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

Qidi Zhou,1 Weizi Wu,2 Mengyao Yi,1 Yan Shen,1 Lloyd Goldsamt,3 Asem Alkhatib,4 Wenjing Jiang,5 Xianhong Li 6

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 2018.1 Many international students came from African and Asian countries, and these two continents accounted for over 80% of total HIV cases globally.2 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.3,4 According to the pooled prevalence of 22 studies, 20.4% of international travellers reported having a new sexual partner.

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.
abroad and only 42.6% of them used condoms.\textsuperscript{45} 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).\textsuperscript{5} 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.\textsuperscript{6} 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,\textsuperscript{7} travelling alone\textsuperscript{8} or without a regular partner,\textsuperscript{9} long-term travel\textsuperscript{10} and a previous history of casual sex during travel.\textsuperscript{11} 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,\textsuperscript{12} such as smoking, alcohol use, substance use and risky sexual behaviour.\textsuperscript{13} 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.\textsuperscript{14} In term of the social cultural influences, Hoffman’s\textsuperscript{15} and Parrado’s\textsuperscript{16} 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.\textsuperscript{17} 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.\textsuperscript{18} Similarly, in China, around 3000 students per year were infected with HIV and 98.6% of these infections were acquired through sexual transmission.\textsuperscript{19} 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.\textsuperscript{20} Increased knowledge about HIV and STIs could be a prerequisite for reducing unprotected sexual behaviour.\textsuperscript{21} However, literature shows that international students in China lack adequate sex and HIV-related knowledge.\textsuperscript{22} One study showed that compared with domestic students, international students had a lower level of HIV knowledge\textsuperscript{23} and another study showed that only 60% of them had adequate HIV-related knowledge.\textsuperscript{24} 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.\textsuperscript{25} 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.\textsuperscript{26} According to the Education Bureau of the Province, there were 5074 international students studying in the Province in 2019.\textsuperscript{27} 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 3.37.

Results

A total of 58 international students, aged 18–39 years, were enrolled in the study. All of the questionnaires were valid and there were no statistically significant differences in the demographic characteristics of the students who completed the questionnaires and those who did not. Most of the students (81.0%) had been in the targeted province for more than 3 years (Figure 1).

Figure 1. Duration of stay in the targeted province

The students’ knowledge of HIV/STIs and sexual behaviour was assessed by a 26-item questionnaire, which included demographic information, acculturation experience, and knowledge and related knowledge. A cumulative score was calculated based on their understanding of HIV/STIs, sexual practices, condom use status and HIV testing experience, with a maximum score of 133.

The results showed that the average score for the ‘easy understanding’ item was 3.37. 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 3.37.
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. This scale has been widely used among youth in China. 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. 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, 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. X² 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 ‘1’), otherwise they were classified as ‘inconsistent condom use’ and recorded as ‘0’). Finally, multivariate logistic regression was used to identify the factors influencing inconsistent condom use, and all significant variables (p value≤0.05) in bivariate analyses were entered into a forward stepwise logistic regression at the 95% CI. Only variables with a p value≤0.05 were retained in the final model.

**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%, p=0.005) (table 1).
| Age          | Total (n, %) | Reporting having no sex during studying in China (n=411) (n, %) | Reporting having had sex during studying in China (n=196) (n, %) | χ² | P value |
|--------------|-------------|---------------------------------------------------------------|---------------------------------------------------------------|----|---------|
| 18–30        | 480 (79.1)  | 345 (83.9)                                                    | 135 (68.9)                                                    | 18.20 | <0.001  |
| >30          | 127 (20.9)  | 66 (16.1)                                                     | 61 (31.1)                                                     |      |         |
| **Region of origin** |          |                                                                |                                                              | 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)                                                       |      |         |
| **University** |          |                                                                |                                                              | 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)                                                       |      |         |
| **Gender**   |             |                                                                |                                                              | 0.69 | 0.408   |
| Female       | 206 (33.9)  | 144 (35.0)                                                    | 62 (31.6)                                                     |      |         |
| Male         | 401 (66.1)  | 267 (65.0)                                                    | 134 (68.4)                                                    |      |         |
| **Married status** |        |                                                                |                                                              | 32.98 | <0.001  |
| Married      | 93 (15.3)   | 373 (90.8)                                                    | 141 (71.9)                                                   |      |         |
| Single       | 514 (84.7)  | 38 (9.2)                                                       | 55 (28.1)                                                     |      |         |
| **Living site** |        |                                                                |                                                              | 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)                                                     |      |         |
| **Major**    |             |                                                                |                                                              | 9.29 | 0.002   |
| Medicine     | 351 (57.8)  | 255 (62.0)                                                    | 96 (49.0)                                                     |      |         |
| Others       | 256 (42.2)  | 156 (38.0)                                                    | 100 (51.0)                                                    |      |         |
| **Studying programme** |    |                                                                |                                                              | 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)                                                     |      |         |
| **Tuition source** |      |                                                                |                                                              | 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)                                                    |      |         |
| **Time spent in China (years)** | |                                                                |                                                              | 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)                                                     |      |         |
| **Medical insurance** |       |                                                                |                                                              | 0.07 | 0.789   |
| Yes          | 423 (69.7)  | 285 (69.3)                                                    | 138 (70.4)                                                    |      |         |
| No           | 184 (30.3)  | 126 (30.7)                                                    | 58 (29.6)                                                     |      |         |
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 condom use for vaginal intercourse, and 4 out 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 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 (%) | χ²   | P value |
|--------------------------------------------|-------------|--------------------|---------------------|------|---------|
| Sexual orientation                         |             |                    |                     |      |         |
| Heterosexuality                            | 186 (94.9)  | 128 (95.5)         | 58 (93.5)           | 0.46 | 0.796   |
| 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)           |      |         |
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, 95% CI 1.94 to 5.87).

#### 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 |
|---------------------------|-------------|--------------------|---------------------|---------|---------|
| **Regular sexual partner**|             |                    |                     |         |         |
| Oral intercourse          |             |                    |                     |         |         |
| Inconsistent condom use    | 52 (91.2)   | 32 (86.5)          | 20 (100)            | 1.52    | 0.218   |
| Consistent condom use      | 5 (8.8)     | 5 (13.5)           | 0 (0.0)             |         |         |
| Anal intercourse           |             |                    |                     |         |         |
| Inconsistent condom use    | 10 (66.7)   | 8 (66.7)           | 2 (66.7)            | 0.00    | 1.000   |
| 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)           |         |         |
| **Casual sexual partner**  |             |                    |                     |         |         |
| 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           |             |                    |                     |         |         |
| Inconsistent condom use    | 9 (75.0)    | 8 (72.7)           | 1 (100)             | 0.00    | 1.000   |
| 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)            |         |         |
| **commercial sexual partner**|             |                    |                     |         |         |
| 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)             |         |         |
| **Group sexual partners**  |             |                    |                     |         |         |
| 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)            |         |         |
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%). In China, attitudes toward sex are strongly influenced by Confucian and Taoist philosophies, which emphasise conservativeness, embarrassment and suppression. 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. Second, several studies among international travellers indicated that the longer they were travelling, the greater the possibility of having a new sexual partner abroad. 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. This might be explained by several reasons. First, international students who do not habitually use condoms do not do so in their host country. A previous study showed that only 16.5% of college students in Ethiopia consistently used condoms during sex. Evidence showed that habitual condom use was a predictor of consistent condom use. Second, acculturation stress has been shown to have a direct and negative association with condom use intention among international students in China. 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. 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). Third, low HIV risk awareness and

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.

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

| Variable                                      | Total (n, %) | Reporting having no sex during studying in China (n=411) (n, %) | Reporting having had sex during studying in China (n=196) (n, %) | χ² | P value |
|-----------------------------------------------|-------------|---------------------------------------------------------------|---------------------------------------------------------------|----|--------|
| HIV-related knowledge (score)                 |             |                                                               |                                                               |    |        |
| 1–5                                           | 294 (48.4)  | 216 (52.6)                                                   | 78 (39.8)                                                     | 8.65 | 0.003  |
| 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.
limited accessibility of HIV/STIs-related health services might increase the possibility of unprotected sex.10 43 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%).44 Language and unfamiliarity with the Chinese healthcare system may create barriers to seeking healthcare for international students.45 In addition, fearing stigma or lack of confidentiality are great barriers for international students to seek HIV and sexual health services.46 Fear of being seen by peers and perceived shame in sexual health-care centres might hinder students from accessing them.

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

| Factors                        | Total (n=196) n (%) | Consistent condom use (n=78) n (%) | Inconsistent condom use (n=118) n (%) | χ²  | 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)                            |      |         |

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.\textsuperscript{47,48} 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.\textsuperscript{45} However, this theory could not explain the higher unprotected sexual practices in the study setting, which is a moderate economic province.\textsuperscript{49} with a traditional conservative attitude towards sex\textsuperscript{28} and an average HIV prevalence in China.\textsuperscript{50}

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.\textsuperscript{51,52} Although adequate HIV-related knowledge may not always lead to protected sexual behaviour, it is an initial step towards behaviour change.\textsuperscript{17} The guideline of popularising HIV prevention and sexual health education among students was issued by the Ministry of Education of China in 2015,\textsuperscript{53} 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.\textsuperscript{34} 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.\textsuperscript{55} Traditionally, women are unable to negotiate condom use in sexual behaviours, and men are more likely to be tempted not to use condoms.\textsuperscript{56,57} 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,\textsuperscript{58} and thus premarital sex is strongly forbidden for women, but more acceptable for men in some countries, such as Iran,\textsuperscript{59} Vietnam,\textsuperscript{40} China,\textsuperscript{28,61} Turkey\textsuperscript{58} and South Africa.\textsuperscript{61} 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.\textsuperscript{62,63} The general assumption is that the preventive function of condoms conflicts with two main norms in marriage, trust and fidelity.\textsuperscript{64} In one study, sub-Saharan people agreed that only with untrusted partners would condoms be used.\textsuperscript{65,66}

**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.\textsuperscript{67} 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,\textsuperscript{68} 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, 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.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) licence, which permits others to distribute, remix, adapt, build upon this work non-commercially, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use and license their derivative works on different terms, provided the original work is not altered.

**ORCID iDs**

Qidi Zhou http://orcid.org/0000-0002-1754-6806

XiangHong Li http://orcid.org/0000-0003-4063-4131

**REFERENCES**

1. China MOE. The statistic date of international students in China, 2018. Available: http://www.moe.gov.cn/jyb_xwfb/gzdtt_gzdtt/s5987/ 201904/t20190412_377692.html

2. The U. HIV/AIDS target will not be met, according to the global progress report, 2021, 2020. Available: http://unaids.org.cn/ page1227/article_id-1200

3. Haderxhanaj LT, Dittus PJ, Loosier PS, et al. Acculturation, sexual behaviors, and health care access among Hispanic and non-Hispanic white adolescents and young adults in the United States, 2006-2010. J Adolesc Health 2014;55:716-9.

4. Svensson P, Sundbeck M, Persson KI, et al. A meta-analysis and systematic literature review of factors associated with sexual risk-taking during international travel. Travel Med Infect Dis 2018;24:65–88.

5. Vivancos R, Abubakar I, Hunter PR. Foreign travel, casual sex, and sexually transmitted infections: systematic review and meta-analysis. Int J Travel Med 2010;14:e842–51.

6. Vivancos R, Abubakar I, Hunter PR. Sexual behaviour, drugs and alcohol use of international students at a British university: a cross-sectional survey. Int J STD AIDS 2009;20:619–22.

7. Cabada MM, Montoya M, Echevarria JI, et al. Sexual behavior in travelers visiting Cuzco. J Travel Med 2003;10:214–6.

8. Croughs M, Van Gompel A, de Boer E, et al. Sexual risk behavior of travelers who consulted a pretravel clinic. J Travel Med 2008;15:50–9.

9. Martins SL, Hellerstedt WL, Bowman SB, et al. International travel as a context for sexual and contraceptive behaviors: a qualitative study of young women traveling outside the U.S. Arch Sex Behav 2020;49:1039–51.

10. Chanakira E, O’Cathain A, Goyder EC, et al. Factors perceived to influence risky sexual behaviours among university students in the United Kingdom: a qualitative telephone interview study. BMC Public Health 2014;14:1055.

11. Muche AA, Kassa GM, Berhe AK, et al. Prevalence and determinants of risky sexual practice in Ethiopia: systematic review and meta-analysis. Reprod Health 2017;14:113.

12. Hoffman S, Higgins JA, Beckford-Jarrett ST, et al. Contexts of risk and networks of protection: NYC West Indian immigrants’ perceptions of migration and vulnerability to sexually transmitted diseases. Cult Health Sex 2011;13:513–28.

13. Parrado EA, Flippin CA. Migration FCA. Migration and sexuality: a comparison of Mexicans in sending and receiving communities. J Soc Issues 2010;66:175–95.

14. Inequalities UC. Confronting inequalities, 2021. Available: https://www.unaids.org/sites/default/files/media_asset/2021-global-aids-update_en.pdf

15. News C. The number of people infected with HIV in China is over 1.05 million, 2021. Available: http://news.hsw.cn/system/2021/12/ 1401288.shtml

16. China NHC. The National health Commission (NHC) at a regular press conference on, 2018. Available: http://blog.sinacom.cn/s/ blog_ecfa58ba102yint1.html [Accessed 23 Nov 2018].

17. Andrew PO, Bhuiyan A, Mawson A, et al. HIV/AIDS knowledge of undergraduate students at a historically black college and university. Diseases 2018;6: doi:10.3390/diseases6040098. [Epub ahead of print: 31 Oct 2018].

18. Hongx V, Wusheng B, Dandan M. Investigation on the knowledge, attitude and practice of AIDS among Thai and Chinese students in one university of Yunnan. Int J Epidemiol Dis 2016;43:76–80.

19. Yuanying S. Analysis on the AIDS KAP in South Asia foreign students and Chinese students in a University . Yunnan. Med Soc:26:847–8.

20. Beijing D. Latest data of human population, 2021. Available: https://baijiahao.baidu.com/s?id=1700176187253998188&fr=spider&for= pc

21. Hunan EOD. Overview of provincial education development in, 2019, 2020. Available: http://jyt.hunan.gov.cn/jyt/sjy/tgxx/hjt/jtxx/ 202003/t20200312_11810778.html

22. The State Council AIDS Working Committee Office tPrsRoC. China HIV/AIDS monitoring and evaluation framework trial. Beijing: Medical Publishing House, 2007.

23. Liu Y, Lu L, Wang YY, et al. Effects of health education on HIV/AIDS related knowledge among first year university students in China. Afr Health Sci 2020;20:1582–90.

24. Lai J, Pan P, Lin Y, et al. A survey on HIV/AIDS-Related knowledge, attitudes, risk behaviors, and characteristics of men who have sex with men among university students in Guangxi, China. Biomed Res Int 2020;2020:785723.

25. Lei Y, Wang H, Xiao X, et al. [Status and influencing factors of rush poppers use and HIV infection among male who have sex with men in Changsha]. Zhonghua Yu Fang Yi Xue Za Zhi 2016;50:148–52.

26. Li C, Cheng Z, Wu T, et al. The relationships of school-based sexuality education, sexual knowledge and sexual behaviors—A study of 18,000 Chinese college students. Reprod Health 2017;14:103.

27. Zheng W, Zhou X, Zhou C, et al. Detraditionalisation and attitudes to sex outside marriage in China. Cult Health Sex 2011;13:497–511.

28. Ng ML, Lau MP. Sexual attitudes in the Chinese. Arch Sex Behav 1990;19:373–80.

29. Bojovich Ly. Antecedents of young women’s sexual risk taking in tourist experiences. J Sex Res 2016;53:927–41.

30. Bellis MA, Hale G, Bennett A, et al. Ibiza uncovered: changes in substance use and sexual behaviour amongst young people visiting an international night-life resort. Int J Drug Policy 2000;11:233–44.

31. Cabada MM, Echevarria JI, Seas CR, et al. Sexual behavior of international travelers visiting Peru. Sex Transm Dis 2002;29:510–3.

32. Gehring TM, Widmer J, Kleiber D, et al. Are preventive HIV interventions at airports effective? J Travel Med 1998;5:205–9.

33. Tao H, Peihui L, Xingrong W. Survey on AIDS-related knowledge, attitude and behavior in students from three universities in Changsha. Int J Clin Res 2020;37:4.

34. Marcantonio T, Angelone DJ, Sledeski E. Using a pattern-centered approach to assess sexual risk-taking in study abroad students. J Am Coll Health 2018;66:165–73.

35. Kebbede A, Molla B, Gerenseha H. Assessment of risky sexual behavior and practice among Aksum university students, Shire campus, Shire town, Tigray, Ethiopia, 2017. BMC Res Notes 2018;11:88.

36. Stulhofer A, Bacak V, Ajdukovic D, et al. Understanding the association between condom use at first and most recent sexual intercourse: an assessment of normative, calculative, and habitual explanations. Soc Sci Med 2010;70:2080–4.

37. Yang N, Xu Y, Chen X, et al. Acculturative stress, poor mental health and condom-use intention among international students in China. Health Educ J 2018;77:142–55.

38. Sandhu DS, Asrarabadi PR. Development of an Acculturative stress scale for international students: preliminary findings. Psychol Rep 1994;75:435–48.
Acculturative stress and influential factors among international students in China: a structural dynamic perspective. PLoS One 2014;9:e96322.

30 Eikington KS, Bauermister JA, Zimmerman MA. Psychological distress, substance use, and HIV/STI risk behaviors among youth. J Youth Adolesc 2010;39:154–27.

31 Murphy DA, Durako SJ, Moscicki A-B, et al. No change in health risk behaviors over time among HIV infected adolescents in care: role of psychological distress. J Adolesc Health 2001;29:57–63.

32 Seth P, Raji PT, DiClemente RJ, et al. Psychological distress as a correlate of a biologically confirmed STI, risky sexual practices, self-efficacy and communication with male sex partners in African-American female adolescents. Psychol Health Med 2009;14:291–300.

33 Cassidy G, Bishop A, Steenbeek A, et al. Barriers and enablers to sexual health service use among university students: a qualitative descriptive study using the theoretical domains framework and COM-B model. BMC Health Serv Res 2018;18:581.

34 Jirong ZB LIU, Tong LI. The awareness rate of HIV/AIDS knowledge among Chinese college students based on meta — analysis. J Zhen Yuan Vocat Tech 2020;32.

35 Parker A, Harris P, Haire B. International students’ views on sexual health: a qualitative study at an Australian university. Sex Health 2020;17:231–8.

36 Bender SS, Fulbright YK. Content analysis: a review of perceived barriers to sexual and reproductive health services by young people. The European Journal of Contraception & Reproductive Health Care 2013;18:159–67.

37 Frith H, Kitzinger C. Reformulating Sexual Script Theory: Developing a Discursive Psychology of Sexual Negotiation. Theory Psychol 2001;11:209–32.

38 Okeke SR. How perceived Australian sexual norms shape sexual practices of East Asian and sub-Saharan African international students in Sydney. BMC Public Health 2021;21:395.

39 Yu B, Chen X, Li S, et al. Acculturative stress and influential factors among international students in China: a structural dynamic perspective. PLoS One 2014;9:e96322.