On Same-Sex Sexual Behaviors Among Male Bachelors in Rural China: Evidence From a Female Shortage Context

Xueyan Yang, PhD[1], Isabelle Attané, PhD[2], Shuzhuo Li, PhD[1],
and Qunlin Zhang, MD[1]

Abstract

Using data from a survey conducted in the rural areas of Anhui Province, this study adopted the crosstabs and logistic regression model to analyze the same-sex sexual behaviors of forced male bachelors and the determinants when compared with married men with same ages. The prevalence of same-sex sexual behaviors among the unmarried men was reported as 17.2%, significantly higher than 8.9% among married men with same ages, indicating that same-sex sexual behaviors could be as a compensation for the absence of female sexual partners to some extent for those marriage squeezed or forced male bachelors. Among all groups, the occurrence of unprotected sexual behaviors were reported above 60%, regardless of marital status and the genders of sexual partners; the scores obtained on knowledge of acquired immune deficiency syndrome (AIDS) and sexually transmitted diseases (STDs) among bachelors (AIDS knowledge = 2.85; STDs knowledge = 2.38) are much poorer than those of married men (AIDS knowledge = 3.45; STDs knowledge = 2.79), which might exert potential negative impacts on men's health.

China has for a long time been a country with a predominantly male population. In the past, this atypical demographic characteristic resulted from excess female mortality, especially at young ages and in the reproductive period, in a society based on patrilineal values, which maintained women in a secondary position (Greenhalgh, 2008). But from the 1980s, following the enforcement of strict birth limitation and in spite of the modernization process, China started to register an increasing proportion of males in its population to the point of having the highest percentage of males in the world: 105.9 per 100 females in its population in 2009; in the marriage market (i.e., among people aged 15-49 years), the sex ratio is also largely above the expected levels: 107 males per 100 females. The female shortage is estimated to be more than 30 million during the whole of the 20th century (S. Z. Li, Jiang, & Feldman, 2006). Consequently, since the 2000s, China has been facing a male marriage-squeeze, with annually at least 10% of men of marriage age not being able to find a female partner to get married (Chen & Ullrich, 2001; Das Gupta & Li, 1999; Guo & Deng, 2000; S. Z. Li et al., 2006).

The current sex ratio imbalance in the marital market is due partly to the mismatched sizes of male and female birth cohorts, from the 1970s onward, now reaching marriageable age, allowing for the spousal age gap, but is exacerbated by the discrimination against girls from the 1980s through sex-selective abortions and neglect after birth, leaving the younger age groups with a pronounced male surplus (Banister, 2004). With economic growth, social development, and the strict birth control policy followed by the low fertility level, China has indeed been witnessing an increase in sex ratio at birth for about 30 years, which is now reaching peak values of around 120 boys per 100 girls at birth as indicated by the data from China State Statistic Bureau. From the early 2010s, therefore, marriage will not be possible to millions of Chinese men because of this male marriage-squeeze (S. Z. Li et al., 2006). Male bachelorhood is becoming a new demographic

[1]Xi'an Jiaotong University, Xi'an, Shaanxi Province, People's Republic of China
[2]French National Institute for Demographic Studies, Paris, France

Corresponding Author:
Xueyan Yang, Institute for Population and Development Studies, School of Public Policy and Administration, Xi'an Jiaotong University, #28, Xianning Xi Road, Xi'an, Shaanxi Province 710049, People's Republic of China
Email: xueyanyang@mail.xjtu.edu.cn

account, especially among men from the most disadvantaged socioeconomic groups, as women generally take the opportunity to marry up (Chen & Ullrich, 2001; S. Z. Li, Zhang, Yang, & Attane, 2010). Although adjustment processes such as a widening spousal age gap or an increase in remarriage of widowed and divorced women may alleviate this imbalance, a significant proportion of the male population may remain permanently excluded from marriage, which is traditionally a universal norm in China. Therefore, the male surplus will have ramifications far beyond the narrow bounds of population counting, and even if they increase no further, the highly skewed sex ratios of today will have huge effects on China's culture and society.

Under the background of sex imbalance followed by marriage squeeze, how will the male bachelors compensate for the absence of a regular female sexual partner? Will the same-sex sexual behavior be a compensation for those marriage-squeezed male bachelors? Are male bachelors more likely to adopt unprotected sexual behaviors? Will an increase in the prevalence of unprotected same-sex sexual intercourses among male bachelors put a threat on their health?

To our knowledge, no study has yet answered the questions proposed above. However, there are two important facts obtained from existing researches on same-sex sexual behaviors. The first fact is that the prevalence of same-sex sexual behaviors varies much across times and countries in different studies ranging from 1% to 20.8% and is influenced by some environmental factors (Bagley & Tremblay, 1998; Billy, Tanfer, Grady, & Klepinger, 1993; Chiang, 2009; Fay, Turner, Klassen, & Gagnon, 1989; Harry, 1990; Hunt, 1974; Janus & Janus, 1993; Kinsey, Pomeroy, & Martin, 1948; Langstrom, Rahman, Carlstrom, & Lichtenstein, 2010; Y. H. Li, 1998; D. L. Liu & Lu, 2005; National Survey of Sexual Health and Behavior, 2010; Pan & Yang, 2004; Pan & Zeng, 2000; Pietropinto & Simenauer, 1977; Sell, Wells, & Wypij, 1995; Smith, 1991; Taylor, 1993). The second fact is that the unprotected same-sex sexual behaviors are the most important way for acquired immune deficiency syndrome (AIDS) and sexually transmitted diseases (STDs), and unprotected sexual intercourses are more likely to occur among male bachelors because it is very hard for them to get married and therefore have sexual intercourses with a regular partner, which would in turn amplify the risks for AIDS and STDs transmission (S. Z. Li et al., 2010; Merli & Hertog, 2010; Morin et al., 2005, 2006; Murphy et al., 2004; Zhang, Attané, & Yang, 2009). Therefore, two assumptions are proposed in this present study:

Assumption 1: Female shortage on the marital "market" might be apt to increase the prevalence of male same-sex sexual behaviors.

Assumption 2: The propensity to unprotected sexual intercourses is apt to threaten males' health, especially through male same-sex sexual intercourses in a context of female shortage in the marital "market."

Based on the two assumptions proposed above, this study has sought to analyze the same-sex sexual behaviors of male bachelors in a context of female shortage in the "marital" market, tried to find in a context of female shortage if male bachelors may have an increased inclination for same-sex sexual behaviors or unprotected sex, and then amplify the risks on men's health.

Data, Measurements, and Method

Sampling and Data

The sample for the "Survey on Reproductive Health and Family Living of Forced Male Bachelors in Rural China" was selected in rural areas of JC county, Anhui province.[1] In the fifth population census (2000), the county had a population of just under 800,000, with an overall sex ratio of 103.9 males per 100 females. Similar to the rest of China, the county shows a marked sex imbalance among children under age 5 years: 118.9 boys per 100 girls (against 120.2 nationally in 2000), or about 15% above the levels normally expected in this age group. A male surplus is also observed in the never-married population aged 27 years and older, where the sex ratio is 177.1 males per 100 females. Two thirds (63.6%) of the married men interviewed said their contact circle included at least one single man above 27 years of age, suggesting that prolonged or permanent male bachelorhood is not a residual phenomenon in the selected villages. Also, the JC county's marriage market is characterized by a high propensity to endogamy: 82.2% of the married men questioned had married a woman from the same county (one in three, a woman from the same village). Average age at first marriage of the married men questioned was 25.1 years at the time of the survey, slightly below the national average (25.7 years in 2000). The male bachelors were overall slightly younger than the married men (with median ages of 37.8 and 39.7 years, respectively).

To ensure the reliability and validity of the survey, the Computer Assisted Personal Interview method was adopted. The survey was conducted in six townships, including two with high level of economic development, two with medium level of economic development, and two with low level of economic development. As suggested by previous qualitative studies, in rural China, males aged above 27 years and below 35 years might have some chances of getting married but significantly less than those aged

below 28 years, and those aged 35 years or above basically have little chance any more. Therefore, the samples were designed as married and unmarried men aged above 27 years. The simple random sampling method was adopted in the survey from the lists provided by townships.

When filling in the questionnaires, the respondents were assembled in a separate and relatively closed place (such as an office or a classroom). An investigator was always present to provide, if necessary, technical assistance to the respondent. For issues deemed "sensitive," the investigator received strict orders to leave the respondent to answer alone and sat in front of the respondent, so that the investigator cannot see the computer screen. Unless the respondent sought some help, the investigator stood at a distance. In cases where the respondents were illiterate (38 cases) or had a low education level, the investigator, with the consent of the respondents, read the questions and explained each step of how to use the laptop computers.

A total of 665 men participated in this survey. Forty-four (6.6%) did not complete the survey due to various reasons (e.g., privacy), leaving us with 621 valid questionnaires, including 344 unmarried (55.4%) and 277 (44.6%) married participants. There was no significant difference with regard to age between married men and unmarried men among the participants, making the two categories comparable, but the education level and income of unmarried men were apparently lower than that of married men. The unmarried participants with high school and above and monthly income above 1,000 Yuan are only 49.7% and 25.6%, respectively, when compared with 85.9% and 51.6% among married participants, indicating that the unmarried participants have indeed the "squeezed" characteristics of lower socioeconomic status, which is in accord with the definition of "forced male bachelors" defined in this study.

Measurements

Same-sex sexual behaviors includes any contact between two persons of the same gender for the purpose of inducing sexual arousal, up to and including an orgasmic response, in either individual, taking various forms of hug, kiss, touching, oral sex, and anal sex (Bailey & Marlene, 2009; Langstrom et al., 2010). As one of the components for sexual orientation, same-sex sexual behavior has been measured by many scholars during the past 150 years (Sell, 1997). Compared with other components of sexual orientation, such as sexual fantasy, sexual attraction, emotional preference, social preference, self-identification, and straight/same-sex sexual life style, and so on, same-sex sexual behavior seems more easy to be measured, but still varied much from one researcher to another and across time. For example, in Klein Sexual Orientation Grid, three

items were used to measure sexual behaviors (Klein, Sepekoff, & Wolf, 1985); however, in Sell-Assessment of Sexual Orientation, four items were adopted for measuring sexual behaviors (Sell, 1996). Currently, www.gaydata.org makes the following recommendation concerning individual questions from Vermont and Massachusetts Behavioral Risk Factor Surveillance Surveys to assess same-sex sexual behaviors: During the past 12 months, have you had sex with only males, only females, or both males and females (Sell, 1997)?

In this present study, we only focus on the same-sex sexual behaviors rather than sexual orientations. Therefore, with above-mentioned existing measurements as the foundation, to make it simple only one item was adopted for measuring male same-sex sexual behavior—"Which genders of the persons you had sex with?"—and provided three answers, including 0 = *only men*; 1 = *both men and women*; 2 = *only women*.

Opinions toward same-sex sexual behaviors were measured by asking, "Do you approve same-sex sexual behaviors?" Opinions toward single life were measured by asking, "Can you accept being single all your life?" Protected sexual behavior at first sex and last sex was measured by asking, "Did you use condom at first sex?" and "Did you use condom at last sex?" Knowledge of AIDS was measured by asking five questions on AIDS; knowledge of STDs was measured by asking a series questions on STDs. Marital status was measured by asking, "Your current marital status?" with 0 = *unmarried, divorced or widowed*, 1 = *married or lived with partner*.

The above-mentioned measurements related to same-sex sexual behavior, opinions toward same-sex sexual behaviors, and knowledge on AIDS and STDs were taken from existing researches and proved to be valid and reliable; only the measurements for opinions toward single life and marital status were original in this present study and taken from previous qualitative studies.

Analysis Strategies

The prevalence of same-sex sexual behavior may vary depending on various characteristics, such as marital status, age, education, and income (Chiang, 2009; Day & Newburger, 2002; Evans, 1997; D. L. Liu & Lu, 2005). Therefore, to test the assumption that "the female shortage on the marital 'market' is apt to positively influence the prevalence of male same-sex sexuality," this study adopted the crosstabs[2] method to compare the occurrence of male same-sex sexual behaviors between unmarried men and married men with same ages, education, and incomes. Then the same method was used to compare the opinions toward same-sex sexual behaviors and single life among groups with different sexual behaviors among married and unmarried men. Finally, we constructed three logistic

regression models with *sexual behaviors* as the dependent variable. Model 1 adopted the *opinions toward same-sex sexual behaviors* and *opinions toward marriage* as the independent variables; Model 2 added *marital status* as control variable to Model 1; Model 3 added *age, education*, and *income* as control variables to Model 2. The multiple regression models were aimed at validating the impact of opinions on same-sex sexual behavior and single life and to see if the same-sex sexual behaviors among male bachelors can be qualified as "situational same-sex sexual behaviors"[3] that resulted from a female shortage in the marital "market."

It was proved as well in the existing researches that the occurrence of the unprotected same-sex sexual behaviors was determined by knowledge on AIDS and STDs (Matteson, 1997; Wit, Storebe, Voorme, & Sandford, 2000). Therefore, to test the assumption that *the propensity to unprotected sexual intercourses is apt to threaten males' health, especially through male same-sex sexual intercourses in a context of female shortage in the marital market,* we then adopted the crosstabs method to compare the occurrence of unprotected behaviors between groups with different sexual behaviors in married and unmarried men and then adopted independent-sample *t* test and one-way ANOVA (analysis of variance) methods to compare means of knowledge on AIDS and STDs between groups with different sexual behaviors in married and unmarried men and constructed three binary logistic models with *protected sexual behavior at first sex* as the dependent variable, with Model 4 adopting *knowledge on AIDS* and *knowledge on STDs* as the independent variables, Model 5 adding *sexual behaviors* and *marital status* as control variables to Model 4, and Model 6 adding *age, education*, and *income* as control variables to Model 5; we also constructed three models with *protected sexual behavior at last sex* as the dependent variable, with Model 7 adopting *knowledge on AIDS* and *knowledge on STDs* as the independent variables, Model 8 adding *sexual behaviors* and *marital status* as control variables to Model 7, and Model 9 adding *age*, *education*, and *income* as control variables to Model 8. The multiple regression models aimed to analyze the impacts of related knowledge on first and last unprotected behaviors for revealing the potential factors among same-sex sexual behaviors of forced male bachelors apt to affect their health.

The multilevel regression models were adopted in this study because the samples randomly selected from six townships with different levels of economic development would be in a nested structure. To test the independence of the samples, we first grouped six townships into three with one well-developed, one medium-developed, and one under-developed economy, and the Chow test was then conducted across groups, and overwhelming majority of *F* values

obtained from the analyses for each independent variable was insignificant, suggesting an independent residual of samples.

Therefore, to make it simple, we finally merged all groups of data into one and used the ordinary regression models for analyzing the merged data in this study.

Results

As seen in Table 1, the reported prevalence of same-sex sexual behaviors (including same-sex sexual and bisexual behaviors) among the unmarried men was 17.2%, significantly higher than that of married men (8.9%).

It appears that the prevalence of same-sex sexual behaviors is significantly higher among those who hold more positive opinions toward same-sex sexual behavior (unmarried = 44.4%; married = 25.6%) than those who have negative (unmarried = 3%; married = 5.7%) or neutral opinions (unmarried = 21.4%; married = 6.3%) regardless of marital status; although the prevalence of same-sex sexual behaviors among those with different opinions toward the possibility of remaining single lifelong varies much by marital status, among the unmarried men it seems to make no significant difference, but among the married men with more acceptable opinions toward single life (bisexual = 19.5%; same-sex sexual = 0%) it is significantly higher than those with more unacceptable (bisexual = 4.1%; same-sex sexual = 3.6%) or neutral opinions (bisexual = 2.6%; same-sex sexual = 5.3%).

When considering age, education, and income, it appears that the prevalence of same-sex sexual behaviors among the participants aged above 35 years (22%) is higher than that among those aged 35 years and younger (10%), but the difference is insignificant regardless of marital status. However, the prevalence among unmarried and married groups with education of primary school and under (unmarried = 34%; married = 20%) is significantly higher than those with higher education (unmarried = 5.1%; married = 7.4%), especially among unmarried men. It seems no obvious difference was observed between the groups with different monthly incomes regardless of marital status.

Three models as shown in Table 2 were tested to describe the impacts of opinions on sexual behaviors. It is found that opinions toward same-sex sexual behaviors are a significant determinant of same-sex sexual behaviors. By contrast, opinions toward the possibility of remaining single on same-sex sexual behaviors are not significant. Besides, education has a significant negative impact on same-sex sexual behaviors, males with lower education of primary and under being more likely to adopt same-sex sexual behaviors than those with higher education.

In our analysis, it is found that the occurrence of unprotected sex at the first sexual intercourse is significantly

Table 1. Occurrence of Same-Sex Sexual Behaviors

	Unmarried (*n* and percentage)			Married (*n* and percentage)		
	Only Women	Both	Only Men	Only Women	Both	Only Men
Which genders of persons you had sex with	111 (82.8)	10 (7.5%)	13 (9.7%)	235 (91.1%)	14 (5.4%)	9 (3.5%)
χ^2 (married and unmarried)				**		
Opinions toward same-sex sexual behaviors						
Disapprove	63 (96.8)	1 (1.6)	1 (1.6)	132 (94.3)	7 (5.0)	1 (0.7)
In between	33 (78.6)	6 (14.3)	3 (7.1)	74 (93.7)	2 (2.5)	3 (3.8)
Approve	15 (55.6)	3 (11.1)	9 (33.3)	29 (74.4)	5 (12.8)	5 (12.8)
χ^2 (opinions toward same-sex sexual behavior)		***			**	
Opinions toward single life						
Unacceptable	54 (85.7)	5 (7.9)	4 (6.3)	179 (92.3)	8 (4.1)	7 (3.6)
In between	24 (85.7)	2 (7.1)	2 (7.1)	35 (92.1)	1 (2.6)	2 (5.3)
Acceptable	33 (76.7)	3 (7.0)	7 (16.3)	21 (80.8)	5 (19.2)	0 (0)
χ^2 (opinions toward marriage)		NS			**	
Age (in years)						
35 and younger	54 (90.0)	3 (5.0)	3 (5.0)	92 (94.8)	4 (4.1)	1 (1.0)
Older than 35	57 (77.0)	7 (9.5)	10 (13.5)	143 (88.8)	10 (6.2)	8 (5.0)
χ^2 (Age)		NS			NS	
Education						
Illiterate and primary school	37 (66.1)	9 (16.1)	10 (17.9)	24 (80.0)	3 (10.0)	3 (10.0)
Junior and senior high school and above	74 (94.9)	3 (1.3)	1 (3.8)	211 (92.5)	11 (4.8)	6 (2.6)
χ^2 (Education)		***			†	
Income						
Less than 1,000 Yuan	63 (77.8)	7 (8.6)	11 (13.6)	111 (88.8)	8 (6.4)	6 (4.8)
More than 1,000 Yuan	48 (90.6)	3 (5.7)	2 (3.8)	124 (93.2)	6 (4.5)	3 (2.3)
χ^2 (Income)		NS			NS	

Note. NS = nonsignificance.
*$p < .05$. **$p < .01$. ***$p < .001$. †$p < .1$.

Table 2. Determinants on Same-Sex Sexual Behaviors

Dependent Variable (Reference: Only Women)	Model 1		Model 2		Model 3	
	Both	Only Men	Both	Only Men	Both	Only Men
Independent variables						
Opinions toward same-gender sexual behaviors	5.49***	2.09**	5.47***	2.08***	5.86***	2.08**
Opinions toward marriage	1.60†	1.57†	1.39	1.53	1.10	1.29
Control variables						
Marital status (Reference: Unmarried)						
Married			0.41†	0.85	0.62	1.29
Age (Reference: Younger than 35 years)						
Older than 35 years					3.18†	1.65
Education (Reference: Illiterate or primary school)						
High school and above					0.25*	0.24**
Income (Reference: No more than 1,000 Yuan)						
More than 1,000 Yuan					0.23	1.04
−2 Log likelihood		52.10***		86.64***		192.83***
df		4		6		16

*$p < .05$. **$p < .01$. ***$p < .001$. †$p < .1$.

Table 3. The Occurrence of Unprotected Sexual Behaviors

	Unmarried (*n* and percentage)			Married (*n* and percentage)	
	No Condom	Use Condom		No Condom	Use Condom
At first sex (If use condom?)	317 (92.2)	27 (7.8)		240 (86.6)	37 (13.4)
χ² (Married and unmarried)			*		
Sexual behaviors					
Only women	89 (80.2)	22 (19.8)		205 (87.2)	30 (12.8)
Both	7 (70.0)	3 (30.0)		11 (78.6)	3 (21.4)
Only men	11 (84.6)	2 (15.4)		6 (66.7)	3 (33.3)
χ² (Sexual behaviors)		NS			NS
At last sex (If use condom?)	300 (87.2)	44 (12.8)		232 (83.8)	45 (16.2)
χ² (married and unmarried)			NS		
Sexual behaviors					
Only women	72 (64.9)	39 (35.1)		193 (82.1)	42 (17.9)
Both	9 (90.0)	1 (10.0)		14 (100)	0 (0)
Only men	9 (69.2)	4 (30.8)		7 (77.8)	2 (22.2)
χ² (Sexual behaviors)		NS			NS

Note. NS = nonsignificance.
*$p < .05$. **$p < .01$. ***$p < .001$. †$p < .1$.

Table 4. Knowledge of Acquired Immune Deficiency Syndrome and Sexually Transmitted Diseases Among Unmarried and Married Males

	Unmarried				Married		
	N	Mean	*SD*		*N*	Mean	*SD*
Mean score on knowledge of AIDS	302	2.85	1.15		262	3.45	0.95
t test (Married and unmarried)				***			
Sexual behaviors							
Only women	101	3.29	1.16		225	3.55	0.87
Both	5	2.40	1.34		14	3.29	1.20
Only men	12	1.92	1.16		5	3.00	1.23
F test (sexual behaviors)		***				NS	
Mean score on knowledge of STDs	344	2.38	0.86		277	2.79	0.59
t test (married and unmarried)				***			
Sexual behaviors							
Only women	111	2.65	0.71		235	2.85	0.51
Both	10	2.50	0.85		14	2.57	0.85
Only men	13	1.92	0.86		9	2.67	0.71
F test (sexual behaviors)		**				NS	

Note. NS = nonsignificance.
*$p < .05$. **$p < .01$. ***$p < .001$. †$p < .1$.

higher among unmarried (92.2%) than married (86.6%) men, whereas there is no significant difference between those two groups at the last sexual intercourse (Table 3). Among the unmarried men, the occurrence of unprotected sex does not significantly differ by sexual behaviors, similar to that among the married men. However, the occurrence of unprotected sexual intercourse among all groups is above 60%.

As presented in Table 4, it is shown that the scores describing the knowledge of AIDS and STDs among the married men (AIDS = 3.45; STDs = 2.79) are significantly higher than those of unmarried men (AIDS = 2.85; STDs = 2.38). Also, among the unmarried men, the scores for knowledge of AIDS and STDs among men with bisexual (AIDS = 2.40; STDs = 2.50) and same-sex sexual behaviors (AIDS = 1.92; STDs = 1.92) are significantly lower than

Table 5. Determinants on Unprotected Sexual Behaviors

Dependent Variable (Reference: No Condom Use)	First Sex			Last Sex		
	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	Condom Use	Condom Use	Condom Use	Condom Use	Condom Use	Condom Use
Independent variables						
Knowledge of AIDS	0.87	0.77	0.73	1.15	0.99	0.93
Knowledge of STDs	2.04*	1.82†	1.69	2.12**	1.95*	1.66
Control variables						
Sexual behaviors (Reference: Only women)						
Both		3.25	3.18		0.24	0.21
Only men		0.98	0.79		1.11	0.78
Marital Status (Reference: Unmarried)						
Married		0.52*	0.53†		0.33***	0.33***
Age (Reference: Younger than 35 years)						
Older than 35 years			0.53*			0.39**
Education (Reference: Illiterate or primary school)						
High school and above			0.85			1.34
Income (Reference: No more than 1,000 Yuan)						
More than 1,000 Yuan			2.58**			1.75†
−2 Log likelihood	357.51*	297.61†	282.64**	364.45***	342.81***	
Cox and Snell R^2	.013	.030	.069		.068	.122
Nagelkerke R^2	.027	.051	.120		.103	.185

$*p < .05. **p < .01. ***p < .001. ^\dagger p < 0.1.$

those of men who only have sex with women (AIDS = 3.29; STDs = 2.65).

As shown in Table 5, only knowledge of STDs has a positive impact on condom use at first and last sexual intercourses, but knowledge of AIDS does not. When same-sex sexual behavior and marital status are included in the model, the positive impact is getting smaller and less significant. At the same time, marital status also has a significant negative impact on condom use at first and last sexual intercourses, with the married men being more likely to experience unprotected sex than the unmarried men.

When integrating control variables including age, education, and income into the model, the impact of knowledge of STDs on unprotected sex disappears. Although age and income both have significant impacts on unprotected sex at first and last sexual intercourses, with men aged above 35 years being more likely to adopt unprotected sexual behaviors than those aged below 35 years, men having income no more than 1,000 Yuan were more likely to adopt unprotected sexual behaviors than those men having income above 1,000 Yuan.

Discussions

Prevalence of Same-Sex Sexual Behaviors and Marriage Squeeze

The results from the analyses indicate that the prevalence of same-sex sexual behaviors among the unmarried men was 17.2%, but among the married men it was 8.9%, indicating a much higher prevalence of same-sex sexual behaviors among the marriage-squeezed forced bachelors. However, the results from further analyses show that the prevalence of same-sex sexual behaviors was relatively much higher among those with more positive opinions toward same-sex sexual behaviors regardless of marital status and the married men with acceptable opinions toward single life, suggesting that the higher prevalence of same-sex sexual behaviors are mainly due to the opinions toward same-sex sexual behaviors and marital status, which is also supported in later regression results. But is this higher prevalence of same-sex sexual behavior among unmarried men determined by the marriage-squeezed situation, only the opinions, or both?

In an American study conducted by Chiang (2009), the prevalence of same-sex sexual behaviors among unmarried people was significantly higher than among married people. But Liu's (D. L. Liu & Lu, 2005) study in China drew an opposite conclusion. He found a large proportion of gays who got married to a partner of the opposite sex, as about 90% of the gays were married. The inconsistent results are plausibly due to the different tolerant opinions toward same-sex sexuality between Chinese and American societies. Most Chinese actually persist in the belief that once they reach adulthood, men and women must marry and that there is no alternative (Evans, 1997). Although marriage remains the traditional norm, it is still difficult for male Chinese to openly express their sexual preference if it is not in compliance with the social norm. When Liu's survey was conducted in 1992, for instance, the social tolerance toward same-sex sexuality in China was low. As a result, a large number of gays were forced to opt for traditional marriage to conceal their same-sex sexual inclination. Indeed, it is well known that in China, most of the gays get married but continue to have same-sex relationships (Li, 1998; D. L. Liu & Lu, 2005). The difference on prevalence of same-sex sexual behaviors between married and unmarried men obtained in this study were similar to the finding suggested in Chiang's study but rather different from Liu's study (Chiang, 2009; D. L. Liu & Lu, 2005). Moreover, opinions toward same-sex sexual behaviors and marriage are also as other expressions for the social tolerance at individual level but different from intrinsic sexual orientations.

Given the Chinese cultural background, we believe that the higher prevalence among the unmarried group is not only due to the female shortage in the marital "market" but also partly due to their opinions. This phenomenon was also found in other cultures and societies, such as there was an increase in male same-sex sexual behaviors because of gender imbalance that occurred in northeast of Siberia, and an increase in male same-sex sexual behaviors because of banning prostitution during Ming and Qing dynasties of China (Y. H. Li, 1998).

When considering age, it appears the prevalence of same-sex sexual behaviors is higher in older than in younger groups with 35 years as the boundary age, but insignificant regardless of marital status, and so was indicated in the regression results, which is similar to other researches, such as Liu's (D. L. Liu & Lu, 2005) survey conducted in Shanghai and Nanjing of China, which suggested that same-sex sexual behavior was more frequent in older than in younger groups among males aged from 17 to 55 years.

From a social perspective, education is known to have a strong correlation with the prevalence of same-sex sexual behaviors, as same-sex sexual behaviors are more likely to occur among well-educated people (Chiang, 2009; D. L. Liu & Lu, 2005). The possible explanation is that people with higher education are also more open-minded and more apt to express openly their sexual choices. However, in the present study, the prevalence among unmarried and married groups with education of primary school and under is significantly higher than those with higher education, especially in the unmarried group, in contrast to the finding from Liu's study, and also as indicated by later regression results, education has significant negative impacts on same-sex sexual behaviors, males with lower education of primary and under being more likely to adopt same-sex sexual behaviors than those with higher education, in contrast to most existing researches as well (Chiang, 2009; D. L. Liu et al., 2005). Further analysis on opinions toward same-sex sexual behaviors by education suggested that in our samples the men with primary school and under hold more positive opinions toward same-sex sexual behaviors than those with higher education level. The possible explanation is due to the difference between the samples adopted in the two surveys: Liu's survey was mainly conducted in an urban area with urban residents as participants whereas the present study was conducted in rural area with rural residents as participants. In rural China, those men with education of primary school and under might know very little about the cultural taboo on "same-sex sexuality" and might be apt to adopt positive opinions toward same-sex sexual behaviors and then induce the increase of same-sex sexual behaviors. A similar phenomenon was also found in the existing researches on premarital sexual intercourses of women in China. The higher occurrence of premarital sexual intercourses were evidenced among the urban women with higher education level, who also held a more positive attitude toward premarital sexual intercourses (J. Liu, 2005); on the contrary, among the rural women, there was a higher occurrence among those with lower education levels, who also held a more positive attitude toward premarital sexual intercourses (Xia et al., 2004).

By contrast, there were few researches focused on the relationship between income and same-sex sexual behaviors. However, as a result of the strong correlation between education and income (Day & Newburger, 2002), we can infer a higher prevalence of same-sex sexual behaviors among higher income group than the lower income group. But in this present study, income seems having no significant impact on the prevalence of same-sex sexual behaviors.

Unprotected Sexual Behaviors, Same-Sex Sexual Behaviors, and Men's Health

The results from analyses indicate higher occurrence in unprotected sexual behaviors among unmarried men but no obvious difference among the men with different sexual behaviors regardless of marital status. However, the average occurrence of unprotected sexual intercourse among all groups is above 60%, even much higher than

the occurrence indicated in other similar studies or surveys (Matteson, 1997; Zeng et al., 2008). This indicates that although same-sex sexual behaviors might not amplify the risks on men's health, men in rural China are facing serious risks on their sexual health regardless of marital status and sexual behaviors.

Besides, knowledge of AIDS and STDs seems significantly less among the unmarried with bisexual and same-sex sexual behaviors than those who only have sex with women, suggesting that among the total participants, unmarried men with bisexual and same-sex sexual behaviors are facing most serious shortage in knowledge of AIDS and STDs.

As indicated in regression results, only knowledge of STDs has a positive impact on condom use at first and last sexual intercourses. At the same time, the married men seem more likely to experience unprotected sex than the unmarried men, which is not in accord with the results suggested in Table 4. The possible explanation is that, unmarried men's condom use behaviors are significantly influenced by their knowledge of STDs than married men's knowledge. In rural China, condom use for married men is more likely a birth control measure rather than a protection behavior; therefore, knowledge of STDs does not significantly influence married men's condom use behaviors; but for unmarried men, condom use is more likely to act as a protection measure due to the diversity and instability of their sexual partners (Huang, Cheng, & Li, 2006). As a result, the unmarried men who know more about STDs are more likely to use condom and avoid unprotected sexual behaviors.

Furthermore, when age, education, and income are controlled in the regression models, the impact of knowledge of STDs on unprotected sex disappears, whereas the men aged above 35 years and with income no more than 1,000 Yuan seem more easily to adopt unprotected sexual behaviors. The possible explanations are as follows: the younger men might know more about STDs and then are more likely to adopt protected sexual behaviors; current male's participation in family planning/reproductive health was relatively low with women mainly adopting contraceptive measures and men being excluded from "getting condom for free" (H. Y. Liu, 2003). It is 10 to 30 Yuan for each box of condom with 10 pieces on sale, which is expensive to those males with a relatively low income in rural China, making impact of income on unprotected sexual behaviors significant.

Conclusions

> Might female shortage on the marital "market" be apt to increase the prevalence of male same-sex sexual behaviors? Can the same-sex sexual behaviors be a compensation for the absence of sexual intercourse with female partners?

As suggested in the above-mentioned results and discussions, the prevalence of same-sex sexual behaviors among forced male bachelors is 17.2%, which is higher than 8.9% of married men at same ages, implying that under the background of sex imbalance followed by marriage squeeze in rural China, there might be a possibility of an increase in same-sex sexual behaviors among forced male bachelors.

Further analyses indicated that the prevalence of male same-sex sexual behaviors were significantly correlated with their approval opinions toward same sexual behaviors, but not correlated to the marital status, and it is also confirmed by multiple logistic regression analysis in Table 2, suggesting the same-sex sexual behaviors were partly determined by their opinions toward same-sex sexual behaviors.

The prevalence of same-sex sexual behaviors did not vary greatly between those with different opinions toward single life, indicating that forced male bachelors holding involuntarily acceptable opinions toward single life were mainly due to desperation for marriage but not directly connected with their intrinsic sexual orientations.

Therefore, we can draw a deliberate conclusion that, under the background of the sex imbalance followed by "marriage squeeze," among the forced male bachelors in rural China who involuntarily stay single and were in short of stable sexual partners, there might be a possibility of an increase in male same-sex sexual behaviors. At the same time, the increase of male same-sex sexual behaviors among forced male bachelors might be partly due to the voluntarily staying single for the sake of their same-sex sexual orientations. However, because of the low tolerance toward same-sex sexual behaviors and the cultural background in rural China, the unmarried men who voluntarily stay single might be very few. From another more positive perspective, the increase of same-sex sexual behaviors among forced male bachelors also means a compensation for the absence of female sexual partners.

> Might the prevalence of unprotected same-sex sexual intercourses be apt to increase with the higher same-sex sexual behaviors among male bachelors? Will this unprotected sexual behaviors put a threat on men's health?

The results from analysis also indicated a relatively high occurrence of unprotected sexual behaviors among men in rural China, with at least 60% of men adopting unprotected measures at first and last sexual intercourses. Although the occurrence of unprotected sexual behaviors among unmarried men is not higher than in married men, the occurrence of unprotected sexual behaviors among men with bisexual and same-sex sexual behaviors is not higher than that among men only having sex with women,

unmarried men are more likely to be facing the diversity and instability of sexual partners, and unprotected same-sex sexual behavior is the most important pathway for transmitting AIDS and STDs, making the forced male bachelors with same-sex sexual behaviors face more serious health risks.

Further analysis found that the knowledge of AIDS and STDs of forced male bachelors is relatively less than that of married men and that of men with bisexual and same-sex sexual behaviors is even much less; the results from binary logistic regression suggested that the main reason for adopting unprotected sexual behaviors is due to less knowledge of STDs. At the same time, men's marital status and income influenced unprotected sexual behaviors to some extent, among which marital status supported the point that the related knowledge influences protected sexual behaviors among unmarried men and income is more related to the access to condom.

Therefore, another conclusion made in this study is that the male same-sex sexual behaviors among forced male bachelors have characteristics of high risks, which is mainly determined by the shortage of related knowledge, access to condoms, and so on.

Limitations and Future Work

In all respects, the case of JC County is relevant to explore the opinions and practices of the male bachelors toward same-sex sexuality in a context of female shortage in the marital "market." However, because of the sensitivity of sexual issues, it is hard to get fully accurate data, especially on same-sex sexual behaviors for which one third (36.88%) of the sample is missing. This may to some extent lead to some instability in the results. In spite of its limited scope due to the small sample size, it has provided answers to our major research questions. Finally, this case study is not intended to infer the situation elsewhere in the country, and a fortiori in other parts of the world, but it is undoubtedly able to shed light on the more general situation of male bachelors in rural areas.

The future directions for improvement are as follows: conduct the survey on the forced male bachelors who migrate from rural to urban areas, improve survey technique, ensure enough sample size, and compare with the results in this present study; conduct a special survey and in-depth interview on the men with same-sex sexual behaviors for compensating the findings obtained in this present study.

Declaration of Conflicting Interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Notes

1. The names of the survey locations were required to be abbreviated by the local government because of the sensitive issues of this study.
2. A cross-tabulation (often abbreviated as crosstabs) displays the joint distribution of two or more variables. They are usually presented as a contingency table in a matrix format. Whereas a frequency distribution provides the distribution of one variable, a contingency table describes the distribution of two or more variables simultaneously. Each cell shows the number of respondents that gave a specific combination of responses, that is, each cell contains a single cross-tabulation.
3. There are two opposite theories on the causes of same-sex sexuality. One is that same-sex sexuality is determined by environmental factors, such as the first sexual experiences, environment during childhood, and other environmental factors resulting in "situational same-sex sexuality" (Rosario, Schrimshaw, Hunter, & Braun, 2006). Another is that same-sex sexuality is mainly determined by biological factors, such as genes, hormones, and brain structures, for which the most powerful evidence is animals' same-sex sexuality (Habr-Alencar et al., 2006; Levan et al., 2009). However, neither of them can be strongly and consistently confirmed, whereas same-sex sexual behaviors can of course only be the consequence of a voluntary choice.

References

Bagley, C., & Tremblay, P. (1998). On the prevalence of homosexuality and bisexuality, in a random community survey of 750 men aged 18 to 27. *Journal of Homosexuality*, *36*(2), 1-18.

Bailey, N. W., & Marlene, Z. (2009). Same-sex sexual behaviour and evolution. *Trends in Ecology & Evolution*, *24*, 439-446.

Banister, J. (2004). Shortage of girls in China today. *Journal of Population Research*, *21*, 19-45.

Billy, J., Tanfer, K., Grady, W., & Klepinger, D. (1993). The sexual behavior of men in the United States. *Family Planning Perspectives*, *25*(2), 52-60.

Chen, Y. H., & Ullrich, M. (2001). Chinese male overpopulation-scale, structure, influence factors and development trends analysis (in Chinese). *Marketing and Population Analysis*, *3*, 1-11.

Chiang, H. H. (2009). Homosexual behaviour in the United States, 1988-2004: Quantitative empirical support for the social construction theory of sexuality. *Electronic Journal of Human Sexuality*, *12*(2), 1-49.

Das Gupta, M., & Li, S. (1999). Gender bias in China, South Korea and India 1920-1990: The effects of war, famine, and fertility decline. *Development and Change*, *30*, 619-652.

Day, J. C., & Newburger, E. C. (2002). *The big payoff: Educational attainment and synthetic estimates of work-life earnings*. Retrieved from http://www.census.gov/prod/2002pubs/p23-210.pdf

Evans, H. (1997). *Women and sexuality in China: Dominant discourses of female sexuality and gender since 1949*. Cambridge, England: Polity Press.

Fay, R., Turner, C., Klassen, A., & Gagnon, J. (1989). Prevalence and patterns of same-gender sexual contact among men. *Science*, *243*, 338-348.

Greenhalgh, S. (2008). *Just one child: Science and policy in Deng's China*. Berkeley: University of California Press.

Guo, Z. G., & Deng, G. S. (2000). Study on marriage squeeze in China (in Chinese). *Marketing and Population Analysis*, *3*, 1-16.

Habr-Alencar, S. F. Dias, R. G. Teodorov, E. & Bernardi, M.M. (2006). The effect of hetero- and homosexual experience and long-term treatment with fluoxetine on homosexual behavior in male rats, *Psychopharmacology, 189*, 269-275.

Harry, J. (1990). A probability sample of gay males. *Journal of Homosexuality*, *19*(1), 89-104.

Huang, N., Cheng, Y. M., & Li, Y. (2006). The survey on knowledge to AIDS and condom use in rural China (in Chinese). *China Medical Science on Behaviour*, *15*, 165-166.

Hunt, M. (1974). *Sexual behavior in the 1970's*. New York, NY: Dell.

Janus, S., & Janus, C. (1993). *The Janus report on sexual behavior*. New York, NY: John Wiley.

Kinsey, A., Pomeroy, W., & Martin, C. (1948). *Sexual behaviour in the human male*. Philadelphia, PA: W. B. Saunders.

Klein, F., Sepekoff, B., & Wolf, T. J. (1985). Sexual orientation: A multi-variable dynamic process. *Journal of Homosexuality*, *11*(1-2), 35-49.

Langstrom, N., Rahman, Q., Carlstrom, E., & Lichtenstein, P. (2010). Genetic and environmental effects on same-sex sexual behavior: A population study of twins in Sweden. *Archives of Sexual Behaviors*, *39*, 75-80.

Levan, K. E. Fedina, T. Y. & Lewis, S. M. (2009). Testing multiple hypotheses for the maintenance of male homosexual copulatory behavior in flour beetles, *European Society for Evolutionary Biology, 22*, 60-70.

Li, S. Z., Jiang, Q. B., & Feldman, W. M. (2006). *Gender preference and social development* (in Chinese). Beijing: China Social Sciences Literature Press.

Li, S. Z., Zhang, Q. L., Yang, X. Y., & Attane, I. (2010). Male singlehood, poverty and sexuality in rural China: An exploratory survey. *Population-E*, *65*(4), 16-32.

Li, Y. H. (1998). *The subculture of homosexuality*. Beijing: China Today Press.

Lu, L. G. (2005). *The study on Chinese homosexuality (in Chinese)*. Beijing: Chinese Society Press.

Liu, H. Y. (2003). The gender issues in reproductive health. *Population and Family Planning* (*in Chinese*), *9*, 30-32.

Liu, J. (2005). *More doing, less talking on premarital sexual intercourses, six out of ten people in large and medium-sized cities being satisfactory with their sexual lives*. Retrieved from http://heilongjiang.dbw.cn

Matteson, D. R. (1997). Bisexual and homosexual behaviour and HIV risk among Chinese- Filipino- and Korean-American men. *Journal of Sex Research*, *34*, 93-104.

Merli, M. G., & Hertog, S. (2010). Masculine sex ratios, population age structure and the potential spread of HIV in China. *Demography Research*, *22*, 63-94.

Merli, M. G., Hertog, S., Wang, B., & Li, J. (2006). Modeling the spread of HIV/AIDS in China: The role of sexual transmission. *Population Studies*, *60*, 1-22.

Morin, S. F., Steward, W. T., Charlebois, E. D., Remien, R. H., Pinkerton, S. D., Johnson, M. O., . . . Chesney, M. A. (2005). Predicting HIV transmission risk among HIV infected men who have sex with men: Findings from the healthy living project. *Journal of Acquired Immune Deficiency Syndrome*, *40*, 226-235.

Murphy, G., Charlett, A., Jordan, L. F., Osner, N., Gill, O. N., & Parry, J. V. (2004). HIV incidence appears constant in men who have sex with men despite widespread use of effective antiretroviral therapy. *AIDS*, *18*, 265-272.

National Survey of Sexual Health and Behavior. (2010). Findings from the National Survey of Sexual Health and Behavior, centre for sexual health promotion, Indiana university. *Journal of Sexual Medicine*, *7*, 243-373.

Pan, S. M., & Yang, R. (2004). *Sexuality for ten years, the follow-up survey on sexual behaviours of nation-wide college students* (in Chinese). Beijing: China Social Sciences Literature Press.

Pan, S. M., & Zeng, J. (2000). *College students' sexual attitudes and behaviours in contemporary China* (in Chinese). Beijing: People Republic of China: Commercial Press.

Pietropinto, A., & Simenauer, J. (1977). *Beyond the male myth*. New York, NY: Times Books.

Rosario, M., Schrimshaw, E., Hunter, J., & Braun, L. (2006). Sexual identity development among lesbian, gay, and bisexual youths: Consistency and change over time. *Journal of Sex Research, 43*(1), 46-58.

Sell, R. L. (1996). The sell assessment of sexual orientation: Background and scoring. *Journal of Lesbian, Gay and Bisexual Identity*, *1*, 295-310.

Sell, R. L. (1997). Defining and measuring sexual orientation for research. *Archives of Sexual Behavior*, *26*, 643-658.

Sell, R. L., Wells, J. A., & Wypij, D. (1995). The prevalence of homosexual behaviour and attraction in the United States, the United Kingdom and France: Results of national population-based samples. *Archives of Sexual Behavior*, *24*, 235-248.

Smith, T. W. (1991). Adult sexual behavior in 1989: Number of partners, frequency of intercourse and risk of AIDS. *Family Planning Perspectives*, *23*, 102-107.

Taylor, H. (1993). *Number of gay men more than four times higher than the 1 percent reported in a recent survey* (The Harris Poll No. 20). New York, NY: Louis Harris.

de Wit, D. J., Storebe, W., de Voorme, E., & Sandford, T. (2000). Understanding AIDS preventive behaviour with casual and primary partners in homosexual men: The theory of planned behaviour and the information-motivation-behavioural-skill model. *Psychology & Health*, *15*, 325-340.

Xia, D. Y., Liao, S. S., He, Q. Y., Liao, J. F., Wang, X. C., & Wu, Q. H. (2004). A questionnaire-based survey on attitude and behavior of sex among rural women in Hainan Province (in Chinese). *Chinese Journal of Epidemiology*, *25*, 586-589.

Zeng, Z. L., Liang, H. Y., Yang, Y., Wang, C., Li, Q. C., Xiao, D., . . . Shao, Y. M. (2008). The survey and study on unprotected homosexual behaviours among men having sex with men (in Chinese). *Natural Medical Journal*, *10*, 241-245.

Zhang, Q. L., Attané, I., & Yang, X. Y. (2009). The survey and analysis on sexual behaviours of Chinese forced male bachelors (in Chinese). *Academy Journal of Xi'an Jiaotong University*, *29*(6), 51-60.