

Assessment of knowledge, attitude, and practice of sexual health among students in a Chinese medical college: a cross-sectional study

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Abstract

Background: Sexual health is an essential part of overall well-being, and medical students' sexual education, level of sexual knowledge, and attitudes toward sexual health will affect their sexual behavior.

Aim: To explore the correlation among medical decision tendency, sex education level, and sexual health KAP (knowledge, attitudes, and practices).

Methods: We conducted a cross-sectional survey in March 2019. Data were collected via online surveys with a self-developed questionnaire covering sexual KAP and sexual education. We used Spearman correlation to assess the effect of sexual education on KAP after scoring the related questions.

Outcomes: Outcomes included descriptive analysis and correlation of medical and nursing students' KAP and education regarding sexual health.

Results: Medical and nursing students hold a high level of sexual knowledge (74.8%) and a positive attitude toward premarital sex (87.5%) and homosexuality (94.5%). By conducting the correlation analysis, we observed that medical and nursing students' tendency to support friends' homosexuality was positively correlated with the view that medical intervention for transgender or gay/lesbian people is unnecessary ($P < .01$). A positive correlation was also found between medical and nursing students who want more diverse sexual education and who would tend to provide patients with more humanistic care regarding their sexual needs ($P < .01$).

Clinical Translation: Medical and nursing students who want more diverse sexual education and who had higher scores in the sexual knowledge test tend to provide their patients with more humanistic care regarding sexual needs.

Strengths and Limitations: The research shows the current situation of medical and nursing students' sexual education experience and preference and sexual knowledge, attitudes, and behavior. Heat maps were used to more intuitively describe the correlation between medical students' characteristics and their sexual knowledge, attitudes, and behaviors and sex education. The results may not be generalizable across China, as the participants were from 1 medical school.

Conclusion: It is essential to provide sexual education for medical and nursing students to ensure a more humanistic approach to patient care regarding sexual needs; therefore, we recommend that medical schools invest in sexual education for medical and nursing students throughout their education.

Keywords: health knowledge; sexual behavior; sex education; practices; students.

Introduction

Sexual health is an essential part of overall well-being related to sexuality.^{1–3} This is particularly important for college students who are sexually mature and actively involved in intimacy and sexual contact. However, sexual problems are common among people in their 20s.^{4–7} According to the Chinese Center for Disease Control and Prevention, Chinese college students have a high rate of unintended pregnancy, induced abortion, and sexually transmitted diseases (STDs),⁸ as well as an increased risk of HIV transmission.⁹ Consequently, it is very important to understand the sexual knowledge, attitudes, and practices (KAP) among college students. As compared with students in other majors, medical students have a deeper

level of sexual knowledge, and their sexual attitudes and behaviors will affect their medical attitudes and behaviors toward patients after becoming doctors.¹⁰ The ability and readiness to talk with patients about sexual problems depend not only on education in sexual physiology and pathology but also on the doctors' beliefs and attitudes toward sexuality.¹¹ Physician discomfort, embarrassment, and perceived lack of time and/or training all play a role in preventing physicians from discussing sexual health with patients.¹²

Globally, medical education is a rigorous process.¹³ The courses and training for these future health care providers are highly demanding.¹⁴ Moreover, courses in medical college provide professional knowledge about anatomic and

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physiologic features of sexual behavior, which is likely to influence students' attitudes toward sexuality¹⁵ and their sexual behaviors. In addition to the relationship between sexuality and personal well-being, a correlation has been reported between medical students' sexual experience and their clinical practice in handling the sexuality issues of patients.¹³ For instance, discrimination against homosexuality and fear of patients living with HIV/AIDS might impede future doctors and nurses from providing high-quality health care to these individuals.¹⁶ Despite guidelines recommending regular reproductive and sexual health counseling for adolescents, studies have demonstrated that providers seldom engage in such discussions due to discomfort, time constraints, and a lack of training in medical school.¹⁷⁻¹⁹ Some studies show that medical students are less likely to watch adult films to acquire sex-related knowledge and to go out on dates,²⁰ which demonstrates the need to increase knowledge and stimulate positive attitudes among students about sexuality, thereby improving their ability to treat patients with sexuality problems.²¹

Although some previous studies have described the cognition, attitudes, and behavior toward sexuality among medical students, these descriptive studies on medical and nursing students have limited reference value for the revision of their sexual education schemes. Questions remain whether the current sexual education fits medical and nursing students' needs and what influence may sexual education bring to medical and nursing students once they start a career as a doctor or nurse. Here, our questionnaire provides comprehensive insights into medical and nursing students' sexual education by covering a range of topics related to education experience and preference, sexual KAP, and their tendencies toward humanistic medical care and LGBTQ people (lesbian, gay, bisexual, transgender, queer).²² After presenting the descriptive statistical results of all the sex-related issues, we utilize correlation analysis to investigate potential factors influencing the future medical practice behaviors of medical and nursing students, which we are concerned about.

Methods

Study design and participants

This cross-sectional study was carried out via an electronic questionnaire at a medical college in Beijing, China. The data were collected in March 2019. A small pilot study was carried out among 12 undergraduate and 12 graduate students (12 males and 12 females) from the MD program, nursing school, and graduate school in a medical college to ensure the accessibility of the questionnaire, readability, and clarity. Approximately 15 minutes was required for respondents to access and complete the questionnaire, and no errors or unclear content was identified. For the full-scale study, we conducted cluster random sampling by randomly selecting classes from the MD program, nursing school, and graduate program and by collecting data during a major class break. We provided the QR code on a projection screen in classrooms and explained the study to all students. Respondents who participated voluntarily completed the electronic questionnaire. To minimize the chance that the participants would complete the survey more than once, only a single survey from 1 Internet protocol address was permitted.

Ethics approval was obtained from the Institutional Review Board of Peking Union Medical College (CAMS&

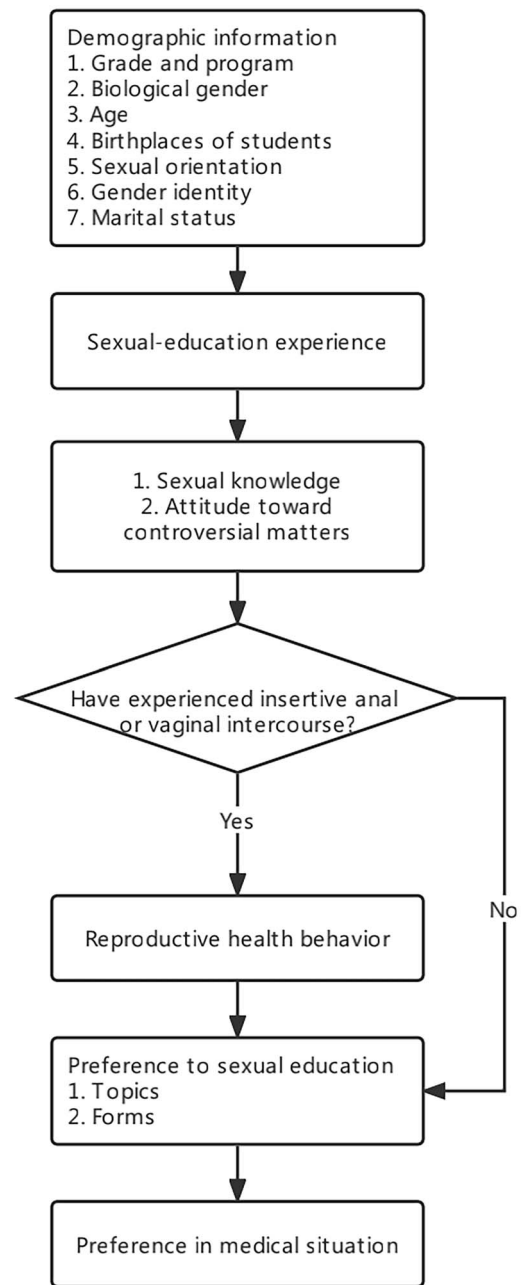


Figure 1. Flowchart of the questionnaire.

PUMC-ICE-2020-030). Each participant signed an informed consent form before beginning the questionnaire.

Questionnaire construction

A structured electronic questionnaire was designed online with Questionnaire Star (www.wjx.cn) (Figure 1). The questionnaire consisted of 2 sections. The first section collected participants' basic information, such as age, biological sex, gender identity, marital status, grade and program, birthplace, and sexual orientation. The second section assessed sexual knowledge, sexual attitude, reproductive health behavior, and sexual education experience. Our team conducted reliability and validity of the questionnaire, with Cronbach coefficient α at 0.715.

Sexual knowledge

The sexual knowledge section was based on relevant literature that identified the critical questions that would directly reflect students' reproductive health.^{23,24} The scale consisted of 4 dimensions: reproductive system (6 items; eg, "The hymen is located inside the vagina"), correct contraceptive measures (7 items; eg, "Safe period contraception is an effective contraceptive measure"), determination and prevention of STD (14 items; eg, "Syphilis is a sexually transmitted disease"), and HIV prevention and discrimination prevention (8 items; eg, "HIV can be transmitted by dining with someone who is HIV positive").

Sexual attitudes

The sexual attitudes section was developed from a pool of items from several available sexual attitude scales, socially controversial sex-related topics, and clinical experience.²⁵⁻²⁷ The scale included 7 items across 4 sex dimensions: sexual psychology (2 items: "For which of the following reasons will you choose to have sex?" and "How does your partner's previous sexual history affect your relationship?"), premarital abstinence (1 item: "What do you think about premarital sex?"), abortion (2 items: "What do you think about abortion?" and "What factors would you consider if you chose to undergo an abortion for an unintended pregnancy?"), and homosexuality (2 items: "How would you respond if your friend of the same/different sex came out to you?").

Reproductive health behavior

The reproductive health behavior section was developed according to several behaviors that the committee experts thought were critical in affecting students' reproductive health. This section investigated sexual behaviors (3 items: "Have you ever engaged in the following sexual behaviors?" "When did your first penetrative sexual intercourse occur?" and "How many partners have you had sex with?"), contraceptive and protective behaviors (2 items: investigating the type and frequency of such behaviors), emergency contraceptive behaviors (2 items: investigating the frequency of unintended pregnancy and emergency contraceptive use), and health care-seeking behaviors (2 items: "Have you undergone an abortion? How many times?" and "What would you do if you feel physical discomfort after having sex such as itching or rash on the genitalia?").

Sexual education experience

The sexual education experience section was developed through discussions with students and committee experts. It investigated whether students received professional sexual education, under what circumstances, and when. Students could provide multiple responses regarding ways that they accessed relevant knowledge. Options were sexual education courses in school, medical courses in school, lectures held by organizations, organized peer education, online media, printed media, family members, friends, and other. The content of the sexual education accessed was also recorded (eg, reproductive system structure and reproductive health; prevention of sexual assault, harassment, and violence; prevention of HIV/AIDS and other STDs).

Statistical analysis

Data describing the demographic characteristics of participants are presented as absolute frequencies and proportions. Previous studies have found that the awareness rate of sexual and reproductive health knowledge among Chinese medical and nursing students ranges from 60% to 80%, while the positive sexual attitude rate is between 30% and 70%.²⁸⁻³⁰ Consequently, our study determined that anything >70% constitutes a high awareness rate, and a more positive sexual attitude is considered >60%. To improve the accuracy and reliability of statistical inference in quantitative analysis, post-stratification weights were applied on the basis of constituent ratios of different majors in total. The weighted proportions and means of responses were compared. To further quantify the correlations among questions, we scored all multiple- and single-choice questions with descriptive options regarding participants' sexual education experiences and KAP. Specifically, Q36 to Q40 involved multiple correct answers to each question, so each score depended on the percentage of correct answers chosen by the participant. Q4, Q8 to Q10, Q12, Q13, Q15 to Q18, Q24 to Q35, and Q41 to Q48 addressed participants' preferences. In these questions, the score for each option was set to be unequal to describe answers varying from conservative to open-minded (see [Table S1](#) for detailed scoring standards). The scores were used to draw heat maps to show the quantitative correlations among questions about sexual education experience and KAP.

Analysis of variance was used to assess differences in continuous variables, and the Pearson χ^2 test or Fisher exact test, as appropriate, was used to compare differences in nonordered categorical variables (ie, gender). The Wilcoxon rank sum test and Kruskal-Wallis test were used for the ordered categorical variables (ie, birthplace). Spearman correlation was used for correlation analysis of the scored questions. A Bonferroni method was used to correct the significance level. An alpha of 0.05 was considered statistically significant. R software version 4.1.0 (R Core Team) was used to conduct correlation analyses and visualization, and other analyses were performed with SPSS Statistics version 26.0 (IBM Corp).

Results

Participants

A total of 472 students participated in this study, from an overall 475 students approached, giving a response rate of 99.3%. The mean age was 20.9 years (SD, 2.00), ranging between 17 and 30 years. Among participants, 330 (69.9%) were female, 133 (28.2%) were male, and 9 (1.9%) were self-reported third gender. In the survey of participants' relationship status, 311 (65.9%) were single, 161 (34.1%) were in a relationship, and none were married or divorced ([Table 1](#)). Constituent ratios of different majors in the Peking Union Medical College were estimated according to the enrollment announcements from the official website ([Table 2](#)).

Sexual KAP according to sex

Sexual knowledge

The mean (SD) score of sexual knowledge among participants was 26.92 (3.92; [Table 3](#)), and the overall awareness rate was 74.8%. The mean score in each dimension was 4.32 (1.04) for the reproductive system, 5.28 (1.39) for correct

Table 1. Demographic characteristics of participants.

Characteristic	No. (%)
Sex	
Female	330 (69.9)
Male	133 (28.2)
Third gender	9 (1.9)
Age, y	
<18	8 (1.7)
18-20	191 (40.5)
21-22	172 (36.4)
≥23	101 (21.4)
Marital status	
Unmarried, partnered	161 (34.1)
Unmarried, not partnered	311 (65.9)
Married	0 (0.0)
Major	
8-y program students	146 (30.9)
Nursing students	212 (44.9)
Master and doctoral students	114 (24.2)
Birthplace	
City	349 (73.9)
Township	50 (10.6)
Countryside	73 (15.5)

contraceptive measures, 11.20 (1.87) for STD prevention, and 6.12 (1.87) for HIV prevention and antidiscrimination. In STD prevention awareness, scores for students who identified as third gender were significantly higher than those for male and female students: 12.22 (1.99) vs 11.46 (1.98) and 11.06 (1.80), respectively ($P = .030$).

Sexual attitudes

We recorded the attitudes of participants toward the following controversial sexual issues.

The main motivation for sex was “deep affection for the partner” (97.7%), and sexual activity tended to occur when there was a more stable relationship (eg, engagement). Among students, sexual desire was largely considered a normal physiologic function: students who identified as third gender (100.0%) agreed significantly more than male students (79.7%) and female students (72.1%; $P = .016$).

Only 12.5% of medical and nursing students were against premarital sex, with significantly more female students (15.5%) than male students (5.3%). There was a significant difference among sexes ($P < .001$). In total, 48.3% of medical and nursing students believed that a history of sexual activity with multiple sex partners would negatively affect their relationship.

In total, 53.6% of students reported feeling that induced abortion is unacceptable, and 40.3% held the opposite view. More female medical and nursing students felt that abortion was unacceptable.

We found that 71.6% of medical and nursing students supported and respected same-sex friends being homosexual, with the percentage of third gender students (88.9%) feeling this way being higher than female students (74.8%) and male students (62.4%). The difference was statistically significant ($P < .05$). Overall, we found that students' tolerance for homosexuality (72.7%) was higher than their tolerance for same-sex friends (71.6%).

Sexual activity

Sexual intercourse was reported by 79 participants: 76 (16.1%) vaginal sex and 9 (1.9%) anal sex. Eight (10.1%) participants had their first sexual intercourse in high school, 68 (86.1%) in college, and 3 (3.8%) in graduate school. In terms of the number of sexual partners, 50 (63.3%) reported having sex with 1 person, 13 (16.5%) with 2 people, 9 (11.4%) with 3 people, and 7 (8.9%) with >3 people.

Regarding safety, 61 (77.2%) of the 79 students said that they took safety measures with a high frequency (>75%); 7 (8.9%), a frequency of 51% to 75%; and 11, a frequency ≤50%. Of the 79 students, 4 (5.1%) experienced an unintended pregnancy.

We recorded participants' preference regarding medical care with physical discomfort after sex. A total of 58 (73.4%) said that they would choose a regular hospital for treatment; 11 (13.9%) would research and take medication on their own; 7 (8.9%) would do nothing; and 3 (3.8%) would seek help from friends or family. No students stated that they would attend a clinic for help.

Correlation analysis about KAP and medical education

Some straightforward correlations were found, following the theory of KAP. The questions in the practice group correlate with one another (Q15, Q17, Q18, Q21; each with $P < .0001$); these ask about specific behavior in sexual experience: “Q15: What forms of sexual behavior have you experienced?” “Q17: How many people have you been involved with sexually?” “Q18: How often do you take safety measures during sexual activity?” and “Q21: How often do you or your sexual partner take emergency contraception?” There is a significant positive correlation (each with $P < 0.0001$) between the level of sexual experience reflected in the responses to the four practice questions and a more positive attitude towards premarital sex, as obtained from Q8.

Two questions (Q50 and Q43) were designed to find factors that may influence medical and nursing students' future behavior in health care. A correlation occurred between Q50 (“As a future health care worker, do you think that transgender or gay/lesbian people need psychological intervention?”) and Q12 (“What is your reaction to a same-sex friend ‘coming out’ as bisexual/gay/lesbian?”; $P < .05$), as well as between Q50 and Q13 (“What is your reaction to an opposite-sex friend ‘coming out’ as bisexual/gay/lesbian?”; $P < .01$). Q50 shows medical and nursing students' view for intervention to LGBTQ from the perspective of future clinical health care staff. Q12 and Q13 asked about participants' attitudes toward LGBTQ friends. The positive correlation may indicate that medical and nursing students with positive attitudes toward their LGBTQ friends will tend to support the opinion that no psychological intervention is required for LGBTQ people. Q43 (more mental support in clinical practice as doctors) was positively correlated with Q42 (need mental care during anal examination as patients; $P < .0001$), which shows that medical and nursing students would focus on the same details when seeing a doctor themselves and when treating their own patients. As described in the options, avoiding unnecessary body contact and unnecessary large area of skin exposure for a long time, during physical examination. Q42 and Q43 were positively correlated with several questions, and the

Table 2. Distribution of all in-school students.

In-school program	No. of students	Ratio, %		
		Constituent	Demographic	Weight
8 y	720	35.0	30.9	1.132686084
Nursing	600	29.2	44.9	0.650334076
Master and doctoral	738	35.9	24.2	1.483471074

top 3 were Q35 (prefer more extended and comprehensive sexual education; $P < .05$), Q36 (know how to efficiently use birth control; $P < .05$), and Q40 (can identify common misconceptions; $P < .05$). These correlations may indicate that medical and nursing students who want more diverse sexual education and who received higher scores would tend to provide patients with more humanistic care regarding their sexual needs. The positive correlation between Q13 (support an opposite-sex friend's homosexuality) and Q43 ($P < .05$) additionally showed that medical and nursing students with positive attitudes toward their LGBTQ friends would also tend to provide their patients with more humanistic mental care (Figure 2).

Discussion

The main findings of our study include assessment of sexual knowledge, attitudes, and behavior and sexual education as well as differences in subgroups by gender and birthplace. Furthermore, we conducted correlation analysis regarding sexual knowledge, attitudes, behavior, education, and medical decision tendency.

Medical and nursing students were significantly open-minded about premarital sex

Among the study participants, 330 (69.9%) were female, 133 (28.2%) were male, and 9 (1.9%) were self-reported third gender. Students who identify as third gender might experience a greater risk of depression, anxiety, and low self-rated health than heterosexual students; therefore, targeted interventions are needed for this population.²⁶ Only 16.42% of participants reported having premarital sex, which is similar to the sexual behavior of general college students in China in 2012 (18.5%)³¹ and 2015 (18.1%).³² In comparison, 87% of women born in the 1969-1978 period in the United States indicated having premarital sex by 25 years of age.³³ Half of the students with a sexual experience had a sexual relationship with only 1 partner. Premarital sex was considered unacceptable under any circumstances by 12.42% of participants, which is close to the results of a recent study among college students in China (10.0%).^{34,35} Premarital sex has become more tolerable in China over the past decade. The proportion of college students who have premarital sex has rapidly increased as compared with 1998 (1.1%).³⁶ The development of sex education, as well as increased exposure to sexual information,³⁷ might account for this change.

Interestingly, significant differences between female and male students were found regarding the level of acceptance about premarital sex and self-reported sexual experience. Males had significantly higher acceptance and fewer restrictions about premarital sex, and a higher percentage self-reported having sexual experience. There was no significant

difference regarding negative attitudes toward partners' sexual history or negative attitudes toward abortion as a solution to an unintended pregnancy.

Medical and nursing students showed high acceptance of homosexuality

Among all participants, 94.5% did not consider homosexuality an "aberration." In total, 71.37% of students said that they would be supportive if a friend revealed that he or she was homosexual. This proportion is much higher than the results reported in a study³⁸ among general heterosexual college students in China (54.4%) and is higher than the results of a survey conducted among 437 undergraduate and graduate students in Midwestern public universities in the United States (84.7% among nonheterosexuals and 66.9% among heterosexuals).³⁹ We analyzed these groups and predicted that college major and grade might influence the level of homosexuality acceptance. Several previous investigations have supported this and suggest that high acceptance of homosexuality is related to higher education, which promotes multiculturalism, cognitive sophistication, and complex reasoning among students.^{38,40,41} However, one study⁴² indicated that completing university education alone is insufficient; specifically, socially engaged practice is essential.⁴³ Medical and nursing training may provide students with more opportunities to learn about homosexual individuals as they meet and provide health care to various patients every day. This may explain the high level of acceptance regarding homosexuality in medical and nursing students. Sexual and gender minority (SGM) individuals experience high rates of harassment and discrimination when seeking health care, which may contribute to substantial health care disparities. However, medical and nursing students are noted to have a poor understanding of the health problems of the SGM population.¹⁷ Therefore, including information about the health care for SGM individuals in medical curricula would be beneficial, such as an introduction to gender identity, sexual orientation, and the health care needs of SGM patients. In this way, health care for SGM individuals would be more targeted and effective.⁴⁴

Overall correlations detected in the questionnaire

We scored questions to quantify their correlations. Examples were found that confirm the logical chain of "knowledge, attitude, and practice." For instance, strong positive correlations have been observed between the acceptance of premarital sex and the various types of sexual contact, as well as the number of sexual partners, that students have had. Positive correlations were also found between the support to the same/opposite-sex friends' homosexuality and the view of unnecessary psychological intervention to transgender or gay/lesbian people as a future health care worker. This suggests that good sex education and guidance are profoundly

Table 3. Sexual knowledge, attitudes, and behavior among Chinese medical students by sex.^a

Variable	Total	Male (n = 133)	Female (n = 330)	Third gender (n = 9)	P value
Sexual knowledge					
Total sexual knowledge score	26.92 ± 3.92	27.39 ± 4.31	26.71 ± 3.74	27.67 ± 3.97	.202
Reproductive system	4.32 ± 1.04	4.37 ± 1.16	4.30 ± 0.99	4.44 ± 1.33	.782
Correct contraceptive measures	5.28 ± 1.39	5.33 ± 1.39	5.27 ± 1.38	4.78 ± 1.48	.503
Determination and prevention of STDs	11.20 ± 1.87	11.46 ± 1.98	11.06 ± 1.80	12.22 ± 1.99	.030
HIV prevention and anti-discrimination	6.12 ± 1.87	6.23 ± 2.00	6.07 ± 1.84	6.22 ± 1.09	.698
Sexual attitudes					
Motivation for having sex					
Deep affection for the partner	461 (97.7)	128 (96.2)	324 (98.2)	9 (100.0)	.398
Normal physiologic needs	353 (74.8)	106 (79.7)	238 (72.1)	9 (100.0)	.016
Fertility requirements	210 (44.5)	54 (40.6)	151 (45.8)	5 (55.6)	.478
Partner requirements	260 (55.1)	77 (57.9)	175 (53.0)	8 (88.9)	.054
Curiosity	288 (61.0)	78 (58.6)	203 (61.5)	7 (77.8)	.473
Professional (academic) development, money, or material returns	174 (36.9)	41 (30.8)	128 (38.8)	5 (55.6)	.139
Premarital sex					
Unacceptable	59 (12.5)	7 (5.3)	51 (15.5)	1 (11.1)	<.001
Only if engaged	55 (11.7)	7 (5.3)	48 (14.5)	0	
Yes, with plans for marriage	50 (10.6)	11 (8.3)	39 (11.8)	0	
Yes, with a strong emotional foundation	276 (58.5)	92 (69.2)	177 (53.6)	7 (77.8)	
Yes, without restrictions	32 (6.8)	16 (12.0)	15 (4.5)	1 (11.1)	
Partners' sexual history					
Negative impact	228 (48.3)	61 (45.9)	163 (49.4)	4 (44.4)	.370
Positive impact	6 (1.3)	4 (3.0)	2 (0.6)	0	
No effect	238 (50.4)	68 (51.1)	165 (50.0)	5 (55.6)	
Induced abortion					
Acceptable, if necessary	190 (40.3)	60 (45.1)	125 (37.9)	5 (55.6)	.232
Unacceptable because it will cause great physical harm to the woman and partner	253 (53.6)	65 (48.9)	186 (56.4)	2 (22.2)	
Unacceptable, inhumane, and cruel	79 (16.7)	18 (13.5)	59 (17.9)	2 (22.2)	.468
It does not matter	14 (3)	3 (2.3)	10 (3.0)	1 (11.1)	
Reaction if a same-sex friend reveals homosexuality					
Support and respect	338 (71.6)	83 (62.4)	247 (74.8)	8 (88.9)	.020
Neutral	109 (23.1)	37 (27.8)	71 (21.5)	1 (11.1)	
Cannot accept it	25 (5.3)	13 (9.8)	12 (3.6)	0	
Reaction if an opposite-sex friend reveals homosexuality					
Support and respect	343 (72.7)	87 (65.4)	248 (75.2)	8 (88.9)	.097
Neutral	111 (23.5)	37 (27.8)	73 (22.1)	1 (11.1)	
Cannot accept it	18 (3.8)	9 (6.8)	9 (2.7)	0	
Sexual activity^b					
First sexual encounter					
High school	8 (10.1)	4 (12.5)	4 (8.7)	0	.957
Undergraduate	68 (86.1)	27 (84.4)	40 (87.0)	1 (100.0)	
Graduate and above	3 (3.8)	1 (3.1)	2 (4.3)	0	
No. of people involved with sexually					
1	50 (63.3)	19 (59.4)	30 (65.2)	1 (100.0)	.686
2	13 (16.5)	8 (25.0)	5 (10.9)	0	
3	9 (11.4)	3 (9.4)	6 (13.0)	0	
>3	7 (8.9)	2 (6.3)	5 (10.9)	0	
Frequency of safety measures taken during sexual activity, %					
0	1 (1.3)	0	1 (2.2)	0	.769
>0-25	6 (7.6)	3 (9.4)	3 (6.5)	0	
26-50	4 (5.1)	3 (9.4)	1 (2.2)	0	
51-75	7 (8.9)	4 (12.5)	3 (6.5)	0	
>75	61 (77.2)	22 (68.8)	38 (82.6)	1 (100.0)	
Experience of unintended pregnancy or unintended pregnancy in sexual partner					
Yes	4 (5.1)	2 (6.3)	2 (4.3)	0	.886
No	75 (94.9)	30 (93.8)	44 (95.7)	1 (100.0)	
If you have physical symptoms after sex, what do you do? ^c					
Go to a regular hospital for treatment	58 (73.4)	26 (81.3)	31 (67.4)	1 (100.0)	.272
Go to a small clinic for treatment	0	0	0	0	
Seek help from family/friends	3 (3.8)	1 (3.1)	2 (4.3)	0	
Self-help with information and medication	11 (13.9)	1 (3.1)	10 (21.7)	0	
No treatment	7 (8.9)	4 (12.5)	3 (6.5)	1 (100.0)	

Abbreviation: STD, sexually transmitted disease. ^aData are presented as mean ± SD or No. (%). ^bFor the sexual activity section, n = 79. ^cIncluding redness, swelling, and itching of the vulva, as well as dysuria or pain on urination, abnormal urethral or vaginal secretions, and others.

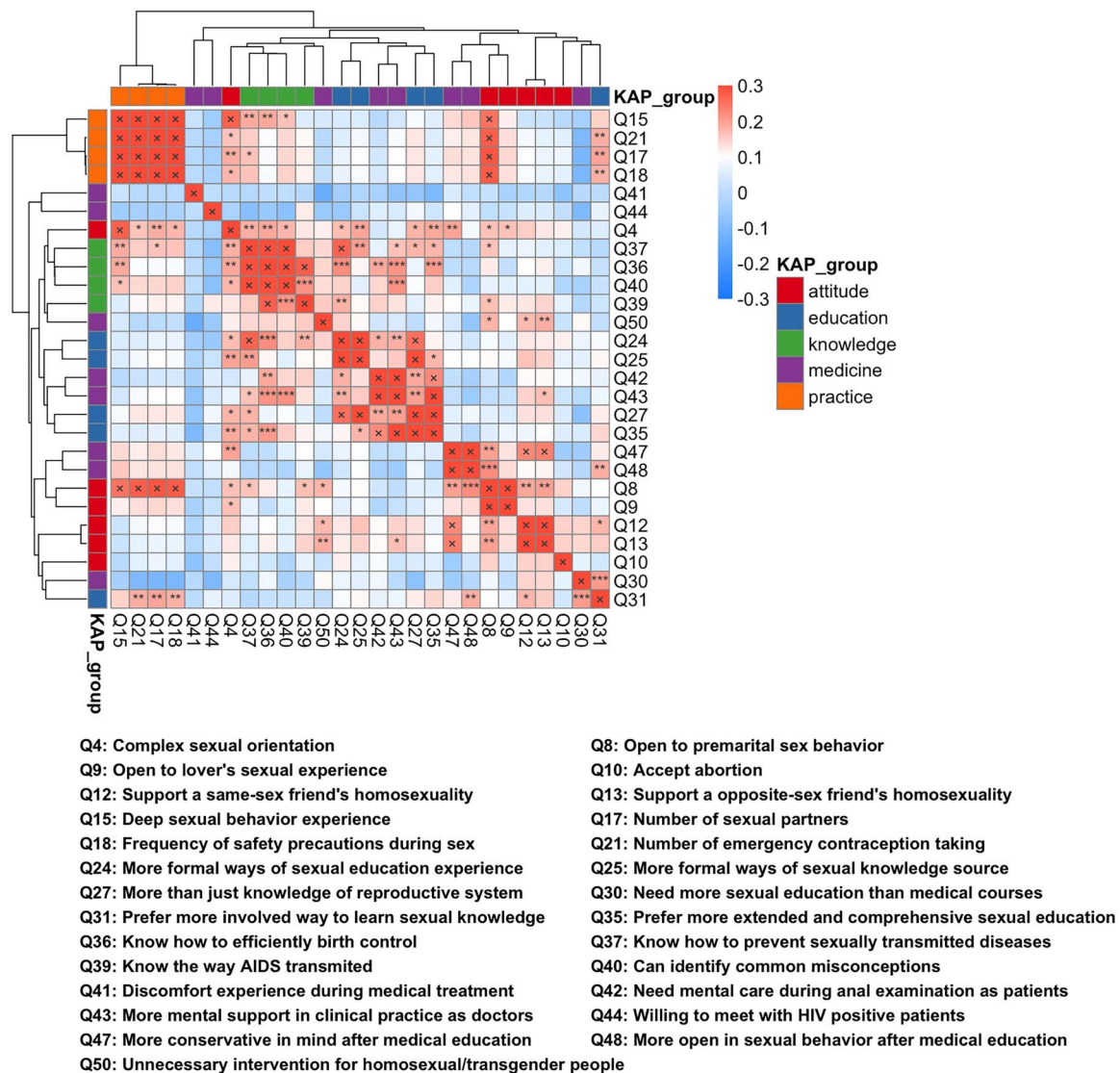


Figure 2. Heat map shows the Spearman correlations among responses to survey questions in our study population. Questions were grouped into beliefs, education, knowledge, medicine, and practice (KAP group). Red, positive correlation; blue, negative correlation. Q, question. * $P < .05$. ** $P < .01$. *** $P < .001$. $\times P < .0001$. KAP, knowledge, attitudes, and practices.

influential for medical and nursing students as future health care providers, when they encounter their first same-sex friend in their lives.

The positive correlation between “What aspects do you want your doctor to pay attention to?” and “What will you pay attention to when you are a doctor?” showed that medical and nursing students would focus on the same details when seeing a doctor themselves as when treating their own patients. So perhaps incorporating role-playing scenarios into sex education could help medical and nursing students better understand the concepts of sexual health and behavior and apply this knowledge more effectively in their work. For example, when medical and nursing students learn about the prevention and treatment of STDs, they can personally experience what it is like to be a member of a sexual minority group. This will help them to understand the concerns and embarrassment that patients may feel during medical visits and examinations and to adjust their medical service behaviors accordingly.

We found that preference for diverse sexual education and higher scores in the sexual knowledge test were positively correlated with providing patients with more

humanistic care.^{45,46} To sum, it was suggested that more courses in sexual health are needed at medical schools to address patients’ sexual health-related issues.⁴⁷⁻⁴⁹

Strengths and limitations

The research explored the characteristics of medical and nursing students on sexual education level and sexual knowledge, attitudes, and behavior. We utilized the Spearman correlation to identify the factors that influence medical and nursing students’ medical practice. To adjust the imbalanced grade distribution, we applied poststratification adjustment to the total sample of 472 students. Still, the limitation of this study is that the results may not be generalizable across China, as the participants were from 1 medical school and our sample size was small.

Conclusion

Our findings indicated that medical and nursing students hold a high level of sexual knowledge and a positive attitude

toward sexual behavior. The support to LGBTQ friends was positively correlated with the view of unnecessary intervention for LGBTQ people. Higher requirements as patients, better sexual knowledge, and higher interest on sexual issues were positively correlated with providing patients with more humanistic care. So, adding diverse sexual topics and scenario simulation to medical education would be an important step to promote diversity, equity, and inclusion in medical education and medical practice.

Author contributions

T.L. conceptualized the study. J.Z. and Y.L. analyzed the data and revised the work. X.W., Z.W., and S.Y. collected the data and revised the work. T.L. and J.Z. designed the project and revised the work. All authors read and approved the final manuscript.

Supplementary material

Supplementary material is available at *Sexual Medicine* online.

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References

- DeLay KJ, Voznesensky I, Hellstrom WJ. The conception and evaluation of sexual health literature. *Sex Med Rev.* 2017;5:135–145.
- Adler M. Sexual health. *BMJ.* 2003;327:62–63.
- Dagadu NA, Barker KM, Okello SBT, et al. Fostering gender equality and reproductive and sexual health among adolescents: results from a quasi-experimental study in northern Uganda. *BMJ Open.* 2022;12:e053203.
- Laumann EO, Paik A, Rosen RC. Sexual dysfunction in the United States. *JAMA.* 1999;281:537–544.
- Melton AW Jr. The sexual problems of college students. *J Am Coll Health Assoc.* 1967;15(suppl):10–14.
- Woo JS, Brotto LA. Age of first sexual intercourse and acculturation: effects on adult sexual responding. *J Sex Med.* 2008;5:571–582.
- Okeke CC, Mbachu CO, Agu IC, et al. Stakeholders' perceptions of adolescents' sexual and reproductive health needs in Southeast Nigeria: a qualitative study. *BMJ Open.* 2022;12:e051389.
- Tang K, Qu X, Li C, Tan S. Childhood sexual abuse, risky sexual behaviors and adverse reproductive health outcomes among Chinese college students. *Child Abuse Negl.* 2018;84:123–130.
- Li G, Jiang Y, Zhang L. HIV upsurge in China's students. *Science.* 2019;364:711.
- Coniglio M, Giammanco G, Bonaccorso S, Pignato S. Knowledge of HIV infection, risk perception, and sexual behaviour of undergraduates. May female medical students act as peer educators. *J Prev Med Hyg.* 2007;48:85–89.
- Müldner-Nieckowski Ł, Sobański JA, Klasa K, Dembińska E, Rutkowski K. Medical students' sexuality-beliefs and attitudes. *Psychiatr Pol.* 2012;46:791–805.
- Bourne SJF, Lee CM, Taliaferro E, et al. Impact of teaching sexual health education on medical students. *Fam Med.* 2020;52:518–522.
- Shindel AW, Ando KA, Nelson CJ, Breyer BN, Lue TF, Smith JF. Medical student sexuality: how sexual experience and sexuality training impact US and Canadian medical students' comfort in dealing with patients' sexuality in clinical practice. *Acad Med.* 2010;85:1321–1330.
- Schwarz MR, Wojtczak A, Zhou T. Medical education in China's leading medical schools. *Med Teach.* 2004;26:215–222.
- Cheng L-F, Yang H-C. Learning about gender on campus: an analysis of the hidden curriculum for medical students. *Med Educ.* 2015;49:321–331.
- Fisher CB, Fried AL, Macapagal K, Mustanski B. Patient-provider communication barriers and facilitators to HIV and STI preventive services for adolescent MSM. *AIDS Behav.* 2018;22:3417–3428.
- Liang JJ, Gardner IH, Walker JA, Safer JD. Observed deficiencies in medical student knowledge of transgender and intersex health. *Endocr Pract.* 2017;23:897–906.
- AIDS Study Group, National AIDS Plan, STI Study Group of the SEIMC, Spanish Group for the Investigation of Sexual Transmission Diseases of the Spanish Academy of Dermatology and Venerology, Spanish Society for Pediatric Infectious Diseases. Consensus document on the diagnosis and treatment of sexually transmitted diseases in adults, children and adolescents. *Enferm Infecc Microbiol Clin (Engl Ed).* 2018;36(9):576–585.
- Bergam S, Sibaya T, Ndlela N, et al. "I am not shy anymore": a qualitative study of the role of an interactive mHealth intervention on sexual health knowledge, attitudes, and behaviors of south African adolescents with perinatal HIV. *Reprod Health.* 2022;19:217.
- Ajmal F, Agha A, Zareen N, Karim MS. Knowledge, attitudes and practices (KAP) regarding sexuality, sexual behaviors and contraceptives among college/university students in Karachi, Pakistan. *J Coll Physicians Surg Pak.* 2011;21:164–168.
- Facio FN Jr, Glina S, Torres LO, Abdo C, Abdo JA, Faria G. Educational program on sexual medicine for medical students: pilot project in Brazil. *Transl Androl Urol.* 2016;5(5):789–793.
- Kelly T, Rodriguez SB. Expanding Underrepresented in Medicine to Include Lesbian, Gay, Bisexual, Transgender, and Queer Individuals. *Acad Med.* 2022;97:1605–09.
- Fisher TD, Davis CM, Yarber WL. *Handbook of Sexuality-Related Measures.* Routledge; 2013.
- See LC, Chu FL, Lo YH, et al. Designing and establishment of the validity and reliability of a questionnaire on sexual knowledge for teenagers. *Xiuchuan Medical Journal.* 2008;8:19–29.
- Hendrick C, Hendrick SS, Reich DA. The Brief Sexual Attitudes Scale. *J Sex Res.* 2006;43:76–86.
- Przedworski JM, Dovidio JF, Hardeman RR, et al. A comparison of the mental health and well-being of sexual minority and heterosexual first-year medical students: a report from the Medical Student CHANGE Study. *Acad Med.* 2015;90:652–659.
- Wang H, Long L, Cai H, et al. Contraception and unintended pregnancy among unmarried female university students: a cross-sectional study from China. *PLoS One.* 2015;10:e0130212.
- Zheng J, Li Y, Gu Y, et al. Status and influencing factors of sexual health knowledge, attitude and behavior among 1524 medical students in higher vocational colleges in Sichuan province. *Occupation and Health.* 2021;37:2992–2996 +3001.
- Jiang XJ, Sun HL, Wang D, et al. Investigation and analysis of medical sexual health education in Three Gorges Reservoir area of Chongqing. *Journal of Modern Medicine & Health.* 2012;28:791–792.

30. Yang LN, Liu GL, Lin L, *et al.* Investigation and analysis of medical sexual and reproductive health status. *China School Medical.* 2022;**36**: 76+159-161.
31. Zhou H, Wang XY, Ye F, Gu HH, Zeng XP, Wang Y. Contraceptive knowledge, attitudes and behavior about sexuality among college students in Beijing, China. *Chin Med J.* 2012;**125**:1153-1157.
32. Cao Y, Xiao H, Yan H, Li J, Li S. Prevalence and sex-related risk factors of premarital pregnancy and reproductive tract infections among female undergraduates in Wuhan, China. *Asia Pac J Public Health.* 2015;**27**:30s-40s.
33. Sprecher S, Hatfield E. Premarital sexual standards among US college students: comparison with Russian and Japanese students. *Arch Sex Behav.* 1996;**25**:261-288.
34. Shu C, Fu A, Lu J, *et al.* Association between age at first sexual intercourse and knowledge, attitudes and practices regarding reproductive health and unplanned pregnancy: a cross-sectional study. *Public Health.* 2016;**135**:104-113.
35. Sun Y, Zhong L, Zhang YY. Investigation and research on the sexual attitude of medical students born after 1995. *Chinese Journal of Human Sexuality.* 2018;**27**:151-153.
36. Cao Y, Zhou X, Wang XQ, *et al.* Sexual knowledge, behaviors, and attitudes of medical students in Kunming, China. *Psychol Rep.* 1998;**82**:201-202.
37. Smith M, Gertz E, Alvarez S, Lurie P. The content and accessibility of sex education information on the internet. *Health Educ Behav.* 2000;**27**:684-694.
38. Zhang YD, Zhang D. Do heterosexual college students think homosexuality is normal? An analysis based on the acceptance of multiculturalism. *China Journal of Health Psychology.* 2020;**28**:222-226.
39. Tollini C, Herbstrith JC. Undergraduate and graduate students' descriptions of the complete acceptance of homosexuality. *Contemp Nurse.* 2016;**6**:215824401663643.
40. Carrera-Fernández MV, Cid-Fernández XM, Almeida A, González-Fernández A, Rodríguez CY. Gender-bashing in adolescents: structural relations with heterosexual matrix, racism/xenophobia and attitudes toward bullying. *J Sch Health.* 2019;**89**:536-548.
41. Kim HY, Park M, Lee E. A cross-sectional survey of relationships between sexual knowledge, sexual attitudes, and reproductive health behaviour among female university students. *Contemp Nurse.* 2018;**54**:640-650.
42. la Roi C, Mandemakers JJ. Acceptance of homosexuality through education? Investigating the role of education, family background and individual characteristics in the United Kingdom. *Soc Sci Res.* 2018;**71**:109-128.
43. Carvacho H, Zick A, Haye A, *et al.* On the relation between social class and prejudice: the roles of education, income, and ideological attitudes. *Eur J Soc Psychol.* 2013;**43**:272-285.
44. Zelin NS, Hastings C, Beaulieu-Jones BR, *et al.* Sexual and gender minority health in medical curricula in new England: a pilot study of medical student comfort, competence and perception of curricula. *Med Educ Online.* 2018;**23**: 1461513.
45. Jadoon SB, Nasir S, Victor G, Pienaar AJ. Knowledge attitudes and readiness of nursing students in assessing peoples' sexual health problems. *Nurse Educ Today.* 2022;**113**:105371.
46. Ören B, Zengin N, Yazıcı S, Akıncı A. Attitudes, beliefs and comfort levels of midwifery students regarding sexual counselling in Turkey. *Midwifery.* 2018;**56**:152-157.
47. Turner D, Nieder TO, Dekker A, Martyniuk U, Herrmann L, Briken P. Are medical students interested in sexual health education? A nationwide survey. *Int J Impot Res.* 2016;**28**: 172-175.
48. Turner D, Driemeyer W, Nieder TO, Scherbaum N, Briken P. "How much sex do medical studies need?" A survey of the knowledge and interest in sexual medicine of medical students. *Psychother Psychosom Med Psychol.* 2014;**64**:452-457.
49. O'Farrell M, Corcoran P, Davoren MP. Examining LGBTI+ inclusive sexual health education from the perspective of both youth and facilitators: a systematic review. *BMJ Open.* 2021;**11**: e047856.