

# BMJ Open HIV knowledge, sexual practices, condom use and its associated factors among international students in one province of China: a cross-sectional study

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**To cite:** Zhou Q, Wu W, Yi M, *et al.* HIV knowledge, sexual practices, condom use and its associated factors among international students in one province of China: a cross-sectional study. *BMJ Open* 2022;**12**:e058108. doi:10.1136/bmjopen-2021-058108

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-058108>).

Received 07 October 2021  
Accepted 30 May 2022



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## ABSTRACT

**Objective** China has seen an increasing number of international students in recent years, mostly from Africa and Asia. However, little is known about these students' HIV knowledge, sexual practices and potential HIV risk. This study aimed to describe HIV-related risk among international students.

**Design** An online cross-sectional survey.

**Setting** 10 universities situated in one province of China.

**Participants** 617 international students filled out the questionnaire and 607 international students were included in this study.

**Primary and secondary outcome measures** Socio-demographic and programme-related characteristics, HIV-related knowledge, sexual practices and other HIV/sexually transmitted infection-related variables. Logistic regression analyses were performed to examine factors associated with inconsistent condom use among international students.

**Result** The results showed that in total, only 51.6% (313/607) of international students had adequate HIV-related knowledge, and 64.9% (394/607) reported not receiving any HIV related education or training while studying in China. Moreover, 32.3% (196/607) reported having penetrative sex including oral, vaginal and anal sex during the period in which they studied in China and among them. The proportions of inconsistent condom use in vaginal and oral intercourse while studying in China were 52.6% (50/95) and 79.5% (35/44), respectively, with casual partners, and 60% (80/129) and 91.2% (52/57) with regular partners, respectively. Female gender, being married and having multiple sexual partners were associated with inconsistent condom use.

**Conclusion** The present study indicated that international students in one province of China have suboptimal HIV-related knowledge, significant unprotected sex, less HIV testing and less safe sex education, which highlights an urgent need to provide HIV education and related health services to international students in China.

## INTRODUCTION

China has become one of the main host countries for international students studying in Asia. With the One Belt and One Road Initiative, the number of international students in China has increased rapidly in recent years, with approximately 500 000 in 2018.<sup>1</sup> Many

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This is the first study that focuses on the sexual practices of international students in China, which have been overlooked during past years considering the increasing number of international students coming to China and the increasing HIV epidemic among college students in China.
- ⇒ A significant proportion of international students practice unprotected sexual behaviours, but receive less HIV-related education, which calls for urgent educational interventions among this group of young people in China.
- ⇒ The sample is not representative because of the non-probability sampling method and there is potential information bias due to the self-report data and social desirability on the sensitive sex-related questions. Thus, one should be cautious when generalising the results to a larger group of international students in China.

international students came from African and Asian countries, and these two continents accounted for over 80% of total HIV cases globally.<sup>2</sup> Due to cultural differences and inequity in health education background, international students might have different levels of HIV-related knowledge, attitudes and sexual practices, which leads to concerns about their HIV infection risk.

There are two main justifications for this concern. First, international students, as a special international traveller group, have longer and more immersive experiences than other travellers, and they might be more likely to engage in sexual practices or have high-risk sexual behaviours during these times. Previous literature indicated that international travellers were more likely to engage in casual sex and unprotected sex abroad.<sup>3,4</sup> According to the pooled prevalence from 22 studies, 20.4% of international travellers reported having a new sexual partner



abroad and only 42.6% of them used condoms.<sup>4,5</sup> Because of their relatively high rates of risky sexual behaviours, a meta-analysis showed that international travellers with casual sexual partners had three times greater risk of acquiring a sexually transmitted infection (STI).<sup>5</sup> As a special group of international travellers, international students may be more likely to engage in unprotected sex, engage in commercial sex and have multiple partners compared with local students, as has been shown among international students in the UK.<sup>6</sup> The increased rates of unprotected sex may be due to the individual, interpersonal and social cultural factors. Several studies have determined the risk factors associated with unprotected sex among international travellers included being single,<sup>7</sup> travelling alone<sup>7</sup> or without a regular partner,<sup>8</sup> long-term travel<sup>7</sup> and a previous history of casual sex during travel.<sup>9</sup> In addition, a sense of curiosity and freedom from moral constraints in their home countries might make international students more willing to engage in high-risk behaviours,<sup>5</sup> such as smoking, alcohol use, substance use and risky sexual behaviour.<sup>10</sup> Moreover, peer influence acts as a potential interpersonal pressure for unprotected sex. According to a systematic review, individuals who were influenced by peers were 3.4 times more likely to engage in risky sexual practices.<sup>11</sup> In term of the social cultural influences, Hoffman's<sup>12</sup> and Parrado's<sup>13</sup> studies suggested that the acculturation experience increased the possibility of high-risk sexual practices, which has been seen as a maladaptive strategy to deal with stress.

Second, international students are at a sexually-active age, and the HIV and STIs prevalence among young people are alarmingly increasing worldwide.<sup>14</sup> Based on a UNAIDS report in 2021, young people aged 15–24 years old accounted for 27% of 3.37 million new HIV infections globally.<sup>14</sup> Similarly, in China, around 3000 students per year were infected with HIV and 98.6% of these infections were acquired through sexual transmission.<sup>15</sup> According to the Chinese Center for Disease Control and Prevention (China CDC), the number of HIV-positive international students increased from 13 in 2010 to 100 in 2017, accounting for 4.6% of all HIV positive foreign residents.<sup>16</sup> Increased knowledge about HIV and STIs could be a prerequisite for reducing unprotected sexual behaviour.<sup>17</sup> However, literature shows that international students in China lack adequate sex and HIV-related knowledge.<sup>18,19</sup> One study showed that compared with domestic students, international students had a lower level of HIV knowledge<sup>18</sup> and another study showed that only 60% of them had adequate HIV-related knowledge.<sup>19</sup> However, both studies were conducted at only a single university.

With the increasing number of international students in China, little is known about their HIV-related knowledge and sexual practices, especially unprotected sex and associated factors among this group of young people. Therefore, this study aims to describe HIV-related knowledge, sexual practices, condom use status and HIV testing experience and examine the influencing factors associated with inconsistent condom use among international

students in one Province of China. Results could provide preliminary epidemiological evidence for researchers, educators and public policymakers to provide HIV-related health education and services for international students in China.

## METHODS

### Study design

An online cross-sectional survey was conducted among international students in one Province of central south China from March to July 2019.

### Participants and study settings

This study was conducted in a south central province of China, which has 66.5 million people.<sup>20</sup> There were 43 133 cumulative HIV cases diagnosed by the end of 2020, and 93.8% were infected through sexual contact; the HIV prevalence among young people in this province is increasing.<sup>15</sup> According to the Education Bureau of the Province, there were 5074 international students studying in the Province in 2019.<sup>21</sup> All of the international students had a physical examination before coming to China, which included HIV/STIs status. The target population were those international students studying in the top 10 universities situated in two major cities; these universities hosted about 90% of the total international students in the province. The international students were recruited for the study if they met the following criteria: (a) holding student visas and pursuing a bachelor's, master's or doctoral degree in the targeted universities, (b) understanding English and (c) willing to voluntarily participate in the survey. Those international students who had (a) grown up in China (lived in China before college) or (b) participated in other intervention studies were excluded.

### Data collection procedure

Data were collected using the web-based survey tool Sojump (Changsha Ran Xing InfoTech, China, www.sojump.com). After getting permission from each university, flyers were posted on bulletin boards at the selected universities as well as on social media programmes such as QQ and WeChat groups set up especially for international students in each university. Those who were interested in this study could scan the QR code on the flyer and initiate the screening. Only those who were eligible for the study were presented with informed consent on their smartphone or computer. Only if the participants clicked the 'Informed and Agree' button, could they start to fill out the questionnaire. Each smartphone or computer IP address was restricted so that it could only be used to fill out the survey a single time. Questionnaires completed in less than 8 min were deemed invalid. This was based on pilot work in which we invited 58 international students to test the questionnaire before the formal investigation. Among these students, the average time to fill out the questionnaire was 8 min, and the average score for the 'easy understanding' item

was 9.2 based on a Likert-10 scale. After submitting the survey, each participant received 10 RMB (Chinese Yuan, approximately equal to US\$1.5) as compensation for their time.

## Measurements

*Socio-demographic and programme-related characteristics:* Age, gender, country of origin, marital status, living site, major, study programme, tuition resources, time spent in China and being covered by any medical insurance were collected.

*HIV-related knowledge:* An eight-item HIV-knowledge questionnaire developed by China CDC in 2016 was used to assess HIV-related knowledge.<sup>22</sup> This scale has been widely used among youth in China.<sup>23 24</sup> Each item could be answered 'True', 'False' or 'Unclear'. Only the correct answer was given one point. If the total score was over 5, it indicated that the participant had adequate HIV-related knowledge.

*Sexual practices:* A 22-item questionnaire was developed based on a previous questionnaire exploring sexual behaviours among Chinese men who have sex with men.<sup>25</sup> We only adopted the items addressing the type of sexual partner (eg, regular sex or casual sex partner), sexual behaviour (eg, oral sex, anal sex or vaginal sex) and condom use behaviours (condom use frequency for each type or pattern of sexual behaviour). For the response to condom use, we used a 5-point Likert scale instead of the 3-point Likert scale used in the original version. The content validity of this new instrument was (content validity index) 0.92, which was calculated by inviting five experts for evaluation. The test-retest reliability in this study was 0.88.

We first asked the participants whether they had sexual intercourse while studying in China. Those who reported 'yes' would continue to answer whether they had regular sex, casual sex, commercial sex and/or group sex. Regular sex was defined as having sex with regular partner(s); casual sex was defined as having sex with a casual partner(s) (including 'hook up' and 'friends with benefits relationship'); commercial sex was defined as paying for sex or getting paid for sex; and group sex was defined as having sex with more than one partner at one sexual event. Participants who reported any of these sexual behaviours were then asked to report the types of sex (oral, anal and vaginal), and the frequency of using condoms for each sexual behaviour (every time, most of the time, sometimes, seldom, never). The number of sexual partners during the previous 6 months was also collected.

*Other HIV/STIs-related variables:* Data on HIV testing experience (either having a test at HIV Voluntary Counseling & Testing (VCT) centres or hospitals, or home by using self-test kits), STIs experience and having received any kinds of HIV/STIs-related education (classes, lectures, brochures, etc) in China were also collected.

## Data analysis

The online data were directly exported into SPSS V.26.0. After data cleaning and double-checking by two authors, further data analyses were performed. Initially, categorical variables were described using frequency and percentage, and continuous variables were described using mean and SD.  $\chi^2$  tests were used to determine the associations between categorical variables, including consistent condom use (those who used a condom in every act of sexual intercourse were classified as 'consistent condom use' and recorded as '0', otherwise they were classified as 'inconsistent condom use' and recorded as '1'). Finally, multivariate logistic regression was used to identify the factors influencing inconsistent condom use, and all significant variables ( $p$  value  $\leq 0.05$ ) in bivariate analyses were entered into a forward stepwise logistic regression at the 95% CI. Only variables with a  $p$  value  $\leq 0.05$  were retained in the final model.

## Patient and public involvement

No patients were involved.

## RESULTS

In total, 617 participants filled out the questionnaire. Among those, 10 were duplicates, yielding a final sample of 607 valid questionnaires (98.4%). The mean age was 26 years (range 18–52, SD 5.37). Most were from Asia (65.8%), men (66.1%), unmarried (84.7%) and undergraduate students (67.9%). Around half (57.8%) of the participants were majoring in medicine, and 42.5% were supported by scholarships from the Chinese government. About 14% of the participants were living off campus and 30% were not covered by any medical insurance. (table 1)

### Sexual practices while studying abroad

Of the 607 participants, 196 (32.3%) reported having sex while studying in China; There were significant differences among participants in having sex during the study period by age ( $p < 0.001$ ), marital status ( $p < 0.001$ ), region of origin ( $p < 0.001$ ), study programmes ( $p < 0.001$ ), major ( $p = 0.002$ ) and the amount of time staying in China ( $p < 0.001$ ) (table 1).

Among the 196 students who reported engaging in sexual behaviours, 186 (94.9%) identified as heterosexual and 97 (49.5%) reported having multiple sexual partners, with a median of 2.99 partners (range 1–11). Furthermore, 169 (86.2%) reported they had regular sexual partners and 106 (54.1%) reported having casual sexual partners, 21 (10.7%) of the participants reported having commercial sex and 14 (7.1%) reported having group sex. More specifically, the number who practiced oral, anal and vaginal sex were 72 (36.7%), 23 (11.7%) and 158 (80.6%), respectively.

In addition, compared with women, male international students were more likely to have casual sex (59.7% vs 41.9%,  $p = 0.020$ ), commercial sex (14.9% vs 1.6%,  $p = 0.005$ ) and multiple sexual partners (56.7% vs 33.9%,

**Table 1** Characteristics of international students (n=607)

	Total (n, %)	Reporting having no sex during studying in China (n=411) (n, %)	Reporting having had sex during studying in China (n=196) (n, %)	$\chi^2$	P value
<b>Age</b>				18.20	<0.001
18–30	480 (79.1)	345 (83.9)	135 (68.9)		
>30	127 (20.9)	66 (16.1)	61 (31.1)		
<b>Region of origin</b>				28.41	<0.001
Africa	125 (20.6)	79 (19.2)	46 (23.5)		
Asia	454 (74.8)	325 (79.1)	129 (65.8)		
Europe	20 (3.3)	5 (1.2)	15 (7.7)		
Oceania	2 (0.3)	1 (0.2)	1 (0.5)		
South and North America	6 (1.0)	1 (0.2)	5 (2.6)		
<b>University</b>				23.10	0.006
A University	165 (27.2)	91 (22.1)	74 (37.8)		
B University	63 (10.4)	47 (11.4)	16 (8.2)		
C University	87 (14.3)	69 (16.8)	18 (9.2)		
D University	21 (3.5)	15 (3.6)	6 (3.1)		
E University	51 (8.4)	32 (7.8)	19 (9.7)		
F University	41 (6.8)	30 (7.3)	11 (5.6)		
G University	90 (14.8)	60 (14.6)	30 (15.3)		
H University	60 (9.9)	45 (10.9)	15 (7.7)		
I University	16 (2.6)	11 (2.7)	5 (2.6)		
J University	13 (2.1)	11 (2.7)	2 (1.0)		
<b>Gender</b>				0.69	0.408
Female	206 (33.9)	144 (35.0)	62 (31.6)		
Male	401 (66.1)	267 (65.0)	134 (68.4)		
<b>Married status</b>				32.98	<0.001
Married	93 (15.3)	373 (90.8)	141 (71.9)		
Single	514 (84.7)	38 (9.2)	55 (28.1)		
<b>Living site</b>				0.31	0.578
On campus	524 (86.3)	357 (86.9)	167 (85.2)		
Out of campus	83 (13.7)	54 (13.1)	29 (14.8)		
<b>Major</b>				9.29	0.002
Medicine	351 (57.8)	255 (62.0)	96 (49.0)		
Others	256 (42.2)	156 (38.0)	100 (51.0)		
<b>Studying programme</b>				30.12	<0.001
Bachelor	412 (67.9)	308 (75.1)	104 (53.1)		
Master	158 (26.0)	86 (21.0)	72 (36.7)		
PhD	37 (6.1)	16 (3.9)	20 (10.2)		
<b>Tuition source</b>				14.97	0.001
By Chinese government	258 (42.5)	153 (63.9)	105 (53.6)		
By their country government	18 (3.0)	12 (5.0)	6 (3.1)		
By themselves	331 (54.5)	246 (31.0)	85 (43.4)		
<b>Time spent in China (years)</b>				19.26	<0.001
<1	7 (1.2)	6 (1.5)	1 (0.5)		
1–2	428 (70.5)	311 (75.7)	117 (59.7)		
>2	172 (28.3)	94 (22.9)	78 (39.8)		
<b>Medical insurance</b>				0.07	0.789
Yes	423 (69.7)	285 (69.3)	138 (70.4)		
No	184 (30.3)	126 (30.7)	58 (29.6)		



**Table 2** The sexual practice of international students who reported having sex during study in China (n=196 )

Items	Total n (%)	Male (n=134) n (%)	Female (n=62) n (%)	$\chi^2$	P value
Sexual orientation				0.46	0.796
Heterosexuality	186 (94.9)	128 (95.5)	58 (93.5)		
Homosexual	4 (2.0)	1 (0.7)	1 (1.6)		
Bisexual	8 (4.1)	5 (3.7)	3 (4.8)		
The number of sexual partner(s)				8.85	0.003
Single	99 (50.5)	58 (43.3)	41 (66.1)		
Multiple	97 (49.5)	76 (56.7)	21 (33.9)		
Have you had regular sexual partners during the China study period?				8.96	0.003
No	27 (13.8)	50 (37.3)	10 (16.1)		
Yes	169 (86.2)	84 (62.7)	52 (83.9)		
Have you had casual sexual partners during the China study period?				5.39	0.020
No	90 (45.9)	54 (40.3)	36 (58.1)		
Yes	106 (54.1)	80 (59.7)	26 (41.9)		
Have you had commercial sexual partners during the China study period?				7.85	0.005
No	175 (89.3)	114 (85.1)	61 (98.4)		
Yes	21 (10.7)	20 (14.9)	1 (1.6)		
Have you had group sex during the China study period?				0.73	0.394
No	182 (92.6)	123 (91.8)	59 (95.2)		
Yes	14 (7.1)	11 (8.2)	3 (4.8)		
Have you had oral intercourse during the China study period?				0.01	0.943
No	124 (63.3)	85 (63.4)	39 (62.9)		
Yes	72 (36.7)	49 (36.6)	23 (37.1)		
Have you had anal intercourse during the China study period?				2.44	0.118
No	173 (88.3)	115 (85.8)	58 (93.5)		
Yes	23 (11.7)	19 (14.2)	4 (6.5)		
Have you had vaginal intercourse during the China study period?				0.16	0.692
No	38 (19.4)	27 (20.1)	11 (17.7)		
Yes	158 (80.6)	107 (79.9)	51 (82.3)		

p=0.003). Female international students were more likely to have regular sex partners (83.9% vs 62.7%, p=0.003) compared with their male counterparts (table 2).

### Condom use

Among the 196 international students who reported having sex while studying in China, about three fifths of them (62.0%, 80/129) did not consistently use condoms when having vaginal intercourse, and 91.2% (52/57) of them did not consistently use condoms when having oral intercourse with their regular sexual partners. When having sex with casual partners, the proportions of inconsistent condom use in vaginal and oral intercourse were 52.6% (50/95) and 79.5% (35/44), respectively. Only 12 participants reported

having anal sex and 9 of them did not consistently use condoms. In terms of commercial sexual practices, 7 out of 18 reported inconsistent condoms use for vaginal intercourse, and 4 out of 7 reported inconsistent condom use for oral sex (table 3). In addition, compared with men, female students who reported having vaginal intercourse with their regular partners (75.0% vs 54.3%, p=0.019) and casual partners (77.3% vs 45.2%, p=0.08) were more likely not to use a condom (table 3).

### HIV/STIs-related variables

Among the 607 participants, around half (51.6%) had adequate HIV-related knowledge. Nearly two-thirds (64.9 %) reported not receiving any HIV/STIs-related

**Table 3** The condom use status of international students who reported having sex during the study in China (n=196)

Categories	Total n (%)	Male (n=134) n (%)	Female (n=62) n (%)	$\chi^2$	P value
<b>Regular sexual partner</b>					
Oral intercourse				1.52	0.218
Inconsistent condom use	52 (91.2)	32 (86.5)	20 (100)		
Consistent condom use	5 (8.8)	5 (13.5)	0 (0.0)		
Anal intercourse				0.00	1.000
Inconsistent condom use	10 (66.7)	8 (66.7)	2 (66.7)		
Consistent condom use	5 (33.3)	4 (33.3)	1 (33.3)		
Vaginal intercourse				5.47	0.019
Inconsistent condom use	80 (62.0)	44 (54.3)	36 (75.0)		
Consistent condom use	49 (38.0)	37 (45.7)	12 (25.0)		
<b>Casual sexual partner</b>					
Oral intercourse				0.15	0.703
Inconsistent condom use	35 (79.5)	25 (78.1)	10 (83.3)		
Consistent condom use	9 (20.5)	7 (21.9)	2 (16.7)		
Anal intercourse				0.00	1.000
Inconsistent condom use	9 (75.0)	8 (72.7)	1 (100)		
Consistent condom use	3 (25.0)	3 (27.3)	0 (0.0)		
Vaginal intercourse				6.97	0.080
Inconsistent condom use	50 (52.6)	33 (45.2)	17 (77.3)		
Consistent condom use	45 (47.4)	40 (54.8)	5 (22.7)		
<b>commercial sexual partner</b>					
Oral intercourse				0.00	1.000
Inconsistent condom use	4 (57.1)	3 (50.0)	1 (100)		
Consistent condom use	3 (42.9)	3 (50.0)	0 (0.0)		
Anal intercourse				-	-
Inconsistent condom use	2 (50.0)	2 (50.0)	0 (0.0)		
Consistent condom use	2 (50.0)	2 (50.0)	0 (0.0)		
Vaginal intercourse				-	-
Inconsistent condom use	7 (38.9)	7 (38.9)	0 (0.0)		
Consistent condom use	11 (61.1)	11 (61.1)	0 (0.0)		
<b>Group sexual partners</b>					
Oral intercourse				0.39	0.530
Inconsistent condom use	50 (52.6)	30 (42.9)	20 (100)		
Consistent condom use	40 (44.4)	40 (57.1)	0 (0.0)		
Anal intercourse				-	-
Inconsistent condom use	3 (50.0)	3 (100)	0 (0.0)		
Consistent condom use	3 (50.0)	3 (100)	0 (0.0)		
Vaginal intercourse				0.00	1.000
Inconsistent condom use	5 (41.7)	4 (40.0)	1 (50.0)		
Consistent condom use	7 (58.3)	6 (60.0)	1 (50.0)		

education during their study in China, and around two-thirds (67.1%) reported having taken an HIV test. More specifically, for those who reported having sex in China, over one-fifth (21.4%) reported not taking an HIV test during the study period. In addition, only nine participants reported having been diagnosed with an STIs before coming to China, and among those participants, four reported having sex while studying in China (table 4).

#### Factors associated with inconsistent condom use

Bivariate analyses in table 5 show that factors associated with inconsistent condom use included gender, marital status, living site, number of sexual partners and university.

The final regression model is shown in table 6. Female students were 3.38 times more likely not to use condoms consistently compared with male students (OR=3.38,

**Table 4** HIV/STDs-related variables among international students (n=607)

	Total (n, %)	Reporting having no sex during studying in China (n=411) (n, %)	Reporting having had sex during studying in China (n=196) (n, %)	$\chi^2$	P value
HIV-related knowledge (score)				8.65	0.003
1–5	294 (48.4)	216 (52.6)	78 (39.8)		
6–8	313 (51.6)	195 (47.4)	118 (60.2)		
HIV testing				17.39	<0.001
Yes	407 (67.1)	253 (61.6)	154 (78.6)		
No	200 (32.9)	158 (38.4)	42 (21.4)		
STDs infection				0.62	0.432
Yes	9 (1.5)	5 (1.2)	4 (2.0)		
No	598 (98.5)	406 (98.8)	192 (98.0)		
Received sexual/HIV-related education in China				0.36	0.548
Yes	213 (35.1)	146 (35.5)	67 (34.2)		
No	394 (64.9)	265 (64.5)	129 (65.8)		

STDs, sexually transmitted diseases.

95% CI: 1.59 to 7.17,  $p=0.002$ ); married students were nearly three times more likely not to use condoms consistently compared with single students (OR=2.98, 95% CI: 1.35 to 6.537,  $p=0.007$ ). Those who had multiple sexual partners were 4.79 times (OR=4.79, 95% CI: 2.37 to 9.67,  $p<0.001$ ) more likely not to use condoms consistently, compared with those who only had one partner.

## DISCUSSION

This is the first study to describe the sexual behaviours and potential HIV risk for international students in China. Our results revealed that a significant number of international students engage in sexual behaviours while studying in China, and consistent condom use was suboptimal. Moreover, most of these students had received little HIV and sex-related education in the host country and did not take any HIV tests in China, which highlight the fact that tailored and culturally appropriate sex education and HIV testing services should be delivered to international students in order to prevent the infection and transmission of HIV or other sexually transmitted disease.

Our study showed that one-third of international students had engaged in sexual behaviours during their study in China, which is higher than the rate among domestic students (20.3%).<sup>26</sup> In China, attitudes toward sex are strongly influenced by Confucian and Taoist philosophies,<sup>27</sup> which emphasise conservativeness, embarrassment and suppression.<sup>28</sup> Chinese students might hold a relatively conservative sexual norm. However, at least two reasons may explain why international students are more sexually active. First, the anonymous and unfamiliar environment may provide feelings of situational disinhibition (detached from one's routine roles and obligations)

and a 'license for thrills' might influence people's sexual behaviour.<sup>29</sup> Second, several studies among international travellers indicated that the longer they were travelling, the greater the possibility of having a new sexual partner abroad.<sup>30–32</sup> Our study confirmed this result, since international students stayed for a longer time in China than general international travellers.

The rates of unprotected sex in China among international students were also high, which raises concerns for HIV/STIs and transmission. In our study, over three-fifths of those who had sex in China had unprotected vaginal or anal intercourse, while a cross-sectional study among male college students in the same province showed that only 37% of local students practiced unprotected sex.<sup>33</sup> This might be explained by several reasons. First, international students who do not habitually use condoms do not do so in their host country.<sup>34</sup> A previous study showed that only 16.5% of college students in Ethiopia consistently used condoms during sex.<sup>35</sup> Evidence showed that habitual condom use was a predictor of consistent condom use.<sup>36</sup> Second, acculturation stress has been shown to have a direct and negative association with condom use intention among international students in China.<sup>37</sup> Acculturation theory suggests that when international students adapt themselves to a new culture and environment, this may cause typical acculturation-related stressors, including identity threat, opportunity deprivation, lack of self-confidence, facing rejection, value conflict, lack of cultural competence and homesickness.<sup>37–39</sup> Such stressors had a strong relationship with poor mental health which proved to be a predictor of unsafe sex (such as having sex with multiple sexual partners, using alcohol or drugs and unprotected sex).<sup>39–42</sup> Third, low HIV risk awareness and

**Table 5** Univariate analysis of factors associated with inconsistent condom use (n=196)

	Total (n=196) n (%)	Consistent condom use (n=78) n (%)	Inconsistent condom use (n=118) n (%)	$\chi^2$	P value
Gender				9.21	0.002
Male	134 (68.4)	63 (80.8)	71 (60.2)		
Female	62 (31.6)	15 (19.2)	47 (39.8)		
University				42.51	<0.001
A University	74 (37.8)	29 (38.2)	45 (37.5)		
B University	16 (8.2)	3 (3.9)	13 (10.8)		
C University	18 (9.2)	4 (5.3)	14 (11.7)		
D University	6 (3.1)	2 (2.6)	4 (3.3)		
E University	19 (9.7)	12 (15.8)	7 (5.8)		
F University	11 (5.6)	11 (14.5)	0 (0.0)		
G University	30 (15.3)	15 (12.5)	15 (12.5)		
H University	15 (7.7)	0 (0.0)	15 (12.5)		
I University	5 (2.6)	0 (0.0)	5 (4.2)		
J University	2 (1.0)	0 (0.0)	2 (1.7)		
Married status				5.01	0.025
Single	141 (71.9)	63 (80.8)	78 (66.1)		
Married	55 (28.1)	15 (19.2)	40 (33.9)		
Living site				5.19	0.023
On campus	167 (85.2)	72 (92.3)	95 (80.5)		
Out of campus	29 (14.8)	6 (7.7)	23 (19.5)		
STDs infection				2.70	0.100
Yes	4 (2.0)	0 (0.0)	4 (3.4)		
No	192 (98.0)	78 (100.0)	114 (96.6)		
The number of sexual partner(s)				9.58	0.002
Single	99 (50.5)	50 (64.1)	49 (41.5)		
Multiple	97 (49.5)	28 (35.9)	69 (58.5)		
Medical insurance				2.64	0.104
Yes	138 (70.4)	60 (76.9)	78 (66.1)		
No	58 (29.6)	18 (23.1)	40 (33.9)		

STDs, sexually transmitted diseases.

limited accessibility of HIV/STIs-related health services might increase the possibility of unprotected sex.<sup>10 43</sup> Our study showed that only half of international students had sufficient HIV-related knowledge, which was lower than the rate among Chinese college students (81%).<sup>44</sup> Language and unfamiliarity with the Chinese healthcare

system may create barriers to seeking healthcare for international students.<sup>45</sup> In addition, fearing stigma or lack of confidentiality are great barriers for international students to seek HIV and sexual health services.<sup>46</sup> Fear of being seen by peers and perceived shame in sexual healthcare centres might hinder students from accessing them.

**Table 6** Factors associated inconsistent condom use among international students in the province (n=196)

Factors	B	SE	P value	OR	OR 95% CI
Gender (0=male 1=female)	1.22	0.38	0.002	3.38	1.59 to 7.17
Married status (0=single 1=married)	1.10	0.40	0.007	2.98	1.35 to 6.57
The number of sexual partners (0=single 1=multiple)	1.57	0.36	<0.0001	4.79	2.37 to 9.67



Sexual script theory views human sexuality as a learnt behaviour influenced by socio-culture characteristics.<sup>47 48</sup> For example, a qualitative study from Australia reported that international students from less developed countries with cultural taboos about sex reported that Australia's free and open sexual culture made them more likely to have sex.<sup>45</sup> However, this theory could not explain the higher unprotected sexual practices in the study setting, which is a moderate economic province<sup>49</sup> with a traditional conservative attitude towards sex<sup>28</sup> and an average HIV prevalence in China.<sup>50</sup>

Our study showed that adequate knowledge was not associated with a higher rate of protected sex among international students. This was consistent with previous studies which highlighted the 'know-do' gap among men who have sex with men and college students.<sup>51 52</sup> Although adequate HIV-related knowledge may not always lead to protected sexual behaviour, it is an initial step towards behaviour change.<sup>17</sup> The guideline of popularising HIV prevention and sexual health education among students was issued by the Ministry of Education of China in 2015,<sup>53</sup> but there is no related policy to deliver sex and HIV-related education to international students in China. The present study showed that only 35.1% of these students had received a brochure or participated in lectures about HIV prevention.

Female international students were less likely to use condoms than men in our study. The comparatively lower rate of consistent condom use among women may be associated with gender power inequity.<sup>54</sup> In our sample, 89.2% of students who had sex in China came from Asia and Africa, where women have relatively low social and economic status due to gender inequity.<sup>55</sup> Traditionally, women are unable to negotiate condom use in sexual behaviours, and men are more likely to be tempted not to use condoms.<sup>56 57</sup> Although male international students self-reported using condoms more frequently than their female counterparts, our research found that they were more likely to engage in casual and commercial sex, and to have multiple sexual partners. This may be because in various traditional cultures, the prejudice and taboo of premarital sex restrict women's behaviour rather than men's. For example, virginity is still considered a critical sign of chastity and purity for women,<sup>58</sup> and thus premarital sex is strongly forbidden for women, but more acceptable for men in some countries, such as Iran,<sup>59</sup> Vietnam,<sup>60</sup> China,<sup>28 61</sup> Turkey<sup>58</sup> and South Africa.<sup>61</sup> Our study also showed that male students who had multiple partners tended not to use condoms consistently. Therefore, male international students' HIV infection and transmission risk should not be neglected.

In comparison with single students, married students were less likely to use condoms, which is consistent with previous studies.<sup>62 63</sup> The general assumption is that the preventive function of condoms conflicts with two main norms in marriage, trust and fidelity.<sup>64</sup> In one study, sub-Saharan people agreed that only with untrusted partners would condoms be used.<sup>65 66</sup>

## Limitations

This study has several limitations. First, the sample may not be representative due to the use of non-probability sampling, and only those students who saw the flyer or were introduced by their peers got the chance to access the questionnaire. However, we selected the top 10 universities that enrolled 90% of all international students in this province as the target population to better reduce selection bias. Second, the sample size is small, mainly due to the sensitive topic of sexual practices; those who took a conservative attitude toward sex might not be willing to participate in our study. Third, information bias might exist due to the collection of self-report data and social desirability bias on these sex-related questions, although the questionnaire was anonymous. Finally, the questionnaire was prepared in English, and misunderstandings might exist because the international students' native languages were not all English. However, pilot testing of the questionnaires showed an easy understanding of all items.

## Implications for practice

Despite these limitations, our study highlights some implications for reducing HIV/STIs-related high-risk sexual behaviours among international students. First, HIV/STIs-related education, reading materials, online courses and HIV/STIs counselling and testing services should be provided to international students in their native languages. Second, female students could be empowered during their education to improve their self-efficacy to use condoms and to learn the skills to negotiate with their partners about condom use.<sup>67</sup> In addition, gender equity in every aspect, especially for sexual life, should be emphasised among both female and male international students. Third, psychological support should be provided to reduce acculturation stress and assist international students to overcome the difficulties in their daily and academic lives, since Chinese culture is historically profound and the language is very difficult to learn, which are always the main barriers for cultural adaption. In addition, peer-led HIV-related education has been proven to be an effective approach among college students,<sup>68</sup> and could also be pilot-tested among international students not only to deliver accurate knowledge, but also to deliver the effective skills to practice safe sex.

## CONCLUSION

International students studying in one southern province of China have inadequate HIV-related knowledge, are sexually active, and a significant proportion practice unprotected sex in the host country. Although those who are man, aged 30 or above and non-medical students reported more sexual activity, those who are woman, married and having multiple sexual partners are more likely not to use condoms during sex. With the increasing number of international students studying in China, it is urgent to address the potential HIV/STIs risk among this

group of young people and provide relevant education and behavioural interventions to promote sexual health among international students.

**Contributors** All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by QZ, WW, AA and MY. The first draft of the manuscript was written by QZ and all authors commented on previous versions of the manuscript. Other authors: LG, YS and WJ: Writing—review and editing. XL: Conceptualisation, methodology, supervision, resources, writing—review and editing. All authors read and approved the final manuscript. XL are responsible for the overall content as the guarantor.

**Funding** This work was supported by Hunan Province Social Science Fund (18YBA438).

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Ethics approval** Ethical approval was provided by the institutional review board at the School of Nursing, Central South University (20190303). Participants gave informed consent to participate in the study before taking part.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available upon reasonable request.

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