Gender Differences In Sex-Related Education, Knowledge, And Attitudes Among Chinese Adolescents

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Abstract

Background: Gender equality in sex education is important to protect adolescents from unexpected pregnancies and sexually transmitted infections. The aim of this study was to examine gender differences in sex-related education, knowledge, and attitudes, and to identify factors that may contribute to these gender differences.

Methods: A cross-sectional survey was distributed to 191 adolescents from four high schools in Fuzhou, China. Multivariable regression analyses were used to determine the associations between individual factors and their knowledge, attitudes.

Results: Over 80% the responding adolescents lacked knowledge about contraception, and half of them cannot recognize all the AIDS transmitted routes. Boys got a lower level sex-related knowledge score than girls. However, parents were more likely to answer girls' questions about sex than boys ($p < 0.001$), and sex education courses were delivered later to boys ($p = 0.003$). Gender difference of knowledge score was not identified in the multivariable linear regression model, while education from parents/school and sex education need score were found to be positive factors. In the multivariable logistic regression models, parents' positive responses to adolescents' questions and need score were associated with respondents' attitudes with adolescence.

Conclusions: Our findings indicated that Chinese high school students had a low level sex-related knowledge and education needs. Several individual factors may explain gender differences in adolescents' sexual knowledge and attitudes. Designation of targeted sex education programs should consider these individual factors in the future.

Introduction

Young people aged 10–24 years constitute a quarter of the world population.[1] Sexually active adolescents are at high risk of unexpected pregnancies and sexually transmitted Diseases (STD).[2] Therefore, sex education, including formal education from school and from parents, was recommended by several medical organizations to delay adolescents' sexual debut, reduce sexual partners, increase birth control, and promote healthy sexual development.[3, 4]

However, recent reports suggested that sex education was not satisfactory in China. Only 55.6% of Chinese college students had ever received sex education,[5] and 6.1–18% discussed about sex with their parents.[6] In developed countries such as the United States, the percentages of adolescents receiving sex education were higher of 55–94%[7]. The lack of sex education leads to lack of sex-related knowledge and negative health outcomes.[5, 8] Particularly, it has been pointed out that girls had higher level of sex-related knowledge than boys[9], while boys had an earlier age of sexual debut, higher prevalence rate of risk behavior, and more sexual partners[6, 10, 11]. Possible explanations may be that parents concentrate more on girls.[9, 12] More researches are needed to reveal the reasons of gender differences and achieve gender equality in sex education.

The present study used a self-developed questionnaire to evaluate Chinese high school students' sex-related knowledge, sex education need, and attitudes. We aim to examine the associations among gender, education experiences, sex-related knowledge, and attitudes, and provide suggestions on targeted sex education.

Materials And Methods

Participants

Students from three junior high schools and one senior high school in Fuzhou, China, were recruited to take our survey during July-December, 2016. Five classes were randomly selected in each school, and 10 students were invited by their teachers to respond to our survey with a convenience sampling method. A total of 145 questionnaires were distributed in three junior high schools and 55 questionnaires in one senior high school. The students were informed that their participation was voluntary, and their answers would be anonymous and confidential. The study was approved by the institutional review board of authors' institution, and completion of the survey was considered to imply consent to participate.

Instruments

A questionnaire was developed based on scientific literature and discussions among 8 experts (authors 1 and 2 and 6 experts in this field).[8, 10, 11] We modified the questionnaire to improve content validity, face validity, and clarity after pilot tests with another 10 experts/teachers.[13] The final questionnaire was attached in Supplemental 1.

For respondents' characteristics, we collected their gender, age, and grade. We used one question to ask whether the respondent has been in a relationship (Question 18).

For education from parents and teachers, we designed four questions. One question asked about their sources to obtain sexual knowledge (Question 7); and the total number of source was named as "Knowledge source score" and higher score means that the respondent has more sources to acquire related knowledge. The second question asked about what knowledge they learned from parents/teachers (Question 9); and the total number of the selected items was regarded as "Knowledge from parents/teachers". We also asked parents' reactions to respondents' inquiries about sex education and students' first time of receiving sexual education courses (Question 8, 10).

We used three questions to investigate students' needs for sexual education (Question 11, 12, and 15). We used single-choice question to measure self-perceived necessity of sex education and to ask about the best time of initiating education, and we used multiple-choice question to ask what kind of knowledge that respondents would like to learn. The total score of these three questions were regarded as "Need score" and higher score shows that the respondent has stronger need for sex education (Supplemental Table 1).

We used four questions to evaluate respondents' knowledge level, including the definition of sexual behavior (Question 23), the reason of pregnancy (Question 24), the correct contraception measurement (Question 25), and the transmitted routes of AIDS (Question 26). Similar to need score, the total score of these questions were regarded as "Knowledge score" and higher score shows that the respondent has higher knowledge level in this area (Supplemental Table 2).

We used two questions to measure students' attitude. One question is about their behaviors when they encounter troubles about puberty (Question 14), and one is about attitude towards friends' discussion about adolescence (Question 16).

Statistical analysis

We reported means and standard deviations (SD) for continuous variables, and percentages for categorical variables. To compare differences among different gender groups, we used χ^2 test or Fisher exact test for categorical variables and the t test for continuous variables. For Knowledge score and Need score, multivariable linear regression analyses were used to determine their associations with respondents' characteristics. The selection of variables referred to priori importance and the results from bivariate analyses. For students' attitudes, multivariable logistic regression analyses were used to determine their associations with respondents' characteristics, and the variables in the final models were selected as above. Two-sided $p < .05$ were considered statistically significant. All statistical analyses were performed using SPSS Version 18.0 software (SPSS Inc., Chicago, IL, USA).

Results

Of the 200 students, 191 returned a completed survey (defined as completing $\geq 80\%$ of the items) [14]. The mean age of the respondents was 14.57 year (Table 1), and boys had a higher age than girls. The mean age of girls' first menstruation was lower than the age of boys' first spermatorrhea (Table 1). Compared to boys, parents were more likely to answer girls' questions about sex (Fig. 1a). What's more, boys received sex education courses later than girls (Fig. 1b). Boys were more likely to obtain sexual knowledge from video while girls relied more on family education and communication with friends (Supplemental Fig. 1a). For the content, more girls acquired knowledge about sexual physiology or psychological development from parents and school, and similar trends were noticed in other items (Supplemental Fig. 1b). Girls seemed to be more positive when they encounter troubles about puberty than boys (Fig. 1c), and they were more positive to participate in friends' discussions about adolescence (Fig. 1d).

Table 1
Characteristics of Respondents

Characteristics	Overall ^a		Male ^a		Female ^a		p value ^b
	No	value	No	value	No	value	
Age, mean(SD), y	183	14.57(1.51)	69	14.84(1.65)	91	14.18(1.33)	0.007
First menstruation/ spermatorrhea, mean(SD), y	183	13.27(1.71)	70	14.26(1.75)	93	12.47(1.17)	< 0.001
Grade							
Junior high school	136	72%	47	64%	77	84%	0.004
Senior high school	53	28%	27	36%	15	16%	
Is it a common phenomenon that your friends are in a relationship?							
Very common/common	58	31%	23	31%	26	28%	0.734
Some/few/none	132	69%	52	69%	66	72%	
Have you experience any relationship?							
Yes	41	22%	21	28%	15	16%	0.068
No	149	78%	54	72%	77	84%	
a: Numbers may not have a sum of 191 because of missing data.							
b: P values for differences between male and female respondents.							

Table 2
Associations Between Need Score and Respondents' Characteristics (n = 159)

Characteristics	Unadjusted β Coefficient (95% CI)	p value	Adjusted β Coefficient (95% CI) ^a	p value
Gender				
Male	Reference		Reference	
Female	-0.605 (-1.955 to 0.745)	0.377	-0.223 (-1.625 to 1.178)	0.753
Grade				
Junior high school	Reference		Reference	
Senior high school	-1.831 (-3.332 to -0.33)	0.017	-2.090 (-3.668 to -0.513)	0.010
Knowledge source score	0.883 (0.445 to 1.322)	< 0.001	0.597 (0.125 to 1.068)	0.014
Knowledge from parents/teachers	0.710 (0.404 to 1.017)	< 0.001	0.541 (0.200 to 0.881)	0.002
Parents' responses to your questions				
Answer with details	Reference		Reference	
Others	-0.272 (-2.106 to 1.562)	0.770	0.416 (-1.330 to 2.163)	0.638
I never ask	-0.471 (-1.983 to 1.041)	0.539	-0.542 (-2.056 to 0.973)	0.481
Is it a common phenomenon that your friends are in a relationship?				
Very common/common	Reference		Reference	
Some/few/none	0.36 (-1.116 to 1.835)	0.631	1.139 (-0.364 to 2.642)	0.136
Have you experience any relationship?				
No	Reference		Reference	
Yes	-0.326 (-1.968 to 1.317)	0.696	-0.628 (-2.270 to 1.014)	0.451
^a : Adjusted model included all variables shown in the table.				

We used three questions to investigate students' needs for sexual education (Supplemental Table 3). Although 89% of respondents believed that sex education was necessary, less than 20% realized the importance of knowledge about prevention of STD, intimate violence, and contraception methods. A total

of 62% of the respondents believed that junior high school would be the best time for initiation of sexual education. We also calculated need score as in supplemental Table 2. Gender difference in need score was not significant. Multivariable linear regression analysis revealed that students' knowledge source score and knowledge from parents/teachers were positively associated with need score, while students' grade was identified as a negative predictor (Table 2).

Four questions were used to evaluate respondents' knowledge level. Table 3 showed that one third of the respondents believed that "safe period" and "external ejaculation" were effective contraception methods, and further analyses revealed that 160 (84%) respondents cannot recognized all the correct contraception methods. Half of them cannot recognize all the AIDS transmitted routes. Nearly 20% boys did not know the reason why women will get pregnant while the percentage of girls was only 4%, and gender difference was significant ($p = 0.005$). Similar trend was noticed for other item, such as "definition of sexual behavior". Knowledge score was calculated as in Supplemental Table 2 and boys got a lower level of knowledge score than girls. Multivariable linear regression model showed that the association between gender and knowledge score was marginally significant (Table 4, $p = 0.076$). Knowledge from parents/teachers and need score were identified as independent factors of sexual knowledge level.

We also performed multivariable logistic regression analyses to explore the associations between students' attitude and characteristics (Table 5). Compared with girls, boys were less likely to perform positive behaviors when they encounter puberty troubles, and this association remained significant even controlled by other variables. Parent's reaction to student's questions was also identified as an independent factor. For students' behaviors to friends' discussions about puberty, need score was identified as a positive factor, while gender was not significant after controlled by other variables.

Table 3 Respondents' answers to the sexual knowledge items

Characteristics	Overall		Male		Female		p value
	No	value	No	value	No	value	
Items that belong to sexual behavior:							
Kiss	63	33%	22	29%	33	35%	0.414
Hug	26	14%	11	15%	12	13%	0.823
Sexual touch	67	35%	25	33%	34	37%	0.745
Flirt	23	12%	12	16%	9	10%	0.247
Talk dirty jokes	37	19%	14	19%	20	22%	0.704
Watch porn videos	69	36%	27	36%	37	40%	0.749
Masturbation	101	53%	34	46%	57	62%	0.043
Intercourse	149	79%	57	76%	77	84%	0.244
Total score of this question ^a , mean(SD)	188	0.42(0.24)	74	0.39(0.25)	92	0.46(0.23)	0.076
Women will be pregnant because:							
Others ^b	20	11%	14	19%	4	4%	
Intercourse	166	89%	60	81%	87	96%	0.005
Please choose all the contraception items:							
Condom	167	87%	69	92%	82	88%	0.453
Prophylactic contraceptive pill	105	55%	39	52%	56	60%	0.348
Intrauterine device	62	32%	34	45%	20	22%	0.001
Safe period	75	39%	25	33%	40	43%	0.208
External ejaculation	66	35%	26	35%	31	33%	0.871
Vasoligation	70	37%	20	27%	37	40%	0.101
Emergency contraception pills	82	43%	28	37%	42	45%	0.347
Total score of this question ^a , mean(SD)	191	0.51(0.30)	75	0.51(0.31)	93	0.51(0.27)	0.947
Please choose the right answer for the AIDS transmitted routes:							

Wrong answer	88	46%	38	51%	42	46%	
Right answer ^c	102	54%	37	49%	50	54%	0.537
Knowledge score, mean(SD)	182	2.36 (0.85)	73	2.20(0.96)	89	2.47(0.72)	0.048

^a: Calculation of this score was based on Supplemental Table 2.

^b: Included "Hug", "Kiss", "Girls will get pregnant when they grow up", and "I don't know".

^c: Right answer is "Both d, e, f, and g are the AIDS transmitted routes".

Table 4. Associations Between Knowledge Score and Respondents' Characteristics (n = 154)

Characteristics	Unadjusted β Coefficient (95% CI)	p value	Adjusted β Coefficient (95% CI) ^a	p value
Gender				
Male	Reference		Reference	
Female	0.281 (0.017 to 0.545)	0.037	0.244 (-0.026 to 0.514)	0.076
Grade				
Junior high school	Reference		Reference	
Senior high school	0.123 (-0.175 to 0.422)	0.416	0.279 (-0.029 to 0.588)	0.075
Knowledge source score	0.152 (0.061 to 0.243)	0.001	0.073 (-0.024 to 0.170)	0.138
Knowledge from parents/teachers	0.135 (0.075 to 0.195)	<0.001	0.096 (0.027 to 0.165)	0.007
Parents' responses to your questions				
Answer with details	Reference		Reference	
Others	0.037 (-0.322 to 0.396)	0.838	0.131 (-0.205 to 0.467)	0.441
I never ask	-0.156 (-0.455 to 0.142)	0.303	-0.135 (-0.430 to 0.159)	0.365
Need score	0.037 (-0.322 to 0.396)	<0.001	0.038 (0.006 to 0.069)	0.020
Is it a common phenomenon that your friends are in a relationship?				
Very common/common	Reference		Reference	
Some/few/none	0.116 (-0.172 to 0.405)	0.427	0.029 (-0.260 to 0.318)	0.843
Have you experience any relationship?				
No	Reference		Reference	
Yes	-0.030 (-0.351 to 0.291)	0.855	0.033 (-0.282 to 0.347)	0.838

^a: Adjusted model included all variables shown in the table.

Table 5
Associations Between Respondents' Attitudes, Behaviors, and Characteristics

Characteristics	Positive behaviors when encounter troubles about puberty ^a (n = 147)		Positive behaviors when friends talk about adolescence ^b (n = 154)	
	Adjusted OR (95% CI) ^c	p value	Adjusted OR (95% CI) ^c	p value
Gender				
male	Reference		Reference	
female	3.085 (1.241 to 7.669)	0.015	1.827 (0.742 to 4.497)	0.190
Grade				
Junior high school	Reference		Reference	
Senior high school	0.758 (0.273 to 2.108)	0.596	0.716 (0.265 to 1.935)	0.511
Knowledge access score	1.266 (0.873 to 1.838)	0.214	1.220 (0.869 to 1.713)	0.251
Knowledge from parents/teachers	1.185 (0.914 to 1.535)	0.201	0.896 (0.715 to 1.123)	0.342
Parents' responses to my questions				
Answer with details	Reference		Reference	
Others	0.269 (0.081 to 0.890)	0.032	0.898 (0.279 to 2.893)	0.857

^a: Positive behaviors included "Communicate with parents", "Communicate with teachers", "Communicate with friends or siblings", "Write a diary", and "Do some sports", and negative behaviors included "Get angry", "Smoke or drink", and "Play computer games".

^b: Positive behaviors included "Participate in the conversation with an active attitude", and "Participate in the conversation with less active attitude".

^c: Adjusted model included all variables shown in the table.

Characteristics	Positive behaviors when encounter troubles about puberty ^a (n = 147)		Positive behaviors when friends talk about adolescence ^b (n = 154)	
	Adjusted OR (95% CI) ^c	p value	Adjusted OR (95% CI) ^c	p value
I never ask	0.183 (0.061 to 0.547)	0.002	0.523 (0.198 to 1.378)	0.190
Is it a common phenomenon your friends in a relationship				
Very common/common	Reference		Reference	
Some/few/none	0.715 (0.265 to 1.929)	0.508	0.899 (0.346 to 2.336)	0.827
Have you experience any relationship				
No	Reference		Reference	
Yes	0.853 (0.299 to 2.435)	0.766	0.388 (0.128 to 1.178)	0.095
Knowledge score	0.867 (0.513 to 1.468)	0.596	1.416 (0.839 to 2.389)	0.193
Need score	0.997 (0.897 to 1.108)	0.955	1.165 (1.037 to 1.308)	0.010
^a : Positive behaviors included “Communicate with parents”, “Communicate with teachers”, “Communicate with friends or siblings”, “Write a diary”, and “Do some sports”, and negative behaviors included “Get angry”, “Smoke or drink”, and “Play computer games”.				
^b : Positive behaviors included “Participate in the conversation with an active attitude”, and “Participate in the conversation with less active attitude”.				
^c : Adjusted model included all variables shown in the table.				

Discussion

Sex education, sex-related knowledge, and proper sexual attitudes are important to protect adolescents from risky sexual behaviors, unintended pregnancies, and other adverse health outcomes.[3, 5, 7, 8] In this study, we used a questionnaire to evaluate Chinese high school students’ characteristics, sex education experiences, needs, knowledge, and sexual attitudes. Our results revealed that girls tended to have higher

level of sexual knowledge and more positive attitudes towards puberty troubles. However, girls received more attention from parents/school regarding sex. The gender differences in students' sexual knowledge and attitudes may partly be explained by their needs for knowledge and education from parents/teachers.

Our results showed that Chinese high school students got a relatively low level of sex-related knowledge, but they did not have adequate sexuality education. One third of the respondents believed that "safe period" and "external ejaculation" were effective contraception methods, and about half of them cannot recognize all the AIDS transmitted routes. Our results were consistent with other research that adolescents lacked sex-related knowledge in China.[9, 15] and in western countries.[16] However, only 20–30% of respondents obtained knowledge about contraception/STD from parents and school in our study (Supplemental Fig. 1b). These findings indicated that the respondents, their parents, and school focused more on knowledge about physical changes and sexual health, while neglect the importance of knowledge about STD and contraception. Sexual conservatism tradition in China makes parents and teachers difficult to discuss sexual issues openly with adolescents, and prefer abstinence education strategy rather than comprehensive sexuality education.[5, 15] which may lead to adolescents' lack of knowledge about contraception, pregnancy, and HIV. As education from parents/school was identified as an independent factor of respondents' knowledge score in our study and other research.[5, 9, 11, 15, 17] more training should be provided to both parents and school, and encourage them to take comprehensive sexuality education that cover knowledge about contraception, pregnancy, STD, and intimate violence.

Gender differences were noticed in sex-related knowledge and sex education experiences in our study. About 20% of boys did not know the reason of pregnancy, while the percentage of girls was only 4%. Other knowledge items showed similar trends, which was consistent with other research.[17, 18] Accordingly, we found that parents and school were more likely to provide sex education to girls, and girls learned more about sex from parents and school (Supplemental Fig. 1). Boys relied more on video, magazines, and the Internet to obtain sexual knowledge. Therefore, boys may be a neglected group for sex education in China. Some research found that a quarter of parents considered boys were not likely to be sexually abused.[12, 19] and only provided abstinence education rather than comprehensive sexuality education[8]. The lack of formal education make boys to look for other sources, such as peers, the Internet, and pornography, to learn about sex.[11, 20] Without proper guidance, boys may be more likely to be involved in risky sex behaviors, early sex debut, and multiple partners.[6, 10, 11] and lack related knowledge to protect themselves.

Moreover, we found that Chinese adolescents did not have much need for sexuality education, which may be a potential barrier for them to acquire important sex-related knowledge. Although 89% of respondents believed that sex education was necessary, most of them would like to learn topics such as physical and physiological changes during puberty, while less than 20% realized the importance of prevention of STD, intimate violence, and contraception methods (Supplemental Table 3). These results were consistent with the lack of knowledge of contraception, pregnancy, and HIV in our study. Most of the respondents believed that junior high school (age 13 to 15) would be the best time for initiation of sexual education, which was later than other countries.[21, 22] The above results indicated that Chinese high school

students got low needs for sex education, indicating the importance to improve their attitudes and inspire their motivations of learning. We calculated their need score of sex education, and found that knowledge source score and knowledge from parents/teachers were independent predictors. Our results were in accordance with other research,[21, 23] and indicated that more sources and more education from parents/teachers should be provided to improve students' self-perceived needs of learning sex-related knowledge.

We also found gender differences in attitudes in several situations. Girls were more likely to perform positive behaviors when they encounter troubles about puberty, and this gender difference remained significant in the adjusted model. Possible reasons may be that girls were considered to be more vulnerable to sexual harassment or STD,[9] and they received more attention from parents/teachers, which may give girls a closer feeling for consultation.[20] Apart from gender, we found that parents' detailed answers to children's questions would increase their likelihood of having positive coping styles. Other studies found similar results, and revealed that high quality of parent-child communication can improve behavior outcome and reduce unintended pregnancy among adolescents.[24] For the attitudes towards discussions about adolescence, although girls tended to be more positive than boys, this difference was not significant in the adjusted model. Need score was identified as a positive factor, indicating that adolescents with more need for related knowledge would take a more positive attitude with discussions among peers.

Recently, an ecological system of adolescent health risky behaviors was developed to explain the interactions between behaviors, people, and their environment.[11, 25] We observed some gender differences in sex-related knowledge and attitudes, and found that these differences can be partly explained by adolescents' experiences, education, and cognition. These results had some implications for future sex education. First, comprehensive sexuality education, including knowledge about contraception, pregnancy, STD, and intimate violence, may improve adolescents' knowledge in these fields. Second, communications among adolescents, parents, and teachers about sex are important ways to influence teenagers' knowledge, attitude, and behaviors. Adequate training for parents and teachers may help them increase their own knowledge and facilitate communications with adolescents.[15, 26] Third, boys may be a neglected group for sex education in China. They should be provided with more education and guidance regarding sex. Targeted sex education[27], including pre-education survey for screening target teenagers, defining needs of information, and designation of specific lecture, may be effective methods to improve adolescents' knowledge, attitude, and health outcome.

Our study had several limitations. First, we can only identify the correlations among variables rather than casual effects with the cross-sectional design in the present study. Second, our results need to be interpreted with caution as the convenience sampling used here, and the conclusions may not be generalized to all Chinese adolescents. National probability samples of high school students may be used to examine the gender differences in future studies. Third, we only asked about biological sex in this study, and the sexual education and knowledge remained unclear among sexual and gender minority in China. More research is needed to investigate sex-related education, knowledge, and attitudes of sexual

and gender minority in the future. Forth, self-reported questions may be influenced by recall bias, and objective biological outcomes may be used in future studies.

Conclusion

The present study revealed that Chinese high school students had a low level of sex-related knowledge, and they did not have much needs for knowledge of prevention of STD, intimate violence, and contraception methods. Compared with boys, girls tended to have higher level of sexual knowledge and more positive attitudes towards puberty troubles. However, girls received more attention from parents/school regarding sex. The gender differences in students' sexual knowledge and attitudes may partly be explained by their needs for sex education and education from parents/teachers. Targeted sex education program should be carefully designed to promote sexually healthy development of both boys and girls in the future.

Abbreviations

STD: Sexually Transmitted Diseases

AIDS: Acquired Immune Deficiency Syndrome

Declarations

Ethics Approval Statement & Consent Form All procedures performed in studies involving human participants were in accordance with the ethical standards of the Research Ethics Committee of the Guangzhou Xinhua University and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All participants were well informed about the objectives of the research and signed a consent form before joining the research.

Consent for publication On behalf of all authors, the corresponding author states that there is no conflict of interest.

Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable requests.

Authors' contributions

Hongfei Li: Designed the study, conducted data analysis, wrote up the manuscript and revised the article according to reviewers' comments.

Jian Mo: Supported with data collection, co-edited the manuscript, and revised the article according to reviewers' comments.

Mantang Gan, Xinlong Rao , Chengzhu Xiong , Dongdong Liu , Xin Guan and Yanfen Liu: Designed the study, co-drafted the manuscript, and revised the article according to reviewers' comments.

All authors have read and approved the manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest.

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References

1. Sawyer SM, Afifi RA, Bearinger LH, et al. Adolescence: A foundation for future health. *Lancet*, 2012, 379: 1630–1640
2. Ma Q, Ono-Kihara M, Cong L, et al. Sexual behavior and awareness of chinese university students in transition with implied risk of sexually transmitted diseases and hiv infection: A cross-sectional study. *BMC public health*, 2006, 6: 232, Satterwhite CL, Torrone E, Meites E, et al. Sexually transmitted infections among us women and men: Prevalence and incidence estimates, 2008. *Sexually transmitted diseases*, 2013, 40: 187–193
3. Chin HB, Sipe TA, Elder R, et al. The effectiveness of group-based comprehensive risk-reduction and abstinence education interventions to prevent or reduce the risk of adolescent pregnancy, human immunodeficiency virus, and sexually transmitted infections: Two systematic reviews for the guide to community preventive services. *American journal of preventive medicine*, 2012, 42: 272–294
4. Lindberg LD, Maddow-Zimet I. Consequences of sex education on teen and young adult sexual behaviors and outcomes. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 2012, 51: 332–338, US Department of Health Human Services Office of Disease Prevention Health Promotion. *Healthy people 2020*. 2010,
5. 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. *Reproductive health*, 2017, 14: 103

6. Chi X, Yu L, Winter S. Prevalence and correlates of sexual behaviors among university students: A study in hefei, china. *BMC public health*, 2012, 12: 972
7. Lindberg LD, Maddow-Zimet I, Boonstra H. Changes in adolescents' receipt of sex education, 2006–2013. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 2016, 58: 621–627
8. Jaramillo N, Buhi ER, Elder JP, et al. Associations between sex education and contraceptive use among heterosexually active, adolescent males in the united states. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 2017, 60: 534–540
9. Yu B, Chen J, Jin Y, et al. The knowledge and skills related to sexual abuse prevention among chinese children with hearing loss in beijing. *Disability and health journal*, 2017, 10: 344–349
10. Li S, Huang H, Cai Y, et al. Characteristics and determinants of sexual behavior among adolescents of migrant workers in shangai (china). *BMC public health*, 2009, 9: 195
11. Lou C, Cheng Y, Gao E, et al. Media's contribution to sexual knowledge, attitudes, and behaviors for adolescents and young adults in three asian cities. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 2012, 50: S26-36
12. Chen J, Dunne MP, Han P. Prevention of child sexual abuse in china: Knowledge, attitudes, and communication practices of parents of elementary school children. *Child abuse & neglect*, 2007, 31: 747–755
13. Burton LJ, Mazerolle SM. Survey instrument validity part i: Principles of survey instrument development and validation in athletic training education research. *Athletic Training Education Journal*, 2011, 6: 27–35
14. The American Association for Public Opinion Research. Standard definitions: Final dispositions of case codes and outcome rates for surveys. 9th edition. 2016,
15. Zhang W, Chen J, Feng Y, et al. Young children's knowledge and skills related to sexual abuse prevention: A pilot study in beijing, china. *Child abuse & neglect*, 2013, 37: 623–630
16. Mollen CJ, Barg FK, Hayes KL, et al. Assessing attitudes about emergency contraception among urban, minority adolescent girls: An in-depth interview study. *Pediatrics*, 2008, 122: e395-401,Johnson R, Nshom M, Nye AM, et al. There's always plan b: Adolescent knowledge, attitudes and intention to use emergency contraception. *Contraception*, 2010, 81: 128–132
17. Makenzius M, Gadin KG, Tyden T, et al. Male students' behaviour, knowledge, attitudes, and needs in sexual and reproductive health matters. *The European journal of contraception & reproductive health care: the official journal of the European Society of Contraception*, 2009, 14: 268–276
18. Bynum SA, Brandt HM, Friedman DB, et al. Knowledge, beliefs, and behaviors: Examining human papillomavirus-related gender differences among african american college students. *Journal of American college health: J of ACH*, 2011, 59: 296–302
19. Chen JQ, Chen DG. Awareness of child sexual abuse prevention education among parents of grade 3 elementary school pupils in fuxin city, china. *Health education research*, 2005, 20: 540–547

20. Lynda M. Young people's views of sex education: Gender, information and knowledge. *Sex Education*, 2004, 4: 153–166
21. Fentahun N, Assefa T, Alemseged F, et al. Parents' perception, students' and teachers' attitude towards school sex education. *Ethiopian journal of health sciences*, 2012, 22: 99–106
22. Ito KE, Gizlice Z, Owen-O'Dowd J, et al. Parent opinion of sexuality education in a state with mandated abstinence education: Does policy match parental preference? *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 2006, 39: 634–641
23. Kohler PK, Manhart LE, Lafferty WE. Abstinence-only and comprehensive sex education and the initiation of sexual activity and teen pregnancy. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 2008, 42: 344–351
24. Rogers AA, Ha T, Stormshak EA, et al. Quality of parent-adolescent conversations about sex and adolescent sexual behavior: An observational study. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 2015, 57: 174–178
25. L'Engle KL, Brown JD, Kenneavy K. The mass media are an important context for adolescents' sexual behavior. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 2006, 38: 186–192
26. Haberland N, Rogow D. Sexuality education: Emerging trends in evidence and practice. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 2015, 56: S15-21
27. Wittich CM, Chutka DS, Mauck KF, et al. Perspective: A practical approach to defining professional practice gaps for continuing medical education. *Academic medicine: journal of the Association of American Medical Colleges*, 2012, 87: 582–585

Figures

Figure 1

Gender differences in sex education experiences, sexual attitudes and behaviors, and sex-related knowledge level. The answers to “Parents' responses to my questions” **(a)**, “First time of receiving sexual education courses” **(b)**, “Behaviors when encounter troubles about puberty” **(c)**, and “Behaviors when friends talk about adolescence” **(d)**. Positive behaviors for troubles about puberty included “Communicate with parents”, “Communicate with teachers”, “Communicate with friends or siblings”, “Write a diary”, and “Do some sports”, and negative behaviors included “Get angry”, “Smoke or drink”, and “Play computer games”. Positive behaviors for the question “Behaviors when friends talk about adolescence” included “Participate in the conversation with an active attitude”, and “Participate in the conversation with less active attitude”.

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