

# BMJ Open Risky sexual behaviour and HIV testing uptake among male college students: a cross-sectional study in China

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## ABSTRACT

**Objective** To understand the sexual behaviours and HIV testing uptake of sexually experienced male college students in China.

**Design** A cross-sectional study was conducted between September and November of 2020 among male college students.

**Setting** Hangzhou, China.

**Participants** Male students who had sexual experience in the previous year were investigated.

**Outcome measures** Sexual risk behaviour was defined as having multiple sexual partners or having unprotected sex.

**Results** More than half of the sexually experienced male students (556, 53.2%) had their first sexual intercourse under the age of 18 years old. Among participants, 32.82% (343/1045) had causal sex in the last 6 months; 4.21% (44/1045) had paid sex; 37.32% (390/1045) had sex with other men and had two or more sexual partners in last half year; and 33.33% (130/390) used psychoactive drugs during same-sex intercourse. Only 33.5% (350/1045) of male students had undertaken an HIV test before.

**Conclusion** Male college students especially men who have sex with men were at risk because they tended to be sexually adventurous, have sex at an early age, have sex with multiple sexual partners and practice unprotected sex. Furthermore, they had a low HIV testing uptake. This highlights the importance of carrying out targeted and timely HIV risk education towards college students.

## INTRODUCTION

In 2020, it was reported that there were 37.7 million people living with HIV/AIDS and 1.5 million people were infected globally during that year.<sup>1</sup> Recently, the overall incidence of HIV has seen a decline, but the rates of HIV infection among young people have increased disproportionately. Worldwide, 32% of newly infected cases were young people aged 15–24 years.<sup>1</sup> In addition, UNICEF reported that young people living with HIV/AIDS had increased by 480 000 from 2000 to 2018.<sup>2</sup> In China, more worryingly, the number of new HIV infections among college students has increased significantly with an annual growth rate of 30%–50% in recent years.<sup>3</sup> In 2017, the

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Due to the significant increase of new HIV infections among male college students and the lack of effective measures implemented, we analysed the risky sexual behaviours and HIV testing uptake among sexually experienced college students to provide evidence for health-related policy.
- ⇒ Considering that most of HIV new infections are among male college students and are transmitted mainly by sex with other men, homosexual organisations were contacted to serve as the location to collect data among sexually experienced male students. Thus, future research should be cautiously interpreted regarding the study populations.
- ⇒ A broader perspective on the susceptibility of young students including female students towards contracting HIV is needed for future study.
- ⇒ Because sex-related issues are often influenced by socially desirable answers, the participants may have overestimated their condom use during sexual intercourse.

number of newly diagnosed students went up to 3077, which was 10 times higher than that of 10 years ago, and nearly 10 college students were infected with HIV each day, predominantly male students.<sup>4</sup> Under this background, the Chinese Center for Disease Control and Prevention (China CDC) started to provide anonymous HIV urine-testing services through vending machines in some universities.<sup>3</sup>

Greater society is now becoming more and more tolerant and open regarding the topic of sex, and the ways to obtain sexual satisfaction are more diversified.<sup>5</sup> The environment at colleges is sexually permissive, and it is where young students with different backgrounds and sexual orientations meet and live together without parental supervision and related administrative restrictions.<sup>6</sup> In addition, with the popularity of the internet and the rise of mobile social media software, college students are exposed to sexual content from various channels, making it more convenient to access various potential

**Table 1** Basic information of male college students who have had sexual experiences

Items	Number	Percentage (%)
Age (years)		
≤19	73	7.0
19–22	740	70.8
23–25	189	18.1
≥26	43	4.1
Stages of the study		
Professional training	95	9.1
Bachelor	830	79.4
Master	100	9.6
PhD	20	1.9
Years in school*		
1	208	22.0
2	308	32.6
3	228	24.2
4	176	18.6
5	18	1.9
≥6	6	0.6
Field of study		
Health science	86	8.2
Non-health science	959	91.8
Residence		
Urban	770	73.7
Rural	275	26.3
Sexual orientation		
Heterosexual	539	51.6
MSM	372	35.6
Bisexual	134	12.8
Age of first sexual intercourse		
≤14	41	3.9
15–18	515	49.3
19–22	465	44.5
≥23	24	2.3
Have you had a boyfriend or girlfriend in the past year?		
Yes	851	81.4
No	194	18.6
How many boyfriends or girlfriends have you had in the past year?		
1	539	51.6
2	213	20.4
≥3	293	28.0

\*111 (9.7%) participants did not report 'the years in school'.  
MSM, men who have sex with men.

sexual partners. For example, about 50% of Chinese young people (aged 18–25 years old), especially male young people, regularly surf the largest homosexual social network app (ie, Blued) in China,<sup>7</sup> which may increase the chances for them to have partners who do not disclose HIV status. Moreover, the cultural stigma

surrounding HIV means that the group of individuals may wish to conceal their status and become 'invisible' HIV transmitters in the population.<sup>8,9</sup>

Social pluralism brings about not only a diversified way of sexual satisfaction but also the threat of sexual risk, especially for college students who are sexually active. As explained by *risk society theory*, hazards exist due to the environment as well as the stress generated by individuals.<sup>10</sup> Besides the open attitude's environment to sex, for the sex education environment, sex education in China's colleges presents a kind of performance style, monotonous in form and content, expecting students to learn by themselves.<sup>11</sup> Thus, understanding the risky sexual behaviours of college students is imperative for the benefit of all of society.

Until now, we have little information about the sexual behaviours and HIV testing uptake among sexually experienced male college students in China. Due to the significant increase of new HIV infections among male college students and the lack of effective measures implemented, there is an urgent need to understand the sexual behaviours and HIV testing uptake of sexually experienced male college students in China. Specifically, how many sexually experienced male students are involved in HIV-related risky sexual behaviours in colleges? How many of these sexually experienced male students take part in HIV testing and know their status?

## METHODS

### Study area and period

A cross-sectional study was conducted among male college students in Hangzhou located in Zhejiang province, eastern China. Hangzhou is a city with an area of 16 850 km<sup>2</sup> inhabited by a population of 11.93 million with a per capita gross domestic product of 152 000 (US\$23 890). As an important educational centre, there are 44 higher institutions of higher education, and all these 44 colleges located in Hangzhou city were chosen as the investigation sites for this research conducted from September to November 2020. Similar to other education institutions across the whole country, sex education is not a compulsory course in Hangzhou.

### Participants and data collection

Considering the significant increase of new HIV infections occurs among male college students and these are transmitted mainly by having sex with other men, we conducted the survey in the context of colleges and homosexual organisations to more effectively locate sexually experienced male students. All college students (≥18 years) who were studying in institutions of higher education in Hangzhou were invited to participate in the investigation, but only male students who had had a sexual experience in the previous year were incorporated into the analysis. In total, 2108 students were surveyed and 1045 sexually experienced male students were incorporated into our analysis.

**Table 2** Sexual behaviours among sexually experienced male university students by age

Items	Total	Age group (, %)				P value
		≤19	19–22	23–25	≥26	
First sexual experience						
Protection used during first sexual intercourse						0.220
Condom used	832 (79.62)	55 (75.34)	599 (80.95)	142 (75.13)	36 (83.72)	
None	213 (20.38)	18 (24.66)	141 (19.05)	47 (24.87)	7 (16.28)	
Type of first partner						0.259
Love object	791 (75.69)	54 (73.97)	573 (77.43)	134 (70.90)	30 (41.10)	
Casual sexual partner	206 (19.71)	15 (20.55)	133 (17.97)	47 (24.87)	11 (15.07)	
Paid sex partner	39 (3.73)	3 (4.11)	28 (3.78)	7 (3.70)	1 (1.37)	
Fixed sexual partner	9 (0.86)	1 (1.37)	6 (0.81)	1 (0.53)	1 (1.37)	
Mean age at first sexual intercourse	18.40±2.09	16.86±1.48	18.21±1.82	19.20±2.374	20.81±2.75	0.000
Time since first sexual intercourse (year)	3.19±2.24	2.12±1.48	2.76±1.84	4.50±2.37	6.79±3.12	0.000
Sexual experience in the last 6 months						
Have you had sex with a casual partner						0.000
Yes	343 (32.82)	31 (42.47)	210 (28.38)	87 (46.03)	15 (34.88)	
No	702 (67.18)	42 (57.53)	530 (71.62)	102 (53.97)	28 (65.12)	
Type of casual partner						0.063
Internal student	83 (24.20)	10 (32.26)	53 (25.24)	18 (20.69)	2 (6.45)	
External student	55 (16.03)	5 (16.13)	41 (19.52)	8 (9.20)	1 (3.23)	
Non-student	84 (24.49)	9 (29.03)	46 (21.90)	22 (25.29)	7 (22.58)	
Internal+external student	25 (7.29)	1 (3.23)	16 (7.62)	7 (8.05)	1 (3.23)	
Internal student+non-student	23 (6.71)	2 (6.45)	9 (4.29)	11 (12.64)	1 (3.23)	
External student+non-student	44 (12.83)	4 (12.90)	26 (12.38)	11 (12.64)	3 (9.68)	
Internal student+external student+non-student	41 (11.95)	0 (0.00)	19 (9.05)	10 (11.49)	12 (38.71)	
Number of casual partners						0.214
1	142 (41.40)	15 (48.39)	93 (44.29)	27 (31.03)	7 (46.67)	
2	71 (20.70)	3 (9.68)	45 (21.43)	21 (24.14)	2 (13.33)	
≥3	130 (37.90)	13 (41.94)	72 (34.29)	39 (44.83)	6 (40.00)	
Protection used during most recent sexual intercourse with casual partner						0.432
Condom used	308 (89.80)	27 (87.10)	186 (88.57)	82 (94.25)	13 (86.67)	
None	35 (10.20)	4 (12.90)	24 (11.43)	5 (5.75)	2 (13.33)	
Have you had a partner who paid for sex						0.619
Yes	44 (4.21)	5 (6.85)	31 (4.19)	6 (3.17)	2 (4.65)	
No	1001 (95.79)	68 (93.15)	709 (95.81)	183 (96.83)	41 (95.35)	
Type of partner who paid for sex						0.852
Internal student	13 (29.55)	2 (40.00)	9 (29.03)	1 (16.67)	1 (50.00)	
External student	2 (4.55)	0 (0.00)	2 (6.45)	0 (0.00)	0 (0.00)	
Non-students	20 (45.45)	1 (20.00)	14 (45.16)	4 (66.67)	1 (50.00)	
Internal+external student	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
Internal student+non-student	2 (4.55)	1 (20.00)	1 (3.23)	0 (0.00)	0 (0.00)	
External student+non-student	3 (6.82)	0 (0.00)	2 (6.45)	1 (16.67)	0 (0.00)	
Internal student+external student+non-student	4 (9.09)	1 (20.00)	3 (9.68)	0 (0.00)	0 (0.00)	
Number of paid sex partners						0.301
1	20 (45.45)	3 (60.00)	14 (45.16)	1 (16.67)	2 (100.00)	
2	14 (31.82)	0 (0.00)	11 (35.48)	3 (50.00)	0 (0.00)	
≥3	10 (22.73)	2 (40.00)	6 (19.35)	2 (33.33)	0 (0.00)	

Continued



Table 2 Continued

Items	Total	Age group (, %)				P value
		≤19	19–22	23–25	≥26	
Protection used during most recent sexual intercourse with paid partner						0.278
Condom used	35 (79.55)	3 (60.00)	27 (87.10)	4 (66.67)	1 (50.00)	
None	9 (20.45)	2 (40.00)	4 (12.90)	2 (33.33)	1 (50.00)	
Have had a same-sex partner						0.000
Yes	390 (37.32)	25 (34.25)	251 (33.92)	93 (49.21)	21 (48.84)	
No	655 (62.68)	48 (65.75)	489 (66.08)	96 (50.79)	22 (51.16)	
Type of same-sex partner						0.009
Internal student	90 (23.08)	8 (32.00)	63 (25.10)	15 (16.13)	4 (19.05)	
External student	55 (14.10)	3 (12.00)	37 (14.74)	10 (10.75)	5 (23.81)	
Non-student	88 (22.56)	4 (16.00)	59 (23.51)	23 (24.73)	2 (9.52)	
Internal+external student	27 (6.92)	2 (8.00)	20 (7.97)	4 (4.30)	1 (4.76)	
Internal student+non-student	26 (6.67)	1 (4.00)	14 (5.58)	7 (7.53)	4 (19.05)	
External student +Non-student	53 (13.59)	6 (24.00)	31 (12.35)	11 (11.83)	5 (23.81)	
Internal student+external student+non-student	51 (13.08)	1 (4.00)	27 (10.76)	23 (24.73)	0 (0.00)	
Condom use during sex with same-sex partner						0.265
Never	18 (4.62)	2 (8.00)	14 (5.58)	1 (1.08)	1 (4.76)	
Sometimes	81 (20.77)	7 (28.00)	52 (20.72)	17 (1.08)	5 (23.81)	
Always	291 (74.62)	16 (64.00)	185 (73.71)	75 (1.08)	15 (71.43)	
Number of same-sex partners*						0.019
1	168 (43.08)	7 (29.17)	122 (48.61)	31 (33.70)	8 (38.10)	
2	80 (20.51)	7 (29.17)	51 (20.32)	17 (18.48)	5 (23.81)	
≥3	140 (35.90)	10 (41.67)	78 (31.08)	44 (47.83)	8 (38.10)	
Have had sex with same-sex partner when using psychoactive drugs						0.100
Yes	130 (33.33)	7 (28.00)	76 (30.28)	38 (40.86)	9 (42.86)	
No	260 (66.67)	18 (72.00)	175 (69.72)	55 (59.14)	12 (57.14)	

\*2 (0.5%) participants did not report 'the number of same-sex partners'.

The questionnaire regarding sexual behaviours and HIV testing was designed based on the guidelines of intervention work for the prevention of HIV/AIDS among men who have sex with men (MSM) issued by China CDC and our previous study.<sup>9</sup> However, some questions were amended to meet the purpose and population of this study. The following information of male college students was collected: sociodemographic characteristics (eg, age, education and residence), sex-related information (eg, sex orientation, age of first sex, partner during first sexual intercourse and related information on boyfriends/girlfriends), sexual behaviours in the past 6 months (eg, commercial; sex with other men; casual, group, type and number of corresponding sexual partners; condom use and psychoactive drug use during sex with other men), HIV test experience and willingness to get tested. Type of partners included internal students who studied in the same college with the participant, external students who studied in different colleges with the participant or non-students who were working or unemployed.

### Data analysis

Sociodemographic data related to the male college students were analysed using descriptive statistics with frequency and percentage. Binary logistic regression model was used to examine the influencing factors of undertaking risky sexual behaviours, having an HIV test and intending to get tested for HIV. Sexual risk behaviour was defined as having multiple sex partners or having unprotected sex. Independent variables included age, stage of study, years of schooling, field of study, residence, sexual orientation, age of first sexual intercourse, having a boyfriend or girlfriend, and numbers of boyfriends or girlfriends in the past year. Unprotected sex was defined as a sexual experience without condom use in the last 6 months no matter casual, paid or with other men. In order not to influence the results of the original data, we eliminated the missing data in the specific analysis, but the percentage of missing data has been reported as the notes after the corresponding tables. All data analysis was based on the statistical software SPSS V.23.0 software.

**Table 3** Factors for having risky sexual behaviours among sexually experienced male college students

Variables	Having multiple partners			Having unprotected sex risk behaviours					
	n (%)	Crude OR	P value	Adjusted OR	P value	Crude OR	P value	Adjusted OR	P value
Age (years )									
≤19	22 (30.14)	1.000	1.000	1.000	1	38 (52.05)	1	1	
19–22	194 (26.22)	1.516	0.302	3.154	0.081	285 (38.51)	0.663	1.581	0.432
23–25	83 (43.92)	1.840	0.059	3.250	0.020	100 (52.91)	1.149	2.261	0.080
≥26	17 (39.53)	0.835	0.601	1.080	0.866	18 (41.86)	0.641	0.849	0.697
Stages of the study									
Professional training	32 (33.68)	1.000	1.000	1.000	1	47 (49.47)	1	1	
Bachelor	234 (28.19)	1.312	0.591	0.820	0.775	337 (40.60)	0.438	0.241	0.030
Master	42 (42.00)	1.698	0.253	0.978	0.972	51 (51.00)	0.627	0.268	0.032
PhD	8 (40.00)	0.921	0.868	1.090	0.888	6 (30.00)	0.412	0.524	0.275
Years in school*									
1	58 (27.88)	1.000	1.000	1.000	1	96 (46.15)	1	1	
2	85 (27.60)	5.172	0.062	4.053	0.227	124 (40.26)	2.333	1.35	0.768
3	58 (25.44)	5.247	0.058	3.311	0.299	85 (37.28)	2.968	1.545	0.668
4	74 (42.05)	5.862	0.044	3.706	0.256	86 (48.86)	3.365	1.715	0.595
5	7 (38.89)	2.757	0.249	1.800	0.612	8 (44.44)	2.093	1.574	0.657
≥6	4 (66.67)	3.143	0.248	4.958	0.208	4 (66.67)	2.5	2.408	0.434
Field of study									
Non-health science	293 (30.55)	1.205	0.462	0.898	0.749	406 (42.34)	1.07	0.874	0.632
Health science	23 (26.74)	1.000	1.000	1.000	1	35 (40.70)	1	1	
Residence									
Urban	235 (30.52)	1.000	0.741	1.000	1	323 (41.95)	1	1	
Rural	81 (29.45)	0.951	0.790	0.790	0.252	118 (42.91)	1.04	0.845	0.334
Sexual orientation									
Heterosexual	58 (10.76)	1.000	1.000	1.000	1	127 (23.56)	1	1	
MSM	185 (49.73)	9.925	0.000	7.311	0.000	227 (61.02)	6.005	4.516	0.000
Bisexual	73 (54.48)	1.210	0.346	0.887	0.617	87 (64.93)	1.182	1.029	0.902
Age of first sexual intercourse									
≤14	21 (51.22)	1.000	1.000	1.000	1	27 (65.85)	1	1	
15–18	190 (36.89)	1.796	0.072	0.990	0.980	241 (46.80)	2.193	1.596	0.251
19–22	98 (21.08)	3.932	0.000	2.152	0.066	162 (34.84)	3.607	2.005	0.095
≥23	7 (29.17)	2.550	0.087	3.353	0.069	11 (45.83)	2.279	2.154	0.229

Continued



Table 3 Continued

Variables	Having multiple partners			Having unprotected sex risk behaviours		
	n (%)	Crude OR	Adjusted OR	n (%)	Crude OR	Adjusted OR
Have you had a boyfriend or girlfriend in the past year?						
Yes	246 (28.91)	1.000	1.000	332 (39.01)	1	1
No	70 (36.08)	1.388	0.147	109 (56.19)	2.005	0.613
How many boyfriends or girlfriends have you had in the past year?						
1	88 (16.33)	1.000	1.000	159 (29.50)	1	1
2	94 (44.13)	4.319	16.727	113 (53.05)	3.257	4.082
3	134 (45.73)	1.067	3.803	169 (57.68)	1.206	1.795

\*30 (9.5%) participants who had more than one sexual partner did not report 'the years in school'. 38 (8.6%) participants who had unprotected sex behaviours did not report the years in school.  
MSM, men who have sex with men.

Variables with p values of <0.05 were considered as statistically significant.

### Patient and public involvement

Patients or the public were not involved in the design, reporting or dissemination plans of our research.

## RESULTS

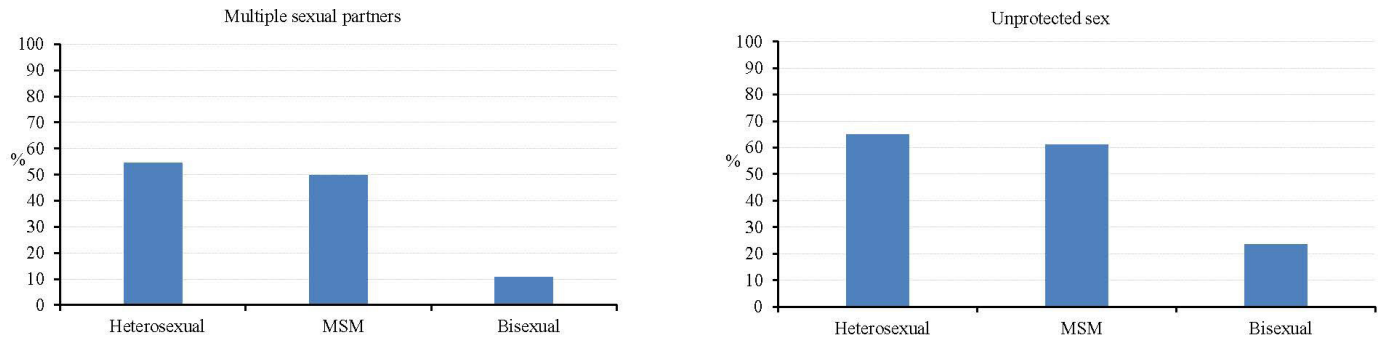
### Basic characteristics

Table 1 shows the basic information of male college students who have had sexual experiences. Among the participants, 70.8% (740/1045) were 19–22 years old and 79.4% (830/1045) were students pursuing a bachelor's degree. Most participants (959, 91.8%) were not studying health science. Almost half of participants (506, 48.4%) identified as MSM and bisexual. More than half of male students (556, 53.2%) had their first sexual intercourse before the age of 18. In addition, 48.4% (506/1045) of male students had at least two boyfriends or girlfriends in the previous year.

### Risky sexual behaviours and influencing factors

The sexual behaviours among sexually experienced male college students by age are shown in table 2. For male college students, the mean age of first sexual intercourse was 18.40±2.09. Among men, 32.82% (343/1045) had casual sex in the last 6 months, and of these individuals, 58.60% had more than one casual sex partner; 4.21% (44/1045) had paid sex; and 54.55% had more than one paid sex partner in the last 6 months; 37.32% (390) had a same-sex partner and 56.92% had more than one same-sex partner in the last 6 months; 33.33% (130/390) used psychoactive drugs during same-sex sexual intercourse. The sex partners of sexually experienced male students included students (from the same college and other colleges) and 'non-students' in society. The mean age of first sexual intercourse among male students of different ages was statistically different (p<0.05), and younger male college students tended to have sex at an earlier age (16.86, 18.21, 19.20 and 20.81 for ≤19, 19–22, 23–25 and ≥26 years students, respectively). Male students aged 23–25 years preferred to have casual sex partners compared with those aged 19–22 years and ≥26 (p<0.05), and tended to have more than one sexual partner, although there was no statistical significance (p>0.05). Although some male students used psychoactive drugs during sex with other men, age did not show any statistical significance.

Factors for undertaking risky sexual behaviours including having multiple sex partners and unprotected sex behaviours among male college students were also examined (table 3). It showed that students who were MSM and had no girlfriend or boyfriend tended to have multiple sex partners (p<0.05). In addition, students who were MSM preferred to engage in unprotected sex behaviours (p<0.05). Specifically, 61.0% and 49.7% of students who were MSM had multiple sex partners



**Figure 1** Risky sexual behaviour by sexual orientation. MSM, men who have sex with men.

and unprotected sex, respectively, in the last 6 months (figure 1). For heterosexual students, 23% and 10.8% had multiple sex partners and unprotected sex, respectively.

### HIV test and influencing factors

Regarding the HIV test history and intention to test for HIV, only 33.5% (350/1045) of male students had undergone an HIV test before, and 73.3% (767/1045) were willing to undergo an HIV test in the future. In table 4, we also found that MSM tended to have a higher tendency to get tested for HIV compared with heterosexual students ( $p < 0.05$ ). Students who had multiple sex partners and a perceived risk of being infected with HIV were more willing to undergo HIV tests compared with their counterparts ( $p < 0.05$ ).

### DISCUSSION

We found that risky sexual behaviours are not uncommon among sexually experienced male college students. The percentage of having casual sex and sex with other men were more than 30%, and students aged 23–25 years old and who were MSM tended to have multiple sexual partners and unprotected sexual behaviours ( $p < 0.05$ ). It is evident that MSM had a high frequency of engaging in sexual intercourse.<sup>12</sup> This subgroup should be given greater attention so as to lower the risk of HIV infection in the college setting. More than half (53.2%) of sexually experienced male students had their first sexual intercourse before the age of 18. This is consistent with findings from studies in the USA and Europe that college students initiate sexual behaviour quite early.<sup>13 14</sup> This earlier sexual behaviour may lead to an elevated risk of HIV infection.<sup>10</sup>

Despite the fact that male college students in China were engaged in various risky HIV behaviours, such as having first sexual intercourse at an early age; having casual sex, paid sex, same-sex, multiple sex partners; using psychoactive drugs; and engaging in unprotected sex behaviours. This group had poor perception of HIV risk, and almost half of male students (46.9%) thought it was impossible for them to be infected with HIV. This sense of invulnerability had also been verified as a crucial factor for HIV testing in our study ( $p < 0.05$ ). In addition, it is evident that early diagnosis and knowing of HIV

status can prevent HIV transmission,<sup>15 16</sup> but only a small proportion (~30%) of the sexually experienced male young students had ever been tested for HIV. Although men who had a perceived risk of being infected with HIV and those who had multiple sex partners and unprotected sex tended to accept HIV testing in the past ( $p < 0.05$ ), the testing rate was very low (40.72% for the perceived HIV risk group and 50%–60% for having multiple sex partners and unprotected sex). In light of this, the willingness and acceptance of HIV testing among college students is an urgent public health concern.

In addition, among sexually experienced male students, 35.6% identified as MSM and 12.8% identified as bisexual. There may be the two main reasons. First, the study population in the study is sexually experienced male students rather than general college students. Second, considering the significant increase of new HIV infections occurs among male college students and HIV infections are transmitted mainly by sex with other men, we conducted the survey in the context of colleges and homosexual organisations in order to find out a sufficient representation of sexually experienced male students. This may cause a higher percentage of MSM and bisexual individuals among the sexually experienced male students. Moreover, previous studies have also shown that male students are more likely to report non-heterosexual orientation.<sup>17</sup> Reasons for this may vary and may include the open sexual consciousness and more tolerant culture of MSM. Previous studies showed a mixed association between age and condom use in colleges,<sup>18</sup> which may imply that because of the impact of traditional culture, sex education and social environment, condom use among college students with a qualification (eg, master or PhD) did not tend to increase or does not represent the students in bachelor programmes who tended not use condom in sexual behaviours. Our study also did not show significant differences between age and risky sexual behaviours.

### Implications of the findings

In our study, high-risk sexual behaviours were evident in all grades of colleges. Therefore, comprehensive interventions, including sexual health education in colleges, making HIV testing more accessible on campuses and



**Table 4** Demographic characteristics, risk behaviours and their association with HIV test and intention to test for HIV

Variables	Have ever tested for HIV				Will test for HIV in the future				
	Yes	COR	P value	AOR	Yes	COR	P values	AOR	P value
Age (years )	n (%)				n (%)				
≤19	14 (19.18)	1		1	51 (87.93)	1		1	
19–22	215 (29.05)	4.846	0.000	2.957	534 (87.68)	1.693	0.467	0.965	0.974
23–25	98 (51.85)	2.808	0.000	1.445	145 (93.55)	1.732	0.370	1.09	0.923
≥26	23 (53.49)	1.068	0.846	0.827	37 (92.50)	0.851	0.813	0.598	0.522
Stage of study									
Professional training	32 (33.68)	1		1	71 (88.75)	1		1	
Bachelor	253 (30.48)	4.594	0.004	4.172	599 (88.61)	2.05E+08	0.998	4.49E+07	0.998
Master	51 (51.00)	5.321	0.000	3.714	79 (89.77)	2.08E+08	0.998	5.05E+07	0.998
PhD	14 (70.00)	2.242	0.126	2.674	18 (100.00)	1.84E+08	0.998	1.13E+08	0.998
Years in school*									
1	51 (24.52)	1		1	145 (85.29)	1		1.00E+00	
2	91 (29.55)	15.392	0.014	11.021	223 (88.14)	2.79E+08	0.999	1.79E+08	0.999
3	70 (30.70)	11.923	0.025	7.325	161 (90.96)	2.17E+08	0.999	1.49E+08	0.999
4	87 (49.43)	11.286	0.028	6.572	140 (93.33)	1.61E+08	0.999	1.09E+08	0.999
5	11 (61.11)	5.115	0.140	4.293	17 (100.00)	1.15E+08	0.999	1.20E+08	0.999
≥6	5 (83.33)	3.182	0.334	6.269	6 (100.00)	1	1.000	1.723	1.000
Field of study									
Non-health science	312 (32.53)	0.609	0.030	0.543	704 (88.44)	0.364	0.093	0.401	0.229
Health science	38 (44.19)	1		1	63 (95.45)	1		1	
Residence									
Urban	243 (31.56)	1		1	562 (87.95)	1		1	
Rural	107 (38.91)	1.381	0.027	1.391	205 (91.93)	1.56	0.105	1.837	0.068
Sexual orientation									
Heterosexual	48 (8.91)	1		1	356 (83.57)	1		1	
MSM	240 (64.52)	8.808	0.000	5.02	314 (95.44)	1.907	0.070	2.965	0.030
Bisexual	62 (46.27)	0.474	0.000	0.42	97 (90.65)	0.463	0.070	0.727	0.543
Age of first sexual intercourse									
≤14	27 (65.85)	1		1	33 (86.84)	1		1	

Continued



Table 4 Continued

Variables	Have ever tested for HIV			Will test for HIV in the future					
	Yes	COR	P value	AOR	P values	AOR	P values	AOR	P value
	n (%)						n (%)		
15–18	186 (36.12)	3.411	0.000	2.034	0.109	0.763	372 (89.64)	0.45	0.155
19–22	124 (26.67)	5.304	0.000	3.41	0.007	0.888	342 (88.14)	0.526	0.270
≥23	13 (54.17)	1.632	0.352	2.283	0.251	0.33	20 (95.24)	0.17	0.187
Do you have a boyfriend or girlfriend?									
Yes	273 (47.23)	1		1		1	632 (89.52)	1	
No	77 (39.69)	1.393	0.043	0.723	0.353	0.753	135 (86.54)	0.454	0.145
How many boyfriends or girlfriends do you have?									
1	148 (27.46)	1		1		1	397 (89.62)	1	
2	89 (41.78)	1.659	0.001	1.112	0.742	0.796	164 (89.62)	1.531	0.404
3	113 (38.57)	0.875	0.466	0.88	0.7	0.796	206 (87.29)	1.789	0.263
Do you have multiple sex partners?									
Yes	193 (61.08)	1		1		1	252 (91.64)	1	
No	157 (21.54)	0.175	0.000	0.468	0.001	0.653	515 (87.73)	1.408	0.404
Are you having unprotected sex?									
Yes	223 (50.57)	1		1		1	335 (90.54)	1	
No	127 (21.03)	0.26	0.000	0.677	0.065	0.752	432 (87.80)	1.046	0.894
Perceived risk of being infected with HIV									
Impossible	124 (25.31)	0.493	0.000	0.857	0.403	0.273	303 (81.89)	0.33	0.000
Possible	226 (40.72)	1		1		1	464 (94.31)	1	
*35 (10%) participants who had tested for HIV did not report 'the years in school'. 73 (9.5%) participants who will test for HIV did not report the years in school. MSM, men who have sex with men.									



offering peer education programmes on HIV/AIDS, should be implemented in China. In fact, sex education should be carried out at an early stage (ie, high school) in one's life. However, in China, precollege education is mainly focused on academic studies. Because of the sensitivity of sex as a topic in traditional Chinese culture, most colleges in China are unable to implement sexual health education with an open and accepting attitude.<sup>17</sup> Therefore, it is important that both educators and parents take on the responsibility to help foster an open environment for sexual health education for students. In recent years, although some colleges have carried out sex education courses, they are more so 'symbolic' and lack any substantive content. In addition, considering the increasingly open sexual consciousness and high-risky sexual behaviours of college students, providing 'sexual development'-related health courses is important. Moreover, to lessen adverse outcomes from sexual behaviour, education initiatives on early pregnancy and care, high-risk sexual behaviours and prevention of HIV and STDs should also be strengthened. Regarding the low rate of HIV testing among sexually experienced college students, strategies must be implemented to make HIV testing more accessible on campus. Therefore, to increase the uptake of HIV testing among young students, a national scale-up of fast testing methods is strongly suggested.

## CONCLUSION

Male college students especially MSM are at risk of HIV infection because they tend to be sexually adventurous, often having sex at an early age, having sex with multiple sexual partners and practising unprotected sex. In addition, they have a low HIV testing uptake. This highlights the importance of carrying out targeted and timely HIV/AIDS risk education towards college students on campus, for example, providing sexual health education in colleges, making HIV testing more accessible on campuses and offering peer education programmes on HIV/AIDS for college students.

## Limitations

Our study is subject to some limitations. First, considering the high infection rate of HIV among male college students in China recently, we only investigated one specific population group: male individuals studying in colleges. Future studies are encouraged to add data on female college students. Second, owing to the large number of higher education institutions, our study collected data only from colleges located in Hangzhou, China. Further studies are needed to gain broader perspectives on the susceptibility of the young students towards contracting HIV. Third, because sex-related issues are often influenced by socially desirable answers, there is a possibility that college students in our study may have overestimated their condom use during sexual intercourse or concealed their high-risk sexual behaviours. Thus, the findings might be subject to social desirability

bias. Fourth, considering the investigation was conducted in the context of colleges and homosexual organisations in order to better locate sexually experienced male students, this may have resulted in an over-representation of MSM and bisexual individuals among the sexually experienced male students. Moreover, the survey refusal rate may be higher, considering the sensitivity of sexual health; however, the refusal rate was not recorded in this study, which may not provide references for future studies. In addition, the questionnaire used was designed based on previous work and amended according to our research participants and objectives. Thus, the validity of the questionnaire in the survey needs to be further tested. Last but not least, some factors (ie, alcohol abuse, internet usage, physical violence, sexual harassment and mental health) may have a significant influence on the risky sexual behaviours of college students; hence, future studies should also pay more attention to these factors.

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