

Internet Use Among Chinese College Students: Implications for Sex Education and HIV Prevention

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ABSTRACT

The Internet has gained great popularity among Chinese college students, but studies on Internet use behaviors and their relationship with sexual risk perception and behaviors have been limited. A survey was conducted among 1,845 college students in an eastern province of China, in order to assess the pattern of Internet use among Chinese college students, to examine the relationship of Internet use and HIV knowledge and susceptibility, and to explore the relationship of online risk behaviors with sexual status, sexual intention, and sexual perceptions. Data suggest that many students used the Internet frequently and often spent long hours online. Differences between genders and across grades were observed in the patterns of students' Internet use. Male students reported much higher rates of visiting pornographic websites or engaging in other online risk behaviors. Students' HIV knowledge or susceptibility did not differ by the extent of Internet use, but online risks were positively associated with their sexual status, sexual intention, and sexual perceptions. Students who were sexually active, planned to have sex, or possessed permissive attitudes toward pre-marital sex were more likely to report online risk behaviors such as visiting pornographic sites, cyber-bullying, or distributing erotic materials via the Internet. The data underscore the importance to provide students with appropriate guidance on their Internet use, especially for reducing online risks and utilizing Internet as a source for sex education and HIV prevention.

INTRODUCTION

THE INTERNET has become one of the most popular communication channels among college students worldwide. Researchers in developed countries have studied how college students' Internet use behaviors influence their sexual behaviors and attitudes.¹⁻⁴ They found that students used the Internet to obtain sex-related information, establish personal connection, and seek sexual entertainment and arousal; and there were gender differ-

ences in college students' Internet use behaviors.³⁻⁷ Available studies suggested that Internet provides a convenient forum for cyber-bullying (an online activity that gains gratification from provoking and tormenting others), and for distributing erotic contents.⁸ In addition, it is evident that pornography viewing is closely related with sexual risks among adolescents and youth.^{9,10} Despite data on Internet use among college students in developed countries, limited research has been conducted in developing countries such as China, where Internet

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use has gained great popularity among the young population.

The past several years have witnessed a rapid growth of Internet technology and use in China. The number of Internet users has grown 192 times since 1997, with an estimated 103 million Internet users in 2004.¹¹ A recent survey among China's Internet users indicated that the Internet users were young (37.7% were 18–24 years of age), unmarried (59.0%), male (59.6%), students (33.2%), or “white-collar” professionals (44.8%).¹¹ Most of the Internet users were college students, who were recently identified by the Chinese government as one of the two high-risk groups that should be targeted in the country's HIV prevention intervention efforts.¹²

Previous studies among Chinese college students had found that, while the majority of students expressed tolerance towards pre-marital sex and perceived a high level of intrinsic reward for sexual experiences; they also perceived very low vulnerability towards HIV/STD infection, with low condom use rate among those who were sexually active or inadequate HIV knowledge, particularly knowledge of HIV preventive measures.^{13–15} There is a limited formal sex education component in the Chinese school curriculum, and communication between students and their school teachers or parents regarding sex education is also limited.^{16,17} Lack of appropriate sex education in schools and homes may drive students to seek information about sex online. For example, studies among Chinese college students found that the Internet has been considered as one of the major sources of sexual information, especially among male students.^{14,17} However, existing studies regarding Internet use in China have mainly focused on the relationship between Internet use behavior and students' psychological development such as interpersonal trust and self-esteem.^{18,19} Limited data are available regarding Internet use behavior and its relationship with online risk behaviors, sexual intention and sexual status among Chinese college students.

Accordingly, this study, employing data from 1,845 Chinese college students, was designed with the following objectives: (1) to assess the pattern of Chinese students' Internet use, including frequency, duration, activities, and the differences between genders and across ages; (2) to examine the relationship between students' Internet use pattern and their HIV/AIDS knowledge; and (3) to explore the relationship of students' online risk behaviors and intentions with their sexual status, sexual intention, and sexual perceptions.

METHODS

Study site

The data collection procedure of this study has been reported elsewhere.^{13,20} Briefly, the study was conducted in 2002 in Jiangsu, an eastern province of China. With a population of 71 million, Jiangsu is among the top administrative regions in China in terms of economic development and education level. There were 2.49 million Internet users in Jiangsu in 2002, accounting for 8.1% of all Internet users in China.²¹ Approximately 620,000 students were enrolled in the region's 93 colleges and universities. Nanjing, the capital city of Jiangsu Province, has one-third of the province's colleges and universities. Collaborating with the provincial Bureau of Education and the local investigators, who were educational researchers themselves, 19 colleges were selected (nine in Nanjing metropolitan and 10 in other Jiangsu cities outside Nanjing). The following selection criteria were considered when schools were selected for participating in the study: (1) schools representing the diversity of school categories in Jiangsu Province-, such as specialized and comprehensive schools, state-, province-, or city-owned schools; (2) the admission scores set by the schools representing the average score of the Chinese National College Entrance Examination for the school category; and (3) willingness to participate in the study. We selected 19 schools (three state-owned, 12 province-owned, and four city-owned) such that they approximately reflected the composition of the schools in Jiangsu (14% state-owned, 62% province-owned, and 24% city-owned).

Participants and procedures

Administrators at each selected college were approached for permission to conduct the survey on their campuses. Once members of the local research team received permission from the college administration, they approached students in their classrooms. The purpose of the study was thoroughly described to students by local researchers at each college or university. Among the 1,890 students approached at the participating schools, 1,874 (99%) signed the informed consent and participated in the survey. Confidentiality of responses was assured at all times. Completion of the entire questionnaire required approximately 30–45 min for a typical respondent. School teachers and administrators were not allowed to be present during the administration of the questionnaire. Data from 1,845 respondents were used for this study, and 29 respondents were excluded because of missing

data on demographic items. The Institutional Review Boards (IRBs) at West Virginia University in the United States and the Institute of Higher Education Research at Nanjing University in China approved the study protocol.

Survey instrument

The Chinese Youth Health Risk Behaviors Inventory—College Version (CYHRBI-CV), a culturally appropriate adaptation of Youth Health Risk Behavioral Inventory (YHRBI),²² was administered to the participants. The cultural adaptation of the instrument was informed by qualitative data collected among Chinese college students.¹⁴ The CYHRBI-CV has approximately 350 items organized in six domains: demographic information, family environment and parenting, sexual attitudes and behaviors, Internet use and risk behaviors, AIDS knowledge, and mental health.

Measures

Socio-demographic characteristics. Students were asked about their gender, age, ethnicity, grade, major, academic performance, post-graduation plans, self-rated physical health, family constellation, family residence, and other family characteristics, including parents' education, parents' occupation and family income.

Internet use. Students were asked about their Internet use behaviors, including frequency of use (occasionally, once every 2 weeks, weekly, or daily), time spent in a typical session (less than 1 h, 1–2 h, 2–4 h, or over 4 h), activities on the Internet (emailing, information searching, viewing news, watching sports, playing games, and visiting pornographic websites). Two questions were used to assess the addiction aspects of Internet use ("often or always feel the need for more time to satisfy" and "often or always feel anxious if cannot access Internet for a while"). Three questions were used to assess personal relationships via the Internet ("have web friends," "have met web friends in person," "have met web lovers in person").

Online risk. Based on literature on online risk behaviors among college students,^{9,10} five items were used to assess students' online risk behaviors including visiting pornographic websites, intention to visit pornographic sites, cyber-bullying on the Internet (e.g., sending hate emails, flame posts), intention to cyber-bully, and intention to distribute erotic materials online. Cronbach alpha of these

items was 0.62. Total number of online risk behaviors was used as a composite score ranging from 0 to 5. Students were grouped into two groups: "online risk" (engaging in at least one online risk behavior) or "no risk" (engaging no online risk behavior).

HIV knowledge. HIV knowledge was assessed using 36 true/false items such as "AIDS is caused by a virus" and "Taking a shower after sex can reduce the chance of getting HIV." The Cronbach alpha of this scale is 0.71. Total number of correct answers to the 36 items was used as a composite score, with higher scores reflecting better knowledge about the transmission and symptoms of HIV/AIDS.

HIV susceptibility. The susceptibility scale consisted of eight items such as "You can get HIV the first time you have sex" and "Anybody can get AIDS," which were based on a four-point scale ranging from "most unlikely" to "most likely." The Cronbach alpha for this scale was 0.64. Total number of correct answers to eight items was used as a composite score, with higher scores reflecting increased perceived susceptibility to HIV/AIDS.

Sexual status. Students were asked if they were currently dating a boy/girlfriend and if they ever had sex. Based on their responses to these questions, students were grouped into one of three sexual/relationship status categories: no date, dating but no sex, and sexually experienced.

Sexual intention. Sexual intention was measured by one item asking students if they plan to have sex in the next 6 months.

Sexual perceptions. Five items were used to assess students' sexual perceptions (e.g., "Pre-marital sex is natural and nothing is wrong with it if two people love each other," "Boys think that sex makes them feel like a man," "Girls think that sex makes them feel like a woman"). These items had a four-point response option ranging from "strongly disagree" to "strongly agree." Cronbach alpha for the scale was 0.75.

Statistical analysis

Chi-square test (for categorical variables) and analysis of variance (ANOVA; for continuous variables) were employed to assess the differences between genders and across grades (i.e., freshmen, sophomore, junior, and senior) in regard to students' Internet use and online risk behaviors.

ANOVA was also employed to assess differences in HIV knowledge and HIV susceptibility by the patterns of Internet use behaviors. Finally, adjusted odds ratio was employed to examine the association of online risks with sexual status, sexual intention and sexual perceptions while controlling for grade, gender, and academic major. All statistical analyses were performed using SPSS 12.0.

RESULTS

Sample characteristics

As depicted in Table 1, the sample consisted of 1,027 male students and 818 female students, with a mean age of 20 years. There were 27% freshmen, 42% sophomores, 25% juniors, and 6% seniors. In this sample, 47% of female students and 30% of male students majored in humanities or social sciences ($p < 0.001$). The majority of the students (84%) planned to attend graduate school after college,

and about 40% planned to study abroad. About 13% of students reported getting mostly "A" grades in school, and most students (78%) reported having excellent or good physical health. More than one half (55%) of the students were the only child in their families, 36% of students grew up in urban area, and the family average monthly income was between 500 and 1000 Yuan (approximately U.S. \$60–120).

Internet use behaviors

As shown in Table 2, 88.1% of students had ever used the Internet, with more male students than female students (90.0% vs. 85.8%, $p < 0.01$) and more seniors than freshmen (93.9% vs. 79.6%, $p < 0.001$) reporting Internet use. Among the Internet users, 37.8% used it occasionally, 28.9% used it once every 2 weeks, 30.9% used it weekly, and 2.4% used it daily. More male students, and also more junior or senior students reported using the

TABLE 1. SOCIAL-DEMOGRAPHIC CHARACTERISTICS OF SAMPLE^a

	Total, 1845 (100%)	Male, 1042 (56%)	Female, 818 (44%)
Mean age \pm SD	20.02 \pm 1.21	20.06 \pm 1.19	19.96 \pm 1.25
Han ethnicity	98%	98%	98
Grade			
Freshman	27	32	21****
Sophomore	42	41	42
Junior	25	24	27
Senior	6	4	10
Major			
Humanities/social sciences	37	30	47****
Science/engineering	59	67	50
Plan to go to grad school	84	82	86
Plan to go abroad	42	44	39*
Mostly A's at school	13	11	17****
Excellent/good health	78	83	72****
Single child	55	56	54
Grew up in urban area	36	31	43****
Live with both parents	92	92	92
Parents divorced	3	3	3
Live with grandparent(s)	23	24	22
Father finished college	17	14	21***
Mother finished college	8	8	10
Father has professional job	27	23	32***
Mother has professional job	14	12	17**
Mean monthly family income ^b	3.45 \pm 1.03	3.37 \pm 1.03	3.56 \pm 1.02

^aNumbers in cells are % unless noted otherwise.

^bCoding for monthly income: 1 = less than 300 Yuan; 2 = 300–500 Yuan; 3 = 500–1000 Yuan; 4 = 1000–3000 Yuan; 5 = 3000–5000 Yuan; 6 = more than 5000 Yuan. (8.2 Yuan = 1 US dollar).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, **** $p < 0.0001$.

TABLE 2. INTERNET USE PATTERN AMONG CHINESE COLLEGE STUDENTS^a

	Total (n = 1845)	Male (n = 1027)	Female (n = 818)	Freshmen (n = 499)	Sophomore (n = 768)	Junior (n = 462)	Senior (n = 116)
Ever used Internet	88.1	90.0	85.8**	79.6	91.2	90.6	93.9****
Frequency of Internet use ^{b-d}							
Occasionally	37.8	32.3	45.1	32.5	43.5	35.4	19.1
Once per 2 weeks	28.9	28.4	29.6	26.1	29.4	32.1	26.4
Weekly	30.9	36.3	23.7	39.8	23.3	30.7	46.4
Once a day	2.4	3.0	1.6	1.5	2.0	1.9	8.2
Time spent per session ^c							
Less than 1 h	6.3	5.2	7.8	3.5	5.6	7.3	18.2
1–2 h	64.0	59.9	69.3	64.7	65.1	60.8	62.7
2–4 h	27.2	31.5	21.6	29.2	27.0	28.8	17.3
Over 4 h	2.5	3.4	1.6	2.5	2.3	3.1	1.8
Often/always feel the need for more time to satisfy	11.1	13.2	8.2**	13.4	11.7	8.7	8.3*
Often/always feel anxious if cannot access Internet for a while	10.2	12.1	7.7**	7.9	11	10.9	12
Internet activities							
Email	63.3	59.0	68.8****	55.1	67.4	61.3	81.0****
Search info	58.6	53.4	65.3****	47.3	57.5	65.9	85.3****
View news	53.0	57.3	47.6****	44.5	53.9	60.9	53.4****
Watch sports	26.3	41.0	8.0****	23.8	27.8	30.9	8.6****
Play games	30.7	42.4	15.9****	35.7	30.3	30.7	7.8****
Visit pornographic sites	5.6	9.9	0.2****	4.8	4.3	9.3	0.9****
Personal relationship via Internet							
Have web friends	68.7	69.9	67.2	73.3	72.4	64.2	47.7****
Have met web friends in person	18.4	16.8	20.5	13.4	18.2	22.7	20.6**
Have met web lovers in person	5.7	6.7	4.3*	3.8	4.7	8.4	6.6*

^aNumbers in cells are % unless noted otherwise.

^bData for the remaining variables in this table were available from those who reported ever used Internet.

^cGender difference was significant ($p < 0.0001$).

^dGrade difference was significant ($p < 0.0001$).

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.0001$.

Internet weekly or daily. More male students than female students reported spending long hours (e.g., ≥ 2 h per session) in a typical session online ($p < 0.001$), whereas there was no significant difference in time spent online across grades. More male students than female students reported often or always feeling the need for more time online to satisfy (13.2% vs. 8.2%, $p < 0.01$), or feeling anxious if they did not access the Internet for a while

(12.1% vs. 7.7%, $p < 0.01$). Students reported multiple activities on the Internet. About 10% male students reported visiting pornographic sites on the Internet, compared to 0.2% female students doing so ($p < 0.001$). More than two-thirds of the students (68.7%) reported having web friends, many of them had met their web friends in person (18.4%), and some had met their web lovers in person (5.7%).

Relationship of Internet use with HIV knowledge and susceptibility

The average score of HIV knowledge was 21.75 (out of a maximum of 36), and average score of HIV susceptibility was 4.71 (out of a maximum of 8). Internet users and non-users did not differ regarding HIV knowledge, but frequency of use was significantly associated with HIV/AIDS knowledge, with the weekly users having a higher score than either less frequent users or daily users ($p < 0.01$). Internet users perceived a higher level of HIV susceptibility ($p < 0.001$). In addition, students having web friends had a higher perceived level of

HIV susceptibility than students without web friends (Table 3).

Association of online risks with sexual status, sexual intention, and sexual perceptions

Students' online risk status (i.e., no risk vs. risk) was significantly associated with their sexual status, sexual intention, and sexual perceptions (Table 4). Among 1,845 participants, 908 (49.2%) had no date, 806 (43.7%) had been dating but never had sex, and 131 (7.1%) were sexually experienced. Students' sexual status was significantly associated with their online risk behaviors and

TABLE 3. HIV/AIDS KNOWLEDGE AND HIV SUSCEPTIBILITY AMONG CHINESE COLLEGE STUDENTS BY INTERNET USE PATTERN

	<i>HIV knowledge</i>	<i>p-value</i>	<i>HIV susceptibility</i>	<i>p-value</i>
Mean \pm SD	21.75 \pm 4.35		4.71 \pm 1.46	
Internet user				
Yes	21.83 \pm 4.31	0.423	4.76 \pm 1.41	0.001
No	21.29 \pm 4.44		4.39 \pm 1.64	
Frequency of Internet use ^a				
Occasionally	21.49 \pm 4.22	0.003	4.77 \pm 1.42	0.173
Once per 2 weeks	21.53 \pm 4.37		4.65 \pm 1.54	
Weekly	22.43 \pm 4.35		4.80 \pm 1.34	
Once a day	21.46 \pm 4.48		5.07 \pm 1.31	
Time spent per usage				
Less than 1 h	20.94 \pm 4.71	0.111	4.81 \pm 1.31	0.526
1–2 h	21.72 \pm 4.29		4.72 \pm 1.47	
2–4 h	22.07 \pm 4.28		4.84 \pm 1.36	
Over 4 h	22.39 \pm 4.39		4.70 \pm 1.47	
Have own websites				
Yes	21.47 \pm 4.37	0.673	4.62 \pm 1.47	0.440
No	21.82 \pm 4.32		4.78 \pm 1.43	
Often visit pornographic websites				
Yes	22.44 \pm 4.17	0.250	4.86 \pm 1.35	0.489
No	21.70 \pm 4.36		4.71 \pm 1.47	
Have cyber-bullied on the Internet				
Yes	21.68 \pm 4.36	0.824	4.78 \pm 1.48	0.264
No	21.81 \pm 4.32		4.75 \pm 1.42	
Have web friends				
Yes	21.72 \pm 4.35	0.419	4.75 \pm 1.44	0.643
No	21.97 \pm 4.30		4.77 \pm 1.39	
Have met web friends				
Yes	21.89 \pm 4.32	0.797	4.89 \pm 1.30	0.007
No	21.71 \pm 4.33		4.72 \pm 1.47	
Have met web lovers				
Yes	22.22 \pm 4.31	0.914	4.86 \pm 1.31	0.230
No	21.69 \pm 4.33		4.73 \pm 1.45	

^aData for the remaining variables in this table were available from those who reported ever used Internet.

TABLE 4. ASSOCIATION OF ONLINE RISK BEHAVIORS WITH SEXUAL STATUS, SEXUAL INTENTION, AND SEXUAL PERCEPTIONS AMONG CHINESE COLLEGE STUDENTS

	N (%)	Overall		Male		Female	
		aOR	95%CI	aOR	95%CI	aOR	95%CI
Sexual/relationship status							
No date	908 (49.2%)	—		—		—	
Dating but no sex	806 (43.7 %)	1.45	1.15–1.82	1.21	0.90–1.61	2.05	1.40–3.01
Sexually experienced	131 (7.1 %)	1.86	1.19–2.93	1.85	1.08–3.18	2.02	0.93–4.38
Sexual intention							
Will have sex in the next 6 months	230 (12.3%)	4.38	3.04–6.32	5.07	3.11–8.25	3.49	1.94–6.26
Sexual perceptions (attitudes toward pre-marital sex)							
Pre-marital sex is natural and nothing wrong if two people love each other.	1106 (59.0%)	2.08	1.64–2.64	2.21	1.61–3.04	1.77	1.22–2.55
Pre-marital sex is immoral.	547 (29.2%)	0.66	0.51–0.85	0.64	0.48–0.89	0.66	0.44–0.97
Boys think that sex makes them feel like a man.	809 (43.2%)	1.83	1.46–2.30	1.91	1.43–2.54	1.71	1.17–2.51
Girls think that sex makes them feel like a woman.	640 (34.2%)	1.79	1.41–2.26	1.88	1.40–2.51	1.61	1.07–2.40
Serious sexual relationship is good for physical and psychological well-being.	1359 (72.5%)	1.83	1.38–2.43	1.80	1.22–2.67	1.81	1.20–2.74

aOR; adjusted odds ratio (adjusting for grade, gender, and academic major).

intentions. Those who had sex were 1.86 times (95% CI, 1.19–2.93) more likely to report online risks than those who had no date. Those who had dated but no sex were 1.45 times (95% CI, 1.15–1.82) more likely to report online risks than those who had no date. Figure 1 depicts the differences on online risk behaviors across the three sexual status groups.

Similar associations were also observed between online risks and sexual intention. Students who anticipated having sex in the next 6 months were 4.38 times (95% CI, 3.04–6.32) more likely to report online risks. Students' sexual perceptions or their attitudes toward pre-marital sex were also significantly related with their online risks. For example, students who perceived pre-marital sex as natural were 2.08 times more likely to report online risks; in contrast, those who perceived pre-marital

sex as immoral were less likely to report online risks (odds ratio = 0.66; 95% CI, 0.51–0.86).

DISCUSSION

The findings from this study indicate that many college students in China used the Internet frequently and spent long hours online, with some exhibiting signs of Internet addiction. Consistent with findings from other countries, there were significant differences in Chinese college students' Internet use patterns by gender and across grades. More male students than female students, and more junior and senior students than freshmen and sophomores used the Internet frequently and spent long hours on the Internet. Gender differences also existed in students' online risk activities, with many more male

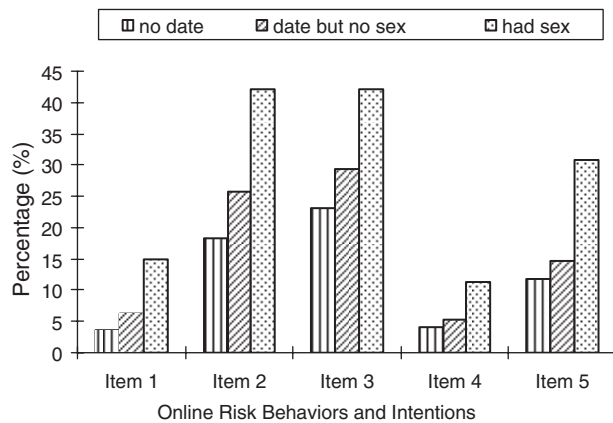


FIG. 1. Online risk behaviors and intentions by sexual status among Chinese college students. Variables of online risk behaviors and intentions. Item 1: Often visit pornographic website. Item 2: Often attack others online. Item 3: Will visit pornographic website in the next 6 months. Item 4: Will send erotic materials online in the next 6 months. Item 5: Will attack others online in the next 6 months. All variables of online risk behaviors and intentions differ by sexual status, $p < 0.0001$.

students than female students visiting pornographic websites, cyber-bullying, and planning to indulge in these online risks in the near future.

It has been reported that the Internet was considered as an important source of information for sex and HIV prevention in China.¹⁷ However, data in this study did not suggest a relationship between Internet use and HIV knowledge among college students. Frequent Internet users or those who spent longer hours online did not possess better HIV/AIDS knowledge than their counterparts. These findings indicate that merely accessing the Internet may not improve their HIV/AIDS knowledge.

Studies in developed countries (e.g., the United States) noted that young adults (especially college students) seeking sex partners online were at greater risk of STD.²³ Given that two thirds of students in this study had “web friends” and many had met their “web friends” or “web lovers” in person, and that those who were sexually active were more likely to engage in online risks such as visiting pornographic sites or distributing erotic materials online, efforts are needed to address the potential risks of HIV/STD infection among this population.

Many researchers have advocated using the Internet for sex education and HIV or STD prevention information dissemination among young adults, especially among students.^{24–27} Some researchers have also noted that due to the current paucity of Internet-based sex education programs, it is actually the pornographic websites and online sex shops that

provide the bulk of Internet-based “sex education” at the present time.^{8,28} Like many other technologies, Internet is a double-edged sword; it can be used or misused. Given that many Chinese college students have used the Internet and quite a number of them used it frequently, the Internet could be a potential venue for sex education and HIV prevention. However, data in the current study indicate that students’ online risks were closely associated with their sexual status, sexual intention, and sexual perceptions, which suggests that many students might use the Internet in an aggressive, or even an abusive manner, in searching or treating sex-related information and content; and many of them might have utilized Internet as an avenue mainly to satisfy their own sexual gratification. Therefore, guidance needs to be provided to students on appropriate use of the Internet as a source for obtaining knowledge and information regarding sex and sexuality. Current efforts in China with regard to HIV awareness promotion and prevention have largely relied on peer education and public media campaigns.^{16,29} Internet-based sex education, with appropriate guidance, can complement these educational efforts by providing a theoretically driven innovative approach for the young audience.

There are several limitations to this study. First, the sample was a convenience sample rather than a random sample; however, efforts were made to recruit participants from a large number of colleges to ensure adequate diversity and representation. Second, all data were based on answers to the self-administered survey, and there might be socially desirable reporting on sensitive questions regarding students’ sexual behavior and online risk behaviors. Third, the study was based on a cross-sectional design; the associations identified in the findings cannot be interpreted as causal. Despite these limitations, the data provide valuable information on Chinese students’ Internet use behavior, and its association with their sexual behaviors and intentions. Our findings also suggest the importance of providing students with more guidance on their Internet use, especially on ways to utilize the Internet as a source of information regarding safe sex and HIV prevention.

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