surveyed. Among them, 2665 men self-reported having sex and informing their sexual partners, accounting for 18.61% of the total number of male college students. If the reported sexual partner is male or both male and female, subjects were identified as MSM. Those who reported that their sexual partners were only women were identified as non-MSM. Among respondents, 8.22% (219/2665) were identified as MSM, of which 5.70% (152/2665) exhibited only homosexual behavior, and 2.51% exhibited had both homosexual and heterosexual behavior (67/2665). The ages of 2665 male college students who self-reported sexual behaviors were between 18 and 28 years old, 20.14 ± 1.48 for the MSM group and 20.21 ± 1.40 for the non-MSM group. There was no statistical difference in age, grade, or family relationship between the 2 groups ($P > .05$). The household registration of the MSM group was higher than in the non-MSM group ($P < .05$). The statistical analysis is shown in Table 1.

3.2. Analysis of influencing factors of male college students' MSM behavior

In a univariate analysis, compared to the control group, hometown was from the city, the student's household registration was from Zhejiang Province, and the school had received publicity about HIV testing during the last year, students had accepted one-night stands, accepted commercial sex, accepted male homosexual sex, received voluntary HIV counseling, and

Table 1
Demographic characteristics of 2665 male college students who exhibit sexual behaviors.

	MSM-group (n=219)		Non-MSM group (n=2446)		χ^2	P
	N	%	N	%		
Age (yrs)					0.995	.616
<19	64	29.2	738	30.2		
20–21	122	55.7	1286	52.6		
≥22	33	15.1	422	17.3		
Grade					2.951	.399
Freshman	36	16.4	476	19.5		
Sophomore	66	30.1	758	31.0		
Junior	81	37.0	776	31.7		
Senior	36	16.4	436	17.8		
Household registration*					6.691	.038
Outside of Zhejiang Province	51	23.3	733	30.0		
Zhejiang Province	167	76.3	1711	70.0		
Hometown					17.285	.000
Rural area	104	47.5	1512	61.8		
Town/city	115	62.5	934	38.2		
Monthly living expenses (RMB, yuan)					4.710	.095
≤1000	68	31.1	635	26.0		
1001–1500	70	32.0	952	38.9		
≥1501	81	37.0	859	35.1		
Family relations					0.601	.451
Harmonious	164	74.9	1888	77.2		
General/disharmonious	55	25.1	558	22.8		

MSM = men who have sex with men, RMB = Renminbi.

* There is missing data.

testing services in the past year, had temporary sex in the past year, had sex with a regular partner in the past year, and were very confident in using condoms and more likely to exhibit homosexual behaviors ($P < .05$). Compared to the control group, MSMs were characterized by monthly living expenses of RMB 1001 to 1500, knew that the correct use of condoms could reduce the risk of AIDS transmission, knew that high-risk sexual behaviors should induce the initiative to seek AIDS counseling and testing, knew that the CDC provides AIDS testing services, and were less likely to have homosexual sex ($P < .05$).

In a multivariate analysis, compared to the control group, hometown was a city (odds ratio [OR]=1.65, 95% confidence interval [CI]=1.09–2.50), and the student’s household registration is Zhejiang Province (OR=1.64, 95% CI=1.08–2.47), they accepted male homosexual sex (OR=24.03, 95% CI=16.27–35.49), had temporary sex in the past year (OR=4.15, 95% CI=2.84–6.06) were more likely to exhibit homosexual behaviors. This group was also characterized by knowing that consistent use of condoms can reduce the risk of AIDS transmission (OR=0.18, 95% CI=0.08–0.40), and knew this was more likely not to occur in homosexual behaviors.

Among the 2665 subjects, 1779 students self-reported that they had sex with a regular partner in the past year. Analyzing the relevant influencing factors of these 1779 students, results showed that compared those with a sex partner in the same school, a sex partner who is a social person (OR=2.64, 95% CI=1.75–3.98) is more likely to have male homosexual behaviors, while a partner who is a student from another school (OR=0.46, 95% CI=0.31–0.69) is less likely to exhibit male homosexual behaviors. Compared to the never using condoms group, male homosexual behaviors were less likely to occur from those who used condoms ($P < .05$). These results are shown in Table 2.

4. Discussion

This was a cross-sectional survey of college students conducted in colleges and universities across the province, which more comprehensively reflects the characteristics and influencing factors of same-sex behavior among male college students in Zhejiang Province. Results demonstrated that the proportion of male college students who had sex was 18.61%. The proportion of boys who have had sex with men who also have sex with men has reached 8.22%, which is higher than a study that reported 3.7% from students at 2 colleges in Zhejiang in 2003.^[17] This shows that the proportion of male college students in Zhejiang Province who have homosexual behaviors is increasing, which may be affected by factors such as the development of the Internet and the popularity of dating software. Increasing MSM make friends through the internet, which has caused increasing concern about the spread of HIV.^[18,19] Therefore, it is necessary to address the safety of homosexual behaviors and the influence of the internet in college sex education.

The results of this study suggest that increased students in the MSM group received the school’s HIV testing promotion, HIV voluntary counseling and testing, and exhibited condom use confidence compared to the non-MSM group. However, the correct use of condoms can reduce the risk of infection and transmission of HIV, and the correct rate of seeking HIV counseling and testing after high-risk sexual behavior was lower in MSM compared to non-MSM students. In the past year, the rate of condom use with fixed sexual partners was low. The results of this study demonstrated that the rate of condom consistent use in the MSM group was 28.3%, which is lower than in the non-MSM group (54.0%). At present, the sex education of Chinese college students is still insufficient and their sexual health is not optimal.^[14] Therefore, during the process of publicity and education for MSM college students, it is necessary to emphasize

Table 2
Influencing factors analysis of homosexual behaviors with 2665 male college students.

	MSM group (n=219)		Non-MSM group (n=2446)		Univariate analysis		Multivariate analysis	
	n	%	n	%	OR (95%CI)	P	OR (95%CI)	P
Age (yrs)								
≤19	64	29.2	738	30.2	1		1	
20–21	122	55.7	1286	52.6	1.09 (0.80–1.50)	.577	1.13 (0.76–1.69)	.544
≥22	33	15.1	422	17.3	0.90 (0.58–1.40)	.643	1.16 (0.67–2.03)	.598
Hometown								
Rural area	104	47.5	1512	61.8	1		1	
Town	36	16.4	350	14.3	1.50 (1.01–2.22)	.047	1.14 (0.69–1.88)	.621
City	79	36.1	584	23.9	1.97 (1.45–2.68)	<.001	1.65 (1.09–2.50)	.019
Household register*								
Outside of Zhejiang Province	51	23.3	733	30	1		1	
Zhejiang Province	167	76.3	1711	70	1.40 (1.01–1.94)	.041	1.64 (1.08–2.47)	.020
Monthly living expenses (RMB, yuan)								
≤1000	68	31.1	635	26.0	1		1	
1001–1500	70	32.0	952	38.9	0.69 (0.49–0.97)	.034	0.82 (0.52–1.29)	.383
≥1501	81	37.0	859	35.1	0.88 (0.63–1.24)	.461	0.74 (0.47–1.19)	.213
Whether consistent use of condoms could reduce the risk of HIV infection and transmission?								
No	34	15.5	69	2.8	1		1	
Yes	185	84.5	2377	97.2	0.16 (0.10–0.25)	<.001	0.18 (0.08–0.40)	<.001
Should you actively seek HIV counseling and testing after high-risk sex?								
No	35	16.0	101	4.1	1		1	
Yes	184	84.0	2345	95.9	0.23 (0.15–0.34)	<.001	0.91 (0.43–1.91)	.797
Have you received the school's publicity about HIV testing in the last year?								
No	63	28.8	954	39.0	1		1	
Yes	156	71.2	1492	61.0	1.58 (1.17–2.15)	.003	1.34 (0.91–1.98)	.140
Can you accept one-night stand?								
No	66	30.1	1218	49.8	1		1	
Yes	153	69.9	1228	50.2	2.30 (1.71–3.10)	<.001	0.91 (0.56–1.47)	.694
Can you accept commercial sex?								
No	97	44.3	1709	69.9	1		1	
Yes	122	55.7	737	30.1	2.92 (2.20–3.86)	<.001	0.88 (0.55–1.40)	.589
Can you accept male homosexual sex?								
No	77	35.2	2281	91.8	1		1	
Yes	142	64.8	165	6.7	25.49 (18.53–35.08)	<.001	24.03 (16.27–35.49)	<.001
Do you know that the CDC provides HIV testing services?								
No	36	16.4	247	10.1	1		1	
Yes	183	83.6	2199	89.9	0.57 (0.39–0.84)	.004	0.95 (0.54–1.67)	.862
Have you received voluntary HIV counseling and testing in the past year?								
No	189	86.3	2315	94.6	1		1	
Yes	30	13.7	131	5.4	2.81 (1.84–4.28)	<.001	1.03 (0.56–1.88)	.935
Has temporary sex occurred in the past year								
No	91	41.6	1991	81.4	1		1	
Yes	128	58.4	455	18.6	6.16 (4.62–8.20)	<.001	4.15 (2.84–6.06)	<.001
Have sex with a regular partner in the past year*								
No	54	25.4	775	32.4	1		1	
Yes	159	74.6	1620	67.6	1.41 (1.02–1.94)	.036	1.13 (0.76–1.68)	.544
Self-efficacy measurement of condom use*								
4 points and below	56	26.2	682	28.5	1		1	
5–8 points	56	26.2	852	35.6	0.80 (0.55–1.18)	.256	0.87 (0.54–1.43)	.590
9 points	102	47.7	856	35.8	1.45 (1.03–1.18)	.032	0.97 (0.61–1.54)	.891
Types of regular sex partners in the last year (n=1779)*								
Own school students	78	49.4	713	44.5	1		—	
Other school students	37	23.4	740	46.2	0.46 (0.31–0.69)	<.001		
Social person	43	27.2	149	9.3	2.64 (1.75–3.98)	<.001		
Use of condom during sex with a regular partner in the last year (n=1781)								
Never use	77	48.4	107	6.6	1		—	
Sometimes/frequently used	37	23.3	637	39.3	0.08 (0.05–0.13)	<.001		
Use every time	45	28.3	876	54.0	0.07 (0.05–0.11)	<.001		

CDC=Center for Disease Control and Prevention, CI=confidence interval, HIV=human immunodeficiency virus, MSM=men who have sex with men, OR=odds ratio, RMB=Renminbi.

* There is missing data.

the unity of knowledge and action, to increase the use of condoms that prevent the spread of diseases.

The results of this study suggest that the MSM group's acceptance of sexual attitudes, such as one-night stands, commercial sex, and homosexual behavior, was higher than in the non-MSM group, suggesting that the MSM group's sexual attitudes are more open. At the same time, judging from the student's household registration and hometown location, male college students whose household registration was in Zhejiang Province and those from cities were more likely to exhibit homosexual behavior. This finding is more consistent with the existing research reports that urban young men exhibit increased same-sex sexual behavior due to more social support, loose and tolerant interpersonal communication, and easy acceptance of personal behaviors.^[20,21] Studies have shown that family sex education plays a significant role in enhancing young people's self-control ability and in reducing risky sexual behaviors, and early provision of HIV/AIDS prevention education is a protective factor for college students' sexual behavior.^[22,23] Therefore, it is necessary to promote family sex education and guide students to have correct concepts and attitudes concerning sex.

The results of this study showed that 29.2% of students in the MSM group were ≤ 19 years old, and 58.4% had temporary sex in the past year. In addition, 27.2% of the MSM group who had sex with a regular partner in the past year were social persons, which was significantly higher than in the non-MSM group, suggesting that MSM are more likely to have contact with social persons on campus. Although MSM students generally exhibit behaviors placing them at high risk for AIDS and have a high awareness of testing services, only 13.7% of them had received voluntary HIV counseling and testing in the past year. Compared to students in the non-MSM group, knowing the information provided by the CDC on HIV testing services was not as adequate as their counterparts. Studies have shown that the proportion of HIV-positive MSM who contracted HIV through unprotected sex was more than two-thirds, and HIV spreads rapidly in urban MSM, while the sexual partner's notification of HIV infection can reduce the risk of HIV transmission.^[24,25] Therefore, for behavioral intervention in MSM college students, it is necessary to increase participation and accuracy of the CDC and other professional departments in the behavioral intervention of MSM, and emphasize the importance of informed friendships.

The results of this study suggest that the MSM group accepts voluntary counseling and testing, knows that the CDC provides testing services, knows who should actively seek AIDS counseling and testing after high-risk sexual behaviors, accepts one-night stands and commercial sex, has high confidence in condom use, has household registration in Zhejiang Province, has hometown that is a city, accept male homosexual behaviors, knows that insisting on using condoms correctly can reduce the risk of infection and transmission of AIDS, and has had temporary sex in the past year affect the occurrence of homosexual behavior among male college students. Therefore, these influencing factors need to be the focus of publicity and education for HIV/AIDS prevention in colleges and universities.

This study has some limitations. First, this research is a cross-sectional survey, and causal inferences cannot be made about the influencing factors identified. Second, the content of the survey was self-reports of research subjects, which may be biased. In addition, the questionnaire was not designed specifically for MSM. The questionnaire lacks information about the time of first sex, the number of sexual partners, condom use,

accessor/recipient, and sex aids. The conclusions of this study require further research to verify the results.

In conclusion, MSM college students are prone to temporary sexual behaviors, low condom use rates, insufficient willingness to actively test, and separation of knowledge, beliefs, and practices for AIDS prevention and treatment, which have led to a more severe AIDS epidemic in this population. Therefore, it is necessary to take multiple measures to promote the education and intervention of HIV/AIDS among college students, such as actively guide students to establish correct sexual concepts (eg, reduce the number of sexual partners, maintain a fixed sexual partner, reduce the number of temporary sexual behaviors, etc), emphasize informed friendship, advocate safe sex, and prevent the spread of diseases.

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