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Table 1. Comparison of socio-demographic characteristics and HIV/sexually transmitted infection (STI)-related knowledge between male STI patients at 21 STI clinics and male controls who were sexually active in the previous year taken from a randomized general population sexual behavior survey

Characteristic	STI*patients (n = 765)		General population controls (n = 1,167)		p value†
	No.	%	No.	%	
Age at survey (years)					<0.001§
18-19	29	3.8	16	1.4	
20-29	324	42.4	194	16.6	
30-39	274	35.8	266	22.8	
40-49	103	13.5	341	29.2	
50-59	35	4.6	350	30.0	
Mean(SD*)		31.8(8.8)		41.6(11.0)	
Median		30		43	
Employment					<0.001
Self-employed	100	13.1	206	17.7	
Management	20	2.6	36	3.1	
Employee	554	72.4	856	73.4	
Unemployed or fulltime student	74	9.7	49	4.2	
Missing	17	2.2	20	1.7	
Marital status					<0.001
Married	259	33.9	919	78.7	
Not married	504	65.9	238	20.4	
Missing	2	0.3	10	0.9	
Educational level					<0.001
High school or below	269	35.2	630	54.0	
College/university or above	494	64.6	529	45.3	
Missing	2	0.3	8	0.7	
HIV*-related knowledge score‡					<0.001§
Mean(SD)		7.4(2.2)		6.3(2.4)	
Median		8		7	
STI-related knowledge score¶					<0.001§
Mean(SD)		5.2(1.7)		3.9(2.0)	
Median		6		4	

* STI, sexually transmitted infection; SD, standard deviation

† p values for chi-square test unless otherwise mentioned.

‡ Score for HIV-related knowledge is the total number of 11 HIV-related knowledge questions answered correctly.

§ p values for Student's t-test

¶ Score for STI-related knowledge is the total number of 7 STI-related questions answered correctly.

Table 2. Comparison of sexual behaviors between male STI patients at 21 STI clinics and male controls who were sexually active in the previous year taken from a randomized general population sexual behavior survey

Characteristic	STI* patients (n = 765)		General population controls (n = 1,167)		p value†
	No.	%	No.	%	
Age at first sexual intercourse (years)					<0.001
<19	427	55.8	420	36.0	
19 or more	327	42.7	639	54.8	
Missing	11	1.4	108	9.3	
Mean(SD*)		18.4(2.8)		20.0(3.5)	
Median		18.0		19.0	
No. of partners (previous year)					<0.001
1	111	14.5	895	76.7	
2-3	231	30.2	181	15.5	
4 or more	408	53.3	71	6.1	
Missing	15	2.0	20	1.7	
Type of sex partner(s) (previous year)					
Regular partner(s)					<0.001
Yes	604	79.0	1068	91.5	
No	159	20.8	92	7.9	
Missing	2	0.3	7	0.6	
Casual partner(s)					<0.001
Yes	408	53.3	117	10.0	
No	351	45.9	1015	87.0	
Missing	6	0.8	35	3.0	
Paid partner(s)					<0.001
Yes	474	62.0	122	10.5	
No	283	37.0	1012	86.7	
Missing	8	1.0	33	2.8	
Sex with regular partners (previous year)					
Had unprotected vaginal sex					0.882
Yes	484	63.3	741	63.5	
No	251	32.8	390	33.4	
Missing	30	3.9	36	3.1	
Had unprotected oral sex					0.012
Yes	423	55.3	574	49.2	
No	273	35.7	475	40.7	
Missing	69	9.0	118	10.1	
Had unprotected anal sex					0.890
Yes	29	3.8	42	3.6	
No	696	91.0	1043	89.4	
Missing	40	5.2	82	7.0	
Sex with casual partners (previous year)					
Had unprotected vaginal sex					<0.001
Yes	284	37.1	73	6.3	
No	449	58.7	1056	90.5	
Missing	32	4.2	38	3.3	
Had unprotected oral sex					<0.001
Yes	286	37.4	74	6.3	
No	418	54.6	1050	90.0	
Missing	61	8.0	43	3.7	
Had unprotected anal sex					<0.001
Yes	18	2.4	6	0.5	
No	702	91.8	1122	96.1	
Missing	45	5.9	39	3.3	
Sex with paid partners (previous year)					
Had unprotected vaginal sex					<0.001
Yes	199	26.0	29	2.5	
No	551	72.0	1103	94.5	
Missing	15	2.0	35	3.0	
Had unprotected oral sex					<0.001
Yes	372	48.6	69	5.9	
No	346	45.2	1058	90.7	
Missing	47	6.1	40	3.4	
Had unprotected anal sex					0.004
Yes	14	1.8	6	0.5	
No	712	93.1	1125	96.4	
Missing	39	5.1	36	3.1	
Gender of sexual partners‡					0.003
Only women	728	95.2	1120	96.0	
Only men	17	2.2	6	0.5	
Both men and women	8	1.0	8	0.7	
Missing	12	1.6	33	2.8	

* STI, sexually transmitted infection; SD, standard deviation

† p values for chi-square test unless otherwise mentioned.

‡ Asked for the previous year for STI patients and for the lifetime for general population.

Table 3. Factors associated with sexually transmitted infection (STI) in a case-control study using male STI patients at 21 STI clinics compared to male controls who were sexually active in the previous year taken from a randomized general population sexual behavior survey

Characteristics	Crude OR*	95% CI*	Adjusted OR†	95% CI
Socio-demographic factors				
Age (years)				
18-39	13.2	9.12, 19.0	3.94	2.17, 7.15
40-49	3.02	2.00, 4.56	1.76	0.93, 3.30
50-59	1.00		1.00	
Employment				
Self-employed	0.32	0.29, 0.50	1.15	0.57, 2.30
Management	0.37	0.19, 0.71	1.00	0.31, 3.19
Employee	0.43	0.29, 0.62	0.95	0.54, 1.70
Unemployed or fulltime student	1.00		1.00	
College/university education or above (referred to high school or less)	2.19	1.81, 2.64	2.03	1.45, 2.83
Unmarried (referred to married)	7.51	6.11, 9.24	2.65	1.80, 3.91
Behavioral factors				
First sexual experience at ≤18 years-old (referred to >18 year-old)	1.99	1.64, 2.40	0.99	0.71, 1.39
Number of sexual partners in the previous year				
1	1.00		1.00	
2-3	10.3	7.80, 13.6	3.33	2.20, 5.05
≥4	46.3	33.6, 63.8	6.29	3.81, 10.4
Sex with regular partners in the previous year				
Had unprotected vaginal sex (referred to no)	1.02	0.84, 1.23	2.70	1.75, 4.17
Had unprotected oral sex (referred to no)	1.28	1.06, 1.56	0.70	0.48, 1.01
Had unprotected anal sex (referred to no)	1.04	0.64, 1.68	0.93	0.40, 2.17
Sex with casual partners in the previous year				
Had unprotected vaginal and/or oral sex (referred to no)	10.9	8.34, 14.1	2.14	1.40, 3.26
Sex with paid partners in the previous year				
Had unprotected vaginal sex (referred to no)	13.7	9.18, 20.6	2.64	1.46, 4.80
Had unprotected oral sex (referred to no)	16.5	12.4, 21.9	4.72	3.04, 7.32

*OR, odds ratio; CI, confidence interval

†Odds ratio was adjusted by multiple logistic regression analysis for districts (Hokkaido, Tohoku, Kanto-Koshinetsu, Kinki, Chugoku and Kyushu)

Research article

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The characterisation of sexual behaviour in Chinese male university students who have sex with other men: A cross-sectional study

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Published: 22 July 2008

Received: 3 January 2008

BMC Public Health 2008, 8:250 doi:10.1186/1471-2458-8-250

Accepted: 22 July 2008

This article is available from: <http://www.biomedcentral.com/1471-2458/8/250>

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Abstract

Background: The risks for Chinese male university students who have sex with other men (MSM) have not been compared with those for non-MSM students. This information is important for the development of targeted HIV prevention programmes for this population.

Methods: Sexually active MSM and non-MSM students were compared for demographic characteristics, sexual behaviour, and related psychosocial variables using bivariate analyses. The data were a subset drawn from a large-scale cross-sectional questionnaire survey of sexually active male students conducted at two universities in a large city in Zhejiang Province, China, in 2003.

Results: Of 1824 sexually active male students, 68 (3.7%) reported having had sex with a man at least once; 33.8% of these 68 men had also had female partners. Compared with non-MSM students, MSM students were 3–6.5 times more likely to have had sexual encounters with casual or commercial sex partners and were three times less likely to have protected sex in the past year or during their lifetime. They were three to five times more likely to have had multiple partners and 15 times more likely to have had a sexually transmitted disease (STD). In addition, the MSM students knew half as much about HIV and had less condom-decision than did non-MSM students and were two times more accepting of commercial sex. However, the MSM students were twice as aware of the risks for HIV infection.

Conclusion: MSM composed 3–4% of the male sexually active university student population studied and was found to be at greater risk than non-MSM students for STD/HIV infection. There is an urgent need for STD/HIV programmes in university health services that take into consideration the sexuality and psychosocial issues of MSM students.

Background

China, the most populous nation in the world, is experi-

encing an increase in HIV/AIDS. National sentinel surveillance data indicate that from 1996 or 1997 to 2004, HIV

prevalence rose from 1.95 to 6.48% in injection drug users, from 0.02 to 0.93% in female sex workers, and from 0 to 0.26% in pregnant women [1,2]. Although injection drug use and sexual contact are currently the predominant modes of HIV transmission, sexual transmission is on the rise and is estimated to have increased from 30% in 2003 to 44% in 2005 and 57% in 2007 [1-4].

Recent reports indicate that there is an HIV epidemic among men who have sex with men (MSM) in Asian countries. MSM constitute 15–45% of all HIV infections in Taiwan and Hong Kong [5,6], and studies conducted in Cambodia and Thailand indicate that the prevalence of HIV in MSM is 15 and 17%, respectively [7,8]. Since the first MSM sexually transmitted HIV case was detected in Beijing in 1989 [9], several studies have shown that an HIV epidemic is emerging in Chinese MSM. A serial survey conducted between 1998 and 2001 found that the prevalence of HIV in MSM was 2.5–17.1% [10]. In Shenzhen, the prevalence of HIV in MSM increased from 0.9% in 2002 to 2.7% in 2005 [11], and in Beijing it increased from 0.5% in 2004 to 5% in 2006 [12]. Estimates by China's Health Ministry and the Joint United Nations Programme on HIV/AIDS indicate that MSM accounted for 7% of HIV infections in China through 2005 [2] and for 12.2% of the cases in 2007 [4].

Several studies performed in China suggest that MSM are vulnerable to sexually transmitted disease (STD) and HIV [13-17] because they have unprotected sexual intercourse. For example, only 23–31% of MSM reported always using a condom during insertive anal sex, 28–34% during receptive anal sex in Jinan and Nanchang during the previous 6 months [16,17], and 32% reported always using a condom during anal sex in a six-city study in 2004 [15]. However, the interpretation of these data is limited by the fact that most of the data were derived from convenience samples collected in gay bars, bathhouses, parks, on the Internet, and from voluntary counselling and testing centres without non-MSM controls. They do not represent the entire MSM population and it is difficult to evaluate if and how their sexual behaviour is more at risk compared to non-MSM population.

In 2003, we conducted a large-scale survey of university students with a response rate of 76.5%. This provided us with the opportunity to determine the proportion of MSM in sexually active student population and to characterise the history, practice, and psychosocial aspects of their sexual behaviour and compare it with that of non-MSM students.

Methods

Setting and participants

We obtained data from a large cross-sectional survey administered in 2003 with a sample of 22,493 students (response rate of 76.5%) from two universities located in a large Chinese coastal city in Zhejiang province [18]. The city contains only two universities. Because both universities participated in the study, opportunity was given to sample entire university student population in the city. Of the 22,493 participants, 17.6% (1981 of 11,255) of the males and 8.6% (963 of 11,238) of the females were sexually active.

Data collection

The questionnaire was developed based on literature reviews, qualitative research, a pilot study, and a test-retest reliability study, as described previously [18]. The final version of the questionnaire included questions on: sociodemographic characteristics (15 items); knowledge about HIV, STD, and contraception (37 items); attitude towards an HIV-positive person and the perception of risk for HIV (5 items); exposure to sexual information and experience in having a boyfriend or girlfriend (7 items); sexual behaviours during the first, lifetime, past year, and most recent sexual contact (31 items); ability to reject unwilling sex (1 item); comfort with obtaining and using condoms (3 items); attitude towards sex (13 items); self-evaluation (2 items); and comments on sex education (4 items). The variables included in this paper were selected among these questions.

All students in Years 1–4 at the two universities were asked to fill out the self-administered survey. Trained staff distributed and collected the questionnaire. The local education board, the two universities involved, and the institutional review body of the Zhejiang Provincial Centre for Disease Prevention and Control reviewed the research protocol and instrument, and approved its use. As a process of informed consent, all participants were informed of the study's purpose, and invited to the study being explained how, when and where the survey was to be conducted. They are also told that non-participation would cause no disadvantage to them, and the survey was anonymous and the data was to be presented only in an aggregated manner, therefore the participants' privacy and confidentiality would be firmly protected. All these policies were also printed in the front cover of the questionnaire.

Statistical analysis

In addition to the sociodemographic and sexual behaviour variables, our study created two psychosocial scales for statistical analysis: HIV knowledge and condom-decision. The HIV-knowledge scale consisted of 10 statements with a Cronbach's alpha coefficient of .667. The 10 state-

ments required a response of "correct," "incorrect," or "do not know," including HIV can be transmitted through (1) sex without protection, (2) syringe or needle sharing, (3) mother-to-child contact, (4) blood transfusion, (5) working together; (6) STD infection increases HIV transmission; condom use can prevent (7) HIV and (8) other STDs; (9) China has a rapidly growing HIV epidemic; and (10) sexual transmission of HIV is a major factor in the HIV epidemic in China. The condom-decision scale consisted of three statements that were designed to determine whether the students make the decision to use a condom prior to sex, if they use a condom when having sex with a partner who is important to them, and whether they are comfortable buying a condom for themselves or their partner. The Cronbach's alpha coefficient for this scale was .514. The condom-decision scales were measured using a 3- to 5-point Likert-type scale, respectively, ranging from positive to negative responses. Participants were categorised into low- and high-score groups based on the median distribution of the total scores for each scale.

The data were analysed using SPSS for Windows (version 12.01; SPSS Inc., Chicago, IL). A bivariate analysis was performed to identify variables that were significantly associated with MSM status and was expressed as an odds ratio (OR) with a corresponding 95% confidence interval (CI). Statistical significance was set at $p < 0.05$.

Results

Sexually active male students who had had oral, anal, or vaginal sex and reported the gender of their sexual partner were included in the study. The sample size was 1824 students. Of these, students who reported that their partners were male or both male and female were identified as MSM; those whose sexual partners were exclusively female were identified as heterosexual, or non-MSM.

Of all sexually active male students, 68 (3.7%) reported having had sex with men, of which 23 (33.8%) reported also having had sex with women. There was no difference between MSM and non-MSM students in demographic or lifestyle variables, including the frequency of dancing, cigarette smoking, and karaoke singing (Table 1). However, the MSM group drank less frequently than did the non-MSM group ($p = 0.041$).

Sexual behaviours

There was no difference between groups in the age at which they first had sex. The first sexual encounter for MSM students was more likely to have been with a casual partner (25.0 vs. 10.9%; OR: 3.15) or commercial partner (8.8 vs. 1.9%; OR: 6.24), and they were more likely than non-MSM students to experience unwilling sex (11.8 vs. 2.4%; OR: 6.17) or coerced sex (7.4 vs. 0.3%; OR: 27.0; Table 2). MSM students had a tendency not to use a con-

Table 1: Sociodemographic characteristics of the respondents

	MSM (n = 68)		Non-MSM (n = 1756)	
	n	% ^a	n	% ^a
University				
A	42	61.8	981	55.9
B	26	38.2	775	44.1
Age				
≤ 19	7	10.3	249	14.2
> 19	58	85.3	1498	85.3
Year of study				
I	10	14.7	399	22.7
II	21	30.9	480	27.3
III	28	41.2	617	35.1
IV	9	13.2	260	14.8
Hometown area				
Rural	17	25.0	417	23.7
Town/city	51	75.0	1333	75.9
family's economic status				
Rich	13	19.1	217	12.4
Between	48	70.6	1418	80.8
Poor	7	10.3	117	6.7

^a The percentage of respondents may not add up to 100% due to non-response for some items.

dom during the first sexual encounter, but it was not statistically significant (OR: 1.78, 95% CI: 0.97–3.29). MSM students had significantly more partners during their lifetime than did non-MSM students (55.9 vs. 33.3%; OR: 5.32), but 61.8% of MSM students never or rarely used condoms compared to 34.9% of non-MSM students (OR: 3.29). MSM students were significantly more likely to have had a history of STD than were non-MSM students, at 12 and 1%, respectively (OR: 15.25).

Of all of the participants in each group, 49 (72.1%) MSM and 1354 (77.1%) non-MSM students had been sexually active during the past 12 months. During this period, MSM students were more likely to have had at least one casual partner (28.6 vs. 11.1%; OR: 3.94) and/or to have been with at least one commercial partner (12.2 vs. 3.0%; OR: 6.33), and were more likely to have had multiple partners (36.7 vs. 20.6%; OR: 2.80). MSM students were less likely to use a condom, with 61.2% reporting that they never or rarely used a condom compared to 37.3% in the non-MSM group (OR: 2.72).

Psychosocial characteristics

Awareness of the risk for contracting HIV was low in both groups. However, MSM students were significantly more aware of the risks than were non-MSM students (32.4 vs. 20.1%; OR: 1.93; Table 3). MSM students were significantly more likely than non-MSM students to approve of commercial sex (50.0 vs. 33.8%; OR: 2.38), and they

Table 2: Sexual behaviours of men who have sex with men (MSM) versus heterosexual men (non-MSM) among sexually active male students, China

	MSM (n = 68)		Non-MSM (n = 1756)		Crude OR(95%CI) ^b	P Value
	n	% ^a	n	% ^a		
First sex						
Partner type in first sex						
Regular	43	63.2	1521	86.6	1	
Casual	17	25.0	191	10.9	3.15(1.76–5.63)	0.000
Commercial	6	8.8	34	1.9	6.24(2.49–15.65)	0.000
Condom use in first sex						
Yes	13	19.1	530	30.2	1	
No/not sure	53	77.9	1215	69.2	1.78(0.97–3.29)	0.067
Consent at first sex						
Willing	52	76.5	1685	96.0	1.0	
Unwilling	8	11.8	42	2.4	6.17(2.76–13.80)	0.000
Being coerced	5	7.4	6	0.3	27.00(7.98–91.32)	0.000
Sex in lifetime						
Partner number lifetime						
1	13	19.1	1062	60.5	1	
≥ 2	38	55.9	584	33.3	5.32(2.81–10.06)	0.000
Condom use life time						
Always/often/sometimes	23	33.8	1113	63.4	1	
Rarely/Never	42	61.8	612	34.9	3.29(1.96–5.53)	0.000
STD diagnosed lifetime						
No	51	75.0	1653	94.1	1	
Yes	8	11.8	17	1.0	15.25(6.29–36.97)	0.000
Sex in the last year						
Partner type in the last year ^c						
Regular only	27	55.1	1139	84.1	1	
Ever casual ^d	14	28.6	150	11.1	3.94(2.02–7.68)	0.000
Ever commercial ^e	6	12.2	40	3.0	6.33(2.47–16.19)	0.000
Partner number in the last year ^c						
1	24	49.0	1040	76.8	1	
≥ 2	18	36.7	279	20.6	2.80(1.50–5.22)	0.001
Condom use in the last year ^c						
Always/often/sometimes	18	36.7	820	60.8	1.0	
Rarely/Never	30	61.2	503	37.3	2.72(1.50–4.93)	0.000

^a The percentage of respondents may not add up to 100% due to non-response for some items.

^b OR, odds ratio; CI, confidence interval.

^c Male students who were sexually active in the last year, n = 49 for MSM, and 1354 for non-MSM.

^d Including those who had had a casual partner at least and those who had had both casual and regular partners.

^e Including those who had had a commercial partner at least.

knew less about HIV (45.6 vs. 28.1%; OR: 2.28) and had lower condom-decision (55.9 vs. 41.2%; OR: 2.04).

Discussion

This is the first study in China to report the proportion of MSM in a male sexually active university student population and to characterise MSM psychosocial factors and sexual behaviour and compare them to those of non-MSM students. Of the sexually active male university students studied, 3.7% had had sex with a man at least once. Previous studies of 15–49-year-old men in 10 Western countries found that 0.9–13.4% (median: 5.0%) had had sex

with a man [19]. Our lower estimate might be due to underreporting by respondents for fear of stigmatisation or to the lower age range of our survey. However, our findings on sexual behaviours are consistent with other recent surveys in China. One-third of MSM reported having had sex with both men and women; this agrees with previous research that indicates that Chinese MSM are commonly bisexual [13–17]; thus the reported MSM data in this paper are on mixed population of MSM having sex only with men and those having sex with both men and women. Recent reports on condom use indicated that in the previous 6 months only 24–27% of MSM always used

Table 3: Psychosocial characteristics of men who have sex with men (MSM) versus heterosexual men (non-MSM) among sexually active male students, China

	MSM (n = 68)		Non-MSM (n = 1756)		Crude OR(95%CI) ^b	P Value
	n	% ^a	n	% ^a		
Risk awareness for HIV						
No/low possible	43	63.2	1333	75.9	1	
Some-high possible/not sure	22	32.4	353	20.1	1.93(1.14-3.27)	0.014
Approve of commercial sex						
Disapprove/not sure	25	36.8	1038	59.1	1	
Approve	34	50.0	593	33.8	2.38(1.41-4.03)	0.001
HIV knowledge scale						
High(9-10)	34	50.0	1231	70.1	1	
Low(0-8)	31	45.6	493	28.1	2.28(1.38-3.75)	0.001
Condom-decision scale						
High(10-12)	23	33.8	895	51.0	1	
Low(3-9)	38	55.9	724	41.2	2.04(1.21-3.46)	0.008

^aThe percentage of respondents may not add up to 100% due to non-response for some items.

^bOR, odds ratio; CI, confidence interval.

a condom with a female partner and 23-34% always used a condom during anal sex with a male partner [15-17]; we found that in the previous 12 months, only 7.7% of the MSM respondents always used a condom.

The MSM participants reported frequent encounters with sexual partners, especially with casual or commercial sex partners. This finding agrees with previous studies in China [16,20]. Our finding that 12% of MSM students had had at least one STD is similar to data reported in previous studies of Chinese MSM [13-16,20,21]. Our data indicate that MSM students studied engaged in the same level of risky sexual behaviour shown by MSM in previous studies, suggesting that they are likely to become part of the HIV epidemic that is emerging in MSM in China.

We quantified the increased sexual risk of MSM students compared to non-MSM students. MSM students studied had 3-6.5 times more sexual encounters with casual or commercial sex partners, were three times less likely to use a condom, were three to five times more likely to have multiple partners, and were 15 times more likely to contract an STD during the previous year or during their lifetime. In addition, MSM students studied were half as informed about HIV and had less condom-decision than did non-MSM students, and were two times more accepting of commercial sex. However, MSM students were twice as aware of the risk for HIV infection. Reason of the lower HIV-related knowledge but higher awareness for the risk of HIV infection among MSM university students studied is unclear but it may be due to the confounding of demographic variables because association of lower HIV-related knowledge but not risk awareness for HIV with MSM status disappeared in multivariate analysis (data not shown), or it may be that MSM students studied had min-

imum knowledge that unprotected sex may place them at risk for HIV infection but lack broader knowledge on HIV because of their limited access to HIV-related information.

These results clearly demonstrate that MSM university students studied are at particular sexual risk. In view of the fact that STD, which increases susceptibility to HIV infection, is already prevalent in MSM students, prevention, STD/HIV testing, treatment, and counselling and support programmes for MSM university students must be a high priority for university health services. Homosexuality is highly stigmatised in Chinese society [22,23], and MSM students face complex psychosocial issues regarding sex and STD. This is indicated by the high incidence of coerced sex, which is associated with unprotected sex, multiple partnerships [24-26], limited understanding of HIV, and low condom-decision. However, MSM students studied had a liberal attitude towards sex and a high awareness of the risk for HIV infection. University STD/HIV prevention programmes that pay particular attention to MSM students' sexuality and their complex psychosocial situation need to be developed.

Our study has some limitations. First, it was restricted to two universities in one city, and the sample may not be representative of MSM university students across China. Second, the cross-sectional nature of the study makes it difficult to determine causal relationships. Third, the data may be biased because the questionnaire was self-reported; there was a relatively large amount of missing data for some variables, and 23.5% of the students did not respond to the survey. Fourth, the questions were not designed specifically for MSM students, and important information such as roles in sex (insertive or receptive),

the use of cruising spots, and various psychological aspects were missing or incomplete. Thus, the data may not fully describe the sexual and psychosocial characteristics of MSM students. Further studies with larger sample size are clearly needed to make deep insight into the psychosocial needs, characteristics of MSM student's sexual behaviour and its context, and to explore the differences between MSM students with different level of risk taking behaviour. Such information may provide the basis for culturally appropriate STD/HIV prevention programmes for this subpopulation in China.

Conclusion

MSM practices were reported by 3.7% of male students from two universities in one coastal city in China. The sexual practices of these students was as risky as that reported by MSM in other studies and much more risky than that reported by non-MSM university students. In fact, > 10% of MSM students experienced STD infection. In view of the emerging HIV epidemic in MSM in China, there is an urgent need for STD/HIV programmes in university health services that take into consideration the issues of MSM students.

Abbreviations

MSM: Men Who Have Sex with Men; STD: Sexually Transmitted Disease; HIV: Human Immunodeficiency Virus; AIDS: Acquired Immune Deficiency Syndrome.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

All authors contributed to the design of this research. LC and QM performed the statistical analysis and drafted the manuscript; LC and GX coordinated the study in field; QM, XP, and DZ played a major role in the field survey; TH helped analyze the data; MO-K and MK supervised the research, statistical analysis and revised the manuscript. All the authors of the manuscript have read and agreed to its content.

Acknowledgements

Sponsorship: This study was supported by a grant from the Japanese Foundation for AIDS Prevention, Japan. We thank Ningbo Education Board, the participants and the two universities involved in this study for their cooperation. We are grateful to Mr. Keith J. Waterbrook, Howard Brown Health Center (retired), Chicago, USA, and Dr. Yasuharu Hidaka, Kyoto University School of Public Health, Japan, for their critical comments on, and English revision of the manuscript.

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Pre-publication history

The pre-publication history for this paper can be accessed here:

<http://www.biomedcentral.com/1471-2458/8/250/prepub>

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Needle and Syringe Sharing Practices Among Injecting Drug Users in Tehran: A Comparison of Two Neighborhoods, One with and One Without a Needle and Syringe Program

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Abstract This study was conducted to compare needle and syringe sharing practices among injecting drug users (IDUs) in two neighborhoods, one with and one without a needle and syringe program (NSP). In 2005, 419 street-based IDUs were interviewed at specific locations in two neighborhoods where IDUs are known to congregate. We compared self-reported needle and syringe access and use between IDUs from a neighborhood with an active NSP to IDUs from a neighborhood without such an intervention. A significantly smaller proportion of IDUs from the former neighborhood reported having used a shared needle/syringe over a 1-month period (21.0%) compared to IDUs from the latter neighborhood (39.9%; adjusted odds ratio, 0.24; 95% confidence interval, 0.13–0.45). These findings indicate that access to an NSP may reduce needle and syringe sharing practices. Therefore, these programs should be intensified in settings with concentrated HIV epidemics among IDUs in Iran.

Keywords Substance abuse, intravenous · Needle-exchange programs · HIV · Iran

Introduction

The Islamic Republic of Iran faces a growing HIV epidemic among its large population of injecting drug users (IDUs). To date, shared drug injection has been the primary manner of HIV transmission in Iran. Among the new cases reported to the Ministry of Health in 2005, 77% have occurred in IDUs (Center for Disease Management 2006). In addition, HIV infection rates have reached epidemic levels, with greater than 20% prevalence among street-based IDUs in Tehran (Zamani et al. 2006).

Although research indicates that many IDUs in Tehran may have contracted HIV through shared drug injection in prison (Zamani et al. 2005, 2006), concerns have been raised over the possibility of HIV transmission from ex-prisoner IDUs to community-based drug injecting and sexual networks in Tehran. This situation is particularly troubling considering the high rates of recidivism among the prison population in Iran. As reported by the Iran Prison Organization (2006), there was an average of 135 000 prisoners at any point in time in the 230 prisons and correctional settings in Iran; 45% of this population were convicted of drug-related offences. Although the average number of prisoners has decreased in recent years, the data show that as many as 600 000 individuals entered and exited prisons during the 2004–2005 Iranian fiscal year (Iran Prison Organization 2006). Recently, more prisons in Iran have initiated HIV prevention programs, including extensive educational activities and methadone maintenance therapy (Iran Prison Organization 2006); however, much more effort is needed to increase the coverage of

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HIV prevention programs among incarcerated drug users, as well as former prisoners in the community.

In response to the dangers of HIV infection among IDUs, Iranian health policy makers have adopted a harm reduction approach, and have initiated a number of interventions to control HIV transmission among the large IDU population (Vazirian 2003; Vazirian et al. 2006; Iran Prison Organization 2006; Razzaghi et al. 2006a). Notably, triangular clinics (health clinics that provide integrated services to IDUs, people living with HIV/AIDS and other sexually transmitted infections; WHO 2004) have been expanding across the country. Methadone maintenance therapy is increasing in community and correctional settings, integrated biobehavioral HIV surveillance has been set up for IDUs, and non-governmental organizations (NGOs) are participating to a greater degree in HIV prevention among IDUs with initiatives that include the provision of needle and syringe programs (NSPs) through drop-in centers and outreach activities (Vazirian 2003; UNAIDS 2007).

One of the first community-based programs for IDUs in Tehran was designed by the Iranian Ministry of Health and implemented by the Persepolis Society in 2003. This NGO has been providing a range of services for drug users, including the NSP, through its drop-in centers and mobile services in south central Tehran, which has dense communities of drug users (Vazirian et al. 2005; Razzaghi et al. 2006b). In October 2004, our research teams recruited a sample of drug users at the drop-in center and surrounding areas. Among those who had been exposed to the NSP, IDUs who had received ≥ 7 sterile syringes per week reported less frequent sharing of needles/syringes in the previous month as compared to IDUs who had not (Vazirian et al. 2005).

Very little research-based evidence is available regarding the effectiveness of NSPs in Iran (Vazirian et al. 2005), which is a significant gap in our knowledge, given that an estimated 200 000 IDUs live in Iran. In addition, many new community-based programs, including NSPs, are now available for IDUs. However, these programs have not been evaluated comprehensively, which makes it difficult to assess their overall effectiveness and hinders further improvements to prevention interventions for IDUs in Iran.

We evaluated the effectiveness of an NSP in Tehran by comparing needle and syringe sharing practices among IDUs in two neighborhoods, one with and one without an NSP. The findings of this study should help to improve harm reduction programs for drug users in Iran.

Methods

Setting

One of the first organized programs providing sterile needles and syringes for community-based IDUs in

Tehran began around 2003. Since then, increasing numbers of NGOs have become involved in providing NSPs for IDUs in their respective catchment areas. This gradual expansion of NSPs in Tehran allowed us, at the time of the study, to locate several neighborhoods with NSPs, as well as many others lacking such programs.

Between September and October 2005, three neighborhoods near two major public railways in south central Tehran were selected, based on their geographical proximity to each other as well as access to an NSP provided by the Persepolis Society. Two of these neighborhoods had active NSPs, whereas the third lacked any kind of HIV prevention activities for IDUs.

Locations where IDUs congregate (parks, vacant buildings, and out-of-sight areas along railways) were selected through intensive fieldwork in each neighborhood and then coded numerically. After adding a time component (day of a week) to each coded location, a list of time and location units was developed and a sample of these units was randomly selected.

Injecting drug users recruited from one of the neighborhoods with an active NSP (the intervention zone) were compared to those recruited from an area without an intervention program (the non-intervention zone). The selection of these two neighborhoods for this report was based on evidence gained after completing a simple descriptive analysis of the risk behaviors of IDUs in each neighborhood that showed that IDUs from these two areas had a similar lifetime rate of using shared needle/syringes (about 70% in each neighborhood).

Participants and Measures

Three teams, each consisting of two male outreach workers from the Persepolis Society and one male interviewer, were posted at the selected locations in each neighborhood during the same time interval. An outreach worker, who was also an ex-drug user, invited the IDUs who visited the location during the fixed time interval to participate in a confidential one-to-one interview. After being screened by the interviewer, active IDUs (those who reported injecting a drug in the previous month) were interviewed, but no biological specimen was collected. The interviews were conducted using a structured questionnaire to gather socio-demographic data, information about past incarcerations, drug use characteristics (including shared use of injection tools), and access to sterile needles and syringes. The main outcome for comparing IDUs from the two neighborhoods was whether the participants injected drugs using someone else's used needle or syringe in the previous month.

Ethical Considerations

All research contacts were provided with refreshments, regardless of participation, but no monetary incentive was offered. Non-participants and interviewees were given a pamphlet discussing the prevention of HIV and other blood-borne infections, along with information about local harm reduction services. The interviewer or outreach workers also explained the information verbally.

Data Analyses

Statistical analysis was performed using SPSS for Windows 13.0 (SPSS, Chicago, IL, USA). Multiple logistic regression analysis was performed to examine the association between a history of shared needle or syringe use (receptive needle or syringe sharing) in the previous month and the recruitment neighborhood, simultaneously adjusting for socio-demographic data and drug use characteristics. Variables related to age, ethnicity, level of

education, marital status, homelessness, length of drug injection, ever having used a shared needle/syringe for drug injection, ever having been treated to stop drug use, ever having shared drug injection utensils inside prison, number of drug injections, and size of drug injecting network in the past month were entered into this model, as they were associated with the recruitment neighborhood ($p \leq 0.10$) or they were considered epidemiologically important. The final model, which included all of the above-mentioned variables, was used to estimate the adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for the association between a history of shared needle or syringe use in the previous month and the recruitment neighborhood.

Results

Sample Characteristics

As shown in Table 1, a total of 419 male IDUs from two neighborhoods consented to participate in the study. Six

Table 1 Socio-demographic data and characteristics related to drug injection among male injecting drug users (IDUs) recruited from two neighborhoods, one with and one without a needle and syringe program, in Tehran ($n = 419$)

Characteristics	Neighborhood without NSP (ref) number (%)	Neighborhood with NSP number (%)	OR	95% CI	Adjusted OR	95% CI
Overall	213	206	—	—	—	—
Mean age (SD) (years)	30.8 (9.3)	33.1 (8.3)	1.03**	(1.01–1.05)	1.05**	(1.01–1.09)
Fars ethnicity	116 (54.5)	81 (39.3)	0.54**	(0.37–0.80)	0.71	(0.44–1.16)
Education (elementary or less)	71 (33.3)	86 (41.7)	1.43	(0.96–2.13)	0.99	(0.59–1.68)
Ever married	118 (55.4)	133 (64.6)	1.47	(0.99–2.17)	1.28	(0.72–2.28)
Homeless	38 (17.8)	122 (59.2)	6.69**	(4.27–10.46)	7.36**	(4.26–12.72)
Mean length of time of drug injection (SD) (years)	4.9 (4.4)	4.8 (5.6)	0.99	(0.96–1.03)	0.93*	(0.88–0.99)
Ever used a shared needle/syringe	148 (69.5)	145 (70.7)	1.06	(0.70–1.61)	1.18	(0.63–2.20)
Ever treated by a physician to stop drug use	62 (29.1)	61 (29.6)	1.03	(0.67–1.56)	1.01	(0.60–1.71)
Ever shared drug injection in prison	79 (37.1)	61 (29.9)	0.72	(0.48–1.09)	0.48*	(0.26–0.88)
Mean number of drug injections in the previous month (SD)	92.6 (47.2)	110.3 (48.4)	1.01**	(1.00–1.01)	1.01**	(1.00–1.02)
Mean size of drug injecting network in the previous month (SD)	2.1 (0.9)	2.6 (2.3)	1.23**	(1.07–1.41)	1.19	(1.00–1.42)
Used a shared needle/syringe in the previous month	85 (39.9)	42 (21.0)	0.40**	(0.26–0.62)	0.24**	(0.13–0.45)
<i>Access to sterile needles/syringes</i>						
Received needles/syringes from an NSP in the previous month	0 (0.0)	139 (67.5)	—	—	—	—
Received needle/syringe primarily from reliable sources ^a in the previous month	149 (70.0)	199 (96.6)	12.21**	(5.44–27.41)	—	—
Perceived access to sterile needles/syringes as “easy” in the previous month	106 (51.0)	185 (90.2)	8.90**	(5.21–15.21)	—	—
Obtained needles/syringes regularly	122 (57.5)	198 (96.1)	18.26**	(8.56–38.94)	—	—

CI, confidence interval; NSP, needle and syringe program; OR, odds ratio; ref, reference

^a Pharmacy or needle and syringe program

* $p < 0.05$; ** $p < 0.01$

IDUs, including one female, declined to be interviewed (response rate of 98.5%). Compared to IDUs from the non-intervention zone, IDUs from the intervention zone were older [mean age, 30.81 versus 33.06 years, respectively; $t(417) = 2.61, p < 0.01$], were less likely to be of Fars ethnicity [54.5% versus 39.3%, respectively; $\chi^2(1, N = 419) = 9.63, p < 0.01$] and were more likely to be homeless [17.8% versus 59.2%; $\chi^2(1, N = 419) = 6.68, p < 0.01$]. However, IDUs from both neighborhoods were similar in terms of educational level, religious beliefs, and marital status (Table 1).

Drug Injection Characteristics

More than 99% of IDUs in both groups used heroin as their primary drug in the previous month. IDUs from the intervention zone had larger drug injecting networks ($M = 2.58; SD = 2.26$) than did IDUs recruited from the non-intervention zone [$M = 2.05, SD = 0.89, t(414) = 3.09, p < 0.01$]. In addition, IDUs from the intervention zone reported more frequent drug injection in the previous month ($M = 110.26, SD = 48.43$) compared to the control [$M = 92.61, SD = 47.19, t(415) = 3.76, p < 0.01$]. However, in the bivariate analyses, IDUs from both neighborhoods were similar in terms of the duration of lifetime injecting practices, the proportion of respondents who had ever shared a needle/syringe for drug injection, those who had been treated by a physician for drug addiction, and those who had shared a drug injection in prison (Table 1).

Although more than 67% of IDUs recruited from the intervention zone had received at least one needle or syringe from the NSP in the previous month, none of the participants from the non-intervention zone had received sterile needle/syringes from any NSP. The majority of the IDUs from the intervention zone reported that they obtained sterile needles/syringes primarily from reliable sources such as pharmacies (49%) and the NSP (47%), and only 3% turned to less reliable sources such as friends or drug dealers. In contrast, up to 30% of IDUs from the non-intervention zone reported that they obtained needles/syringes primarily from friends or drug dealers in the previous month. Compared to the IDUs from the non-intervention zone, a significantly higher proportion of respondents from the intervention zone reported that they had easy (51% versus 90%; OR, 8.90; 95% CI, 5.21–15.21) and regular (57% versus 96%; OR, 18.26; 95% CI, 8.56–38.94) access to needle/syringes during the previous month. Most importantly, a smaller proportion of IDUs from the intervention zone reported sharing a drug injection in the previous month (21%) than did those recruited from the non-intervention zone (40%; OR, 0.40; 95% CI, 0.26–0.62). This association between shared needle/syringe

use and frequenting a neighborhood with an active needle/syringe program remained significant in the multivariate analysis, which incorporated all of the variables mentioned in the data analyses (adjusted OR, 0.24; 95% CI, 0.13–0.45; Table 1).

Discussion

Needle and syringe programs constitute one of the main components of the government's comprehensive HIV prevention package, and are becoming increasingly accessible to community-based IDUs in Iran. However, there was little evidence concerning the effectiveness of these interventions in reducing injection-related risk behaviors among IDUs. Through this study, we investigated the potential impact of one NSP on drug-related risk behaviors in community-based IDUs in Tehran by comparing needle and syringe sharing practices among IDUs in two neighborhoods, one with and one without an NSP.

We found that a significantly smaller proportion of IDUs from the neighborhood with an NSP reported shared needle and syringe use in the previous month as compared to IDUs from a neighborhood without an intervention program. Our results showed that access to an NSP provided IDUs with better sources for sterile needles/syringes, free of charge, and with easier and more regular access to needles/syringes, which may have been the basis for the finding that IDUs from the intervention zone shared needles/syringes less frequently than did those in a non-intervention zone. The importance of these results only increases if we consider that IDUs from the intervention zone were living in a more vulnerable context than IDUs from the non-intervention zone: as mentioned earlier, 59.2% of the participants were homeless at the time of interview, compared to only 17.8% in the non-intervention zone. Subsequently, IDUs from the area with an NSP had larger drug injecting networks, and more frequent drug injection in the previous month, as compared to the non-intervention group. As may be conjectured, the general vulnerable context of the intervention zone is not a result of the NSP there, but is a known characteristic of that neighborhood, and is one of the primary reasons why health policy managers in Tehran decided to start community-based HIV prevention interventions for drug users there (Vazirian et al. 2005). Although IDUs from this neighborhood with an active NSP showed background characteristics that should have increased the risk of shared drug injection (Tyndall et al. 2003), shared drug injection was reportedly less in the previous month, as compared to the non-intervention group.

The effectiveness of NSPs has been researched extensively in many developed countries (Hartgers et al. 1989;

Bluthenthal et al. 2000; Cox et al. 2000; Gibson et al. 2002; Power and Nozhkina 2002; Wodak and Cooney 2005), and some information exists regarding Asian countries (Gray 1998; Quan et al. 1998; Chen and Liao 2005). Our findings indicated that the NSP in Tehran may have allowed the IDUs from a neighborhood with an active program to better avoid shared drug injection, as compared to participants from a neighborhood lacking this intervention.

In our previous biobehavioral study conducted in the same neighborhood with an active NSP in 2004, we found that over 23% of IDUs were infected with HIV and that infection was associated with a history of shared drug injection while in prison and with multiple incarcerations (Zamani et al. 2006). The risk of HIV transmission in association with shared drug injection in Iranian prisons has also been documented in other studies (Razzaghi et al. 2000; Razzaghi and Rahimi 2005; Zamani et al. 2005). Although the Iran Prison Organization has increased the scope of HIV prevention programs for drug-using inmates, concern remains over the possibility of HIV transmission from ex-prisoner IDUs to their community-based injecting and sexual networks in Tehran. This study clearly demonstrated that up to one-third, or more, of community-based IDUs recruited from two neighborhoods had a history of shared drug injection inside prison and it is very likely that many participating IDUs with a history of shared drug injection may have contracted HIV during incarceration, potentially providing infection routes into community needle/syringe sharing and sexual networks. Consequently, it is very important that comprehensive HIV prevention measures, including NSPs, become widely available for community-based IDUs in order to best control the epidemic among IDUs and prevent further transmission of the infection to broader populations.

Some limitations to this study should be noted. Although a considerable effort was made to recruit comparable IDUs from both neighborhoods, there is a possibility that our comparison was biased because of unknown background characteristics. The cross-sectional design of the study precludes us from drawing causal relationships between access to an NSP and not participating in shared drug injection. Although interviews were conducted by independent interviewers, outreach workers affiliated to the NGO that provides the NSP in the intervention zone assisted in participant recruitment. Because the potential participants were first approached by one of the outreach workers, it is possible that IDUs who were active in the NSP were over-represented in the study population. Therefore, the proportion of IDUs exposed to the NSP (67%) should not be used as an indication of the program's overall coverage in that neighborhood. We relied primarily on self-reported risk behaviors, which are vulnerable to bias through faulty recall ability or social

desirability (Latkin et al. 1993). Shrestha et al. (2006) recently reported on the limitations of relying on self-reported sharing of needles and syringes, rather than on other, more objective, measures.

This study is among the first in Iran to examine the impact of NSP on drug-related risk behaviors in community-based IDUs. The findings of this study indicate that access to an NSP may reduce sharing practices among IDUs in Tehran, Iran. Because the HIV epidemic is currently expanding among this population, it is essential that comprehensive prevention measures, including NSPs, are made available to both incarcerated IDUs and those in the community. Future research can investigate barriers to NSPs among IDUs in neighborhoods in Tehran lacking an NSP, as well as other cities with emerging HIV epidemics among IDUs where prevention interventions have not yet been established.

Acknowledgments The authors would like to express their sincere appreciation to the participants of this study for sharing their experiences. We would also like to extend our special thanks to the staff members of the Persepolis Society and the National Center for Addiction Studies at Tehran University of Medical Sciences, and the survey team, in particular Drs. Mehran Boroumand, Mohammad Sajjadi-Far, and Seyed Reza Hosseini. We also wish to acknowledge Dr. Lisa Maher and Ms. Jane Koerner for their critical comments. This research was supported jointly by the Fujiwara Foundation in Japan and the Tehran University of Medical Sciences and Health Services, Iran.

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Original research article

Unintended pregnancy and its risk factors among university students in eastern China

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Received 13 August 2007; revised 30 September 2007; accepted 15 October 2007

Abstract

Background: The study was conducted to determine the prevalence of unintended pregnancy, induced abortion and contraceptive use, and factors associated with unintended pregnancy among Chinese university students.

Study Design: A self-administered questionnaire survey with cross-sectional design was administered among students in two universities in Ningbo, China, in November–December 2003. Sociodemographic and behavioral factors associated with unintended pregnancy were identified in both genders using univariate and multivariate analyses.

Results: Of sexually active students, 10.6% of male and 11.6% of female students reported their partner or they had a history of pregnancy; 10.0% of male and 11.3% of female students reported their partner or they had a history of induced abortion. The risk factors for unintended pregnancy identified among males by multivariate analysis were older age [odds ratio (OR), 2.12; 95% confidence interval (CI), 1.15–3.88], initiation of sexual activity before high school (OR, 2.45; 95% CI, 1.36–4.44), reported lack of condom use in first sexual activity (OR, 1.71; 95% CI, 1.10–2.64), multiple sexual partners (OR, 1.54; 95% CI, 1.06–2.23), and often used condoms during their lifetime (OR, 1.97; 95% CI, 1.01–3.81). The identified risk factors among females were initiation of sexual activity before high school (OR, 5.12; 95% CI, 1.49–17.68), non-consensual sexual intercourse as first sex (OR, 1.77; 95% CI, 1.08–2.90), multiple partners (OR, 2.75; 95% CI, 1.61–4.71), and sometimes/never (OR, 3.02; 95% CI, 1.16–7.87) or often (OR, 3.92; 95% CI, 1.43–10.73) used condoms during their lifetime.

Conclusion: The high prevalence of unintended pregnancies and induced abortions in this population indicates a need for better and targeted sex education and family planning services.

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Keywords: Unintended pregnancy; Abortion; Contraceptive use; University; Students

1. Introduction

During the past two decades, China has experienced dramatic social change, associated with rapid economic growth and reform. Traditional attitudes toward sex, marriage and family have changed considerably. Young people, including university students, consider premarital sex more acceptable, and their sexual behavior and attitudes have become more open [1,2].

Many studies in developing countries have shown that young people do not receive sufficient information about contraception and disease prevention, which often results in misconceptions about reproduction [3]. The sexual and reproductive health of young people could become a significant public health problem in China because of the real and perceived increase in sexual activity, premarital pregnancies, abortions and sexually transmitted infections (STIs) among young people. Research on sexuality and the sexual behavior of Chinese university students in the last decade has shown that 9–16% of students report that they are sexually experienced [4–6]. In 2005, the Chinese Ministry of Education lifted the ban on the marriage of university students [7]; the sexual activity among Chinese university

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students will increase rapidly as a result of this policy and the continuing rapid social and economic change in China. However, thus far, little attention has been given to reproductive health issues, including contraception, unintended pregnancies and induced abortions in this population. The studies on unintended pregnancies and induced abortions among unmarried young people in China have focused mainly on women attending premarital examinations [8] and those seeking to terminate a pregnancy at clinics and hospitals [9–12]. Thus, there is little literature documenting other aspects of sexual behavior in university students.

In the present study, we primarily report data on unintended pregnancies and the associated factors among students at two universities in an eastern Chinese city to assess the determinants of the pregnancies and the effectiveness of current contraceptive services and education in meeting the needs of students.

2. Materials and methods

2.1. Setting and participants

This study was conducted in Ningbo Municipality, Zhejiang Province. Ningbo, a large city with a population of 5.5 million on the eastern coast of China, is one of the most economically developed areas in the country. The city is home to two universities, both of which participated in the study. All students in Grades I to IV at both universities were recruited. Of the 29,409 possible respondents, 22,493 responded validly, giving a final response rate of 76.5%. Of the 22,493 respondents, 17.6% (1,981/11,255) of males and 8.6% (963/11,238) of females were sexually active. Only sexually active students who responded to the question about a history of pregnancy were included in the analysis. Thus, the final sample comprised 1835 males and 848 females. We considered all the pregnancies reported here to be unintended because, at the time of the study, the Ministry of Education prohibited all university students from marrying, and pregnant students could have been discharged from a university for breaching regulations.

2.2. Data collection

The instrument was developed through reviews of Chinese and international literature and was modified using the results of qualitative studies that included in-depth interviews with 11 students (three males and three females from one university, and three males and two females from the other) and interviews with four focus groups (one for each gender at each university) comprising a total of 21 students recruited by university counselors from the two universities. The revised instrument was pilot-tested at one of the universities in a group of 50 students randomly selected from various grades and faculty members of both genders. The instrument's reliability was evaluated in 89 of 160 college students recruited from another city who could be matched between the two tests with a 1-week interval. More

than 70% of the categorical variables had Kappa statistics over 0.4 (all $p < .05$), and the coefficient of correlation for discrete variables varied from 0.63 to 0.93 (all $p < .05$).

For the main survey, students were asked by university staff and student leaders to come to classrooms at specified times outside lecture hours in order to complete the self-administered questionnaire. Field teams consisted of trained staff from the local Centers for Disease Control and Prevention and counselors from each university. Data were collected from November to December 2003.

2.3. Ethical considerations

Those responsible for institutional review at Zhejiang Province's Center for Disease Control and Prevention, the two universities involved and the Ningbo Education Board approved the study protocol. All students were advised of the study's purpose and were told that nonparticipation would cause no disadvantage to them. The students were assured that their privacy and confidentiality would be strictly protected because no personal names or other identifiers were to be included in the questionnaire and the data were to be presented only in an aggregate manner.

2.4. Statistical analysis

For the analyses, SPSS for Windows (Version 12.01; SPSS, Chicago, IL) was used. We first determined which factors were associated with a history of pregnancy in themselves or a partner in univariate analyses. Variables significant in the univariate analyses ($p < .05$) other than condom and oral contraceptive (OC) use during the most recent year were entered in a multivariate logistic regression model that was performed by a backward stepwise logistic regression, with p value $> .10$ as a criterion for removal of a variable from the model.

3. Results

Of the sexually active students, 11.6% females reported a history of pregnancy, and 10.6% males reported that a partner had such a history. A history of induced abortion was reported by 11.3% females, and 10.0% males reported this history in a partner (Table 1). Up to 33.7% females and 22.5% males thought they or a partner could possibly or highly possibly become pregnant by sexual intercourse, with females having significantly higher risk awareness than males ($\chi^2 = 53.271$, $p < .001$).

The majority of the students, male and female, were over 19 years old, were from urban areas and had a middle-class family economic status (Table 2). Among males, 66% had ever smoked cigarettes; this rate was only 13% in females. In both genders, over 79% and 66% had ever consumed alcoholic beverages and danced, respectively. According to the univariate analysis, having ever smoked cigarettes and dancing in women and older age and having ever smoked cigarettes in men were related to a history of pregnancy in the

Table 1
Reproductive health and risk awareness among sexually active students

	Male (n=1835)		Female (n=848)	
	n	%	n	%
History of unintended pregnancy				
Yes	194	10.6	98	11.6
No	1546	84.3	725	85.5
Not sure	95	5.2	25	2.9
History of induced abortion				
Yes	184	10.0	96	11.3
No	1536	83.7	729	86.0
Not sure	105	5.7	20	2.4
Risk awareness for pregnancy				
Not-low possible	S	72.9	496	58.8
Some-high possible	413	22.5	286	33.7
Not sure	84	4.6	63	7.4

female or the male's partner. Hometown area, family economic status, and alcohol beverage consumption were unrelated to pregnancy in both males' partners and females.

The rate of condom use during the first sex experience was 30.0% for males and 26.6% for the females' partners, whereas the condom use rates during the most recent sexual encounter were 48.3% and 46.0% for males and females, respectively (Table 3). Among the students, 14.5% males and 18.9% females reported that they or their partner always used a condom throughout their lifetime, and among these "always" users, 4.6% males and 3.2% females reported that their partner or they had a history of pregnancy. The reported pregnancy rate was similar between those who often used condoms and those who sometimes/never used one, in both genders. Oral contraceptive use during the most recent sex was 26.5% for the males' partners and 29.2% for females.

With regard to risky behaviors associated with pregnancy, students who initiated sex at a younger age (vs. those who initiated later), students who did not report using a condom during first sex (vs. those who did), students who had multiple sexual partners (vs. those with only one), students who often or sometimes/never used condoms throughout their lifetime (vs. those who always did), students who reported having been diagnosed with an STI (vs. those with no such history) and students who often or sometimes/never used condoms and OCs during the most recent year (vs. those who always did) were more likely to report having a history of pregnancy during their lifetime, for both males' partners and female students. Non-consensual sex as a first sex experience was related to pregnancy among women. Condom use and contraceptive use during the most recent sex for both males and females were not associated with a history of pregnancy in males' partners or females.

Multivariate logistic regression analysis for men showed that older age [odds ratio (OR), 2.12; 95% confidence interval (CI), 1.15–3.88], initiation of sexual activity before high school (OR, 2.45; 95% CI, 1.36–4.44), reported lack of condom use at first sex (OR, 1.71; 95% CI, 1.10–2.64), multiple sex partners (OR, 1.54; 95% CI, 1.06–2.23) and often condom use during their lifetime (OR, 1.97; 95% CI, 1.01–3.81) remained as risk factors for pregnancy in their partners (Table 4). Multivariate logistic regression analysis for women revealed that initiation of sexual activity before high school (OR, 5.12; 95% CI, 1.49–17.68), non-consensual sexual intercourse at first sex (OR, 1.77; 95% CI, 1.08–2.90), multiple sexual partners (OR, 2.75; 95% CI, 1.61–4.71) and sometimes/never (OR, 3.02; 95% CI, 1.16–7.87) or often (OR, 3.92; 95% CI, 1.43–10.73)

Table 2
Sociodemographic characteristics and factors for unintended pregnancy among sexually active students

	Male (n=1835)			Female (n=848)		
	Total n* (%)	Pregnancy n (%)	COR (95% CI)	Total n* (%)	Pregnancy n (%)	COR (95% CI)
Age						
≤19	257 (14.1)	16 (6.2)	1	186 (22.0)	19 (10.2)	1
≥20	1567 (85.9)	176 (11.2)	1.91 (1.12–3.24)	660 (78.0)	77 (11.7)	1.16 (0.68–1.97)
Hometown area						
Rural	434 (23.7)	44 (10.1)	1	165 (19.5)	17 (10.3)	1
Urban	1394 (76.3)	149 (10.7)	1.06 (0.74–1.51)	681 (80.5)	81 (11.9)	1.18 (0.68–2.04)
Family's economic status						
Rich	231 (12.6)	32 (13.9)	1.47 (0.73–2.98)	87 (10.3)	14 (16.1)	0.96 (0.36–2.59)
Between	1478 (80.7)	149 (10.1)	1.03 (0.55–1.91)	719 (84.8)	77 (10.7)	0.60 (0.26–1.40)
Poor	122 (6.7)	12 (9.8)	1	42 (5.0)	7 (16.7)	1
Cigarette smoking						
Never	618 (33.7)	44 (7.1)	1	737 (87.0)	78 (10.6)	1
Ever	1216 (66.3)	150 (12.3)	1.84 (1.29–2.61)	110 (13.0)	20 (18.2)	1.88 (1.10–3.22)
Alcoholic drinking						
Never	122 (6.6)	12 (9.8)	1	175 (20.6)	13 (7.4)	1
Ever	1713 (93.4)	182 (10.6)	1.09 (0.59–2.02)	673 (79.4)	85 (12.6)	1.80 (0.98–3.31)
Dancing						
Never	619 (33.8)	71 (11.5)	1	240 (28.3)	16 (6.7)	1
Ever	1215 (66.2)	123 (10.1)	0.87 (0.64–1.19)	608 (71.7)	82 (13.5)	2.18 (1.25–3.81)

COR, crude odds ratio.

* Total may not add up to 1835 for male and 848 for female due to missing data.