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Migration and Unprotected Sex in Shanghai, China: Correlates of Condom Use and Contraceptive Consistency Across Migrant and Nonmigrant Youth

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 A B S T R A C T

Purpose: Despite the exceptionally large population of young migrants in China, as well as increasing rates of HIV and sexually transmitted infections in recent years, condom use and contraceptive consistency among this population remains critically under-studied. This study examines the association between migration and condom use and contraceptive consistency.

Methods: A cross-sectional survey of 959 youth aged 15–24 years was conducted in rural and urban Shanghai. Logistic regression was conducted to examine the association between migration status and condom use and consistent contraceptive use. Analyses are stratified by gender.

Results: Overall, only 32% reported condom use at first sex, and <10% reported consistent contraceptive use. Compared with 63.6% of urban nonmigrants, 83.1% of rural-to-urban migrants reported not using a condom at first sex. Multivariate logistic regression models indicate that patterns of migration and gender clearly impact condom use and contraceptive consistency. After adjusting for background characteristics, rural-to-urban migrant males were significantly less likely to report condom use at first sex and consistent contraceptive use with first partner compared with nonmigrants and urban-to-urban migrants. Females living in rural areas who never migrate, by contrast, are least likely to report condom use and consistent contraceptive use compared with other females.

Conclusion: Because rural men who migrate to urban areas and rural nonmigrant young women are at particular risk, programs should target rural areas for both of these groups that would give support to young men before they leave their hometowns, as well as focusing on females who might not have the opportunity to migrate.

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China's rates of sexually transmitted infections (STIs), particularly HIV, have increased [1]. HIV prevalence in China is currently at .1%, which translates to over 700,000 infected individuals [1]. Migration is associated with increased sexual risk behaviors in urban areas as migrants are exposed to a commercial sex industry, drugs and alcohol, and different peer networks [2–4]. China is experiencing the largest flow of labor migration in human history, with an internal migrant population, or *floating*

population, of over 140 million individuals [5]. Under China's household registration system, known as the "hukou system", those who are not officially registered in a new place of residence are termed the "floating population." The floating population represents a high-risk group [1,6–8] that might be the "tipping point" of the HIV/AIDS epidemic in China [9].

Most of China's floating population is young [10,11]. Sixty-four percent of female migrants and 47.1% of male migrants are between 15 and 24 years [10]. Youth account for a disproportionate number of HIV infections worldwide [12]. The same is true in China. In 2001, 7.5% of HIV/AIDS cases were among 16–19-year-olds, and 56.0% of HIV/AIDS cases were among 20–29-year-olds [6]. Despite their HIV vulnerability, there are limited data on migrant youth.

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Condom use protects against HIV and STIs [13,14]; consistent condom users are 10–20 times less likely to acquire HIV compared with inconsistent or nonusers [15]. Condom use is low in China [4], and most studies focus on high-risk populations, such as commercial sex workers and clients of commercial sex workers [14,16–18]. There are few studies of gender differences in sexual behaviors in the migration literature. Although young men continue to outnumber young women among migrants (sex ratio of migration = 109/100), the numbers of female migrants are increasing in China [19]. Male and female migrants differ across several demographic factors that may lead to different patterns of sexual risk behaviors [10,20–24], including unequal labor opportunities in cities [10] and higher rates of unemployment [22]. Many argue that “male surpluses” are driving the demand for commercial sex work in urban areas [24]. Therefore, a better understanding of gender differences in sexual behavior is necessary to target interventions among young people.

The current article addresses two gaps in the literature. We focus on several types of migrants, in contrast to studies that focus on just one (e.g., rural-to-urban migrants), and we focus on gender differences in condom use. Our research questions are as follows: (1) How do urban nonmigrants, rural nonmigrants, rural-to-urban migrants, and urban-to-urban migrants differ across key demographic characteristics? (2) Are rural-to-urban migrants and urban-to-urban migrants more likely to report unprotected sex compared with rural and urban nonmigrants, net of these background characteristics? and (3) How does unprotected sex differ across gender?

Methods

Subjects and procedure

The analysis is based on the Three-City Asian Adolescent and Youth Survey conducted in 2006. The data were collected from 17,016 young people aged 15–24 years in urban and rural districts of Taiwan, Shanghai, and Hanoi. The overall goal of the study was to investigate the impact of family, peers, community, and exposure to media and modernization on adolescent sexual and reproductive health issues. The household sampling process for Shanghai was based on a three-stage method, and participants were selected using two sampling frames including residential households and group living facilities. Listings of all dwelling units with persons aged 15–24 years were chosen, and then dwelling units were randomly sampled from the residential groups. Both urban and rural districts were sampled within metropolitan Shanghai, and subdistricts were then chosen at random. Group living facilities were especially important to capture because they include dormitories for university students, and more importantly, housing facilities for factory workers, typically rural-to-urban migrants. The sampling methodology has been described in more detail in another article [25].

These analyses, using only the 6,299 youth in Shanghai, further restrict the sample to individuals who were sexually experienced (15% of original study population). We also eliminated those whose first sexual encounter was within marriage. Because of small sample size, three groups of migrant youth were further eliminated from the sample: rural-to-rural migrants ($n = 37$), urban-to-rural migrants ($n = 1$), and international migrants ($n = 1$). These selections left 959 individuals. The research study was reviewed and approved by the four relevant Institutional Review Boards.

Outcome measures

We constructed a binary indicator for *condom use at first sex*. Participants were asked “Which method or methods did you use the first time you had sexual intercourse?” Those who indicated using a condom with their first or only partner were coded 1 and others 0.

Participants were then asked about how consistently they used any form of protection. We based an indicator of *consistent contraceptive use* on the question “Thinking about all the times you and your first partner had sexual intercourse, how often would you say you or your partner used any method to prevent pregnancy or sexually transmitted infection?” Those who answered that they used some form of protection every time were coded as consistent users, and all others were coded as not consistent users.

Major predictor

Migrants were classified by a set of questions about current and prior residence. In this article, migration status distinguishes among urban nonmigrants, rural nonmigrants, rural-to-urban migrants, and urban-to-urban migrants.

Background characteristics

The data contain several demographic characteristics including *age*, *gender*, *marital status*, *knowledge of the Shanghainese language*, and *registration as a permanent resident of Shanghai*. We created an index of *socioeconomic status* using a set of household asset variables and principal component analysis. We classified individuals into economic tertiles. *Family structure* distinguishes among living with parents, living alone, living with other relatives, or living with others (including peers or dormitory). We coded *education* as primary school or less, junior secondary education, senior secondary education, and college/university. Participants' *activity status* indicates whether a participant was in school only, working only, both in school and working, or neither. *Job type* distinguishes among professional, unprofessional (i.e., unskilled construction, factory worker, etc.), and other types of work (i.e., artists, musicians, etc.). We defined *early sex* as a person whose sexual debut took place at age 20 years or younger [20]. Our indicator of *recency of migration* is the difference between migrants' ages and their ages of migration (continuous variable). The variable indicating the *reasons for migration* include moving for education, moving for labor, and other reasons (e.g., move to be with family, want to live on their own, married or moved with partner, or to join someone else in city, etc.).

Analyses

We used Stata version 11MP to analyze the data [26] (Stata-Corp, College Station, TX). The descriptive analyses consisted of tabulating the means, standard errors, frequency distributions, and frequency of missing data of key variables by migrant status. We used chi-square and analysis of variance to assess differences across migrant/nonmigrant groups. We used bivariate analyses to identify important associations between migration status and each independent and outcome variable.

Because the outcomes of interest (condom use at first sex and consistent contraceptive use with first partner) are binary responses, we used logistic regressions to estimate the associations

Table 1
Demographic characteristics of study participants, by migrant status

Demographic characteristics	Migrant status				Total n = 959	p
	Urban nonmigrant n = 443	Rural nonmigrant n = 274	Rural-to-urban migrant n = 123	Urban-to-urban migrant n = 119		
Age cohort						.059
15–19 years	23.3	16.1	10.4	17.0	19.3	
20–24 years	76.7	83.9	89.6	83.0	80.7	
Female	38.7	49.1	45.7	38.1	42.5	.044
Wealth tertile						<.001
Low	13.6	37.5	87.6	59.4	32.5	
Mid	65.5	48.4	8.6	33.3	51.7	
High	20.9	14.0	3.7	7.4	15.8	
Currently in job/school						<.001
In school but no job	26.7	11.2	1.2	19.1	18.8	
Neither job nor school	10.8	34.7	11.2	6.0	17.6	
Both job and school	11.7	1.8	.0	12.2	7.7	
Job but no school	50.8	52.3	87.6	62.6	55.9	
Highest educational level						<.001
Primary or less	.1	.4	.8	.7	.3	
Junior secondary	14.8	47.7	84.4	28.7	32.7	
Senior secondary	51.9	46.0	11.0	38.6	44.9	
College/university/graduate	33.3	6.0	3.8	32.0	22.1	
Type of work						<.001
Professional	32.9	13.1	4.6	23.4	23.0	
Unprofessional	65.1	85.7	95.4	62.6	74.1	
Other	1.9	1.2	.0	14.0	2.9	
Family structure						<.001
Parents	79.7	51.6	.0	19.4	57.5	
Alone	1.6	3.9	.8	6.4	2.7	
Other relatives	6.4	24.6	11.9	10.6	12.8	
Friends/dorm	12.4	20.0	87.3	63.6	27.0	
Speak Shanghainese dialect	97.7	89.5	42.1	47.4	84.8	<.001
No household registration (no hukou)	.6	1.4	98.4	66.4	16.8	<.001
Reason for migration						<.001
School/university	N/A	N/A	1.2	26.0	14.3	
Activity	N/A	N/A	90.7	37.7	62.8	
Other	N/A	N/A	8.0	36.3	22.9	
Recency of migration (years)	N/A	N/A	3.0	5.1	4.1	.008
Early sex (20 years or younger)	66.1	47.4	53.3	61.9	59.0	.001
Mean age of sex (years)	19.8	20.5	20.2	20.1	20.1	.004
Condom use at first sex	36.4	28.8	16.9	35.7	32.3	.031
Consistent use with first partner	29.1	11.3	9.6	33.0	22.4	.000

N/A = Not applicable.

between our predictors and outcomes. We selected final models using likelihood ratio tests and Pearson’s goodness-of-fit test.

We weighted all analyses to avoid biased estimates and used robust standard errors to account for clustering of observations because of complex sampling [27]. In all models, urban nonmigrant is the reference category for the main predictor of migrant status. In addition, estimates and p values are calculated for each pair of migration status to assess statistical significance across different groups.

Results

Descriptive results

The percentage of unprotected sex was high across all groups; only 32% of the total sample indicated using a condom during their first sexual experience. Rural-to-urban migrants disproportionately reported the highest prevalence of unprotected sex with first partner. Among rural-to-urban migrants, 83.1% had unprotected sex compared with 71.2% of rural nonmigrants, 63.6% of urban nonmigrants, and 64.3% of urban-to-urban migrants (p = .031).

Only 22% of the sample reported consistent contraceptive use, and there was a significant disparity across the migrant groups. Only 9.6% of rural-to-urban migrants reported consistent use compared with 33% of urban-to-urban migrants, 29.1% of urban nonmigrants, and 11.3% of rural nonmigrants (p = .000).

The mean age of sexual debut for the sample was 19.8 years for urban nonmigrants, 20.5 years for rural nonmigrants, 20.2 years for rural-to-urban migrants, and 20.1 years for urban-to-urban migrants (range; 13–24 years) (p ≤ .05). Fifty-nine percent of the study population experienced sex at an early age, defined as 20 years or younger. Across the different groups, urban nonmigrants were most likely to report early sex, followed by urban-to-urban migrants, rural-to-urban migrants, and rural nonmigrants.

Migrants and nonmigrants differed across several key demographic characteristics (Table 1). As expected in this sexually active sample, there are more participants in the older age cohorts (80.7%) compared with younger cohorts (19.3%). The age differences are marginally statistically significant across the four groups (p = .057). There are slightly fewer females compared with males, with 43% of the sample comprising females. Across the board, rural-to-urban migrants are more economically dis-

Table 2
Bivariate and multivariate correlates of condom use at first sex, by gender

Demographic characteristics	All (N = 959)		Male (N = 560)		Female (N = 399)	
	OR (CI)	AOR (CI)	OR (CI)	AOR (CI)	OR (CI)	AOR (CI)
Urban nonmigrants	1.00	1.00	1.00	1.00	1.00	1.00
Rural nonmigrants	.71* (.51, .98)	.60** (.43, .83)	1.03 (.65, 1.65)	1.01 (.64, 1.59)	.40*** (.27, .58)	.36*** (.24, .55)
Rural-to-urban migrants	.36* (.14, .90)	.29* (.11, .80)	.27* (.09, .78)	.27* (.09, .80)	.34* (.12, .98)	.31 (.09, 1.09)
Urban-to-urban migrants	.97 (.57, 1.66)	.91 (.52, 1.60)	.98 (.42, 2.28)	1.05 (.46, 2.39)	.95 (.62, 1.47)	.97 (.55, 1.70)
Younger (15–19 years)		1.00		1.00		1.00
Older (20–24 years)		.57* (.36, .89)		.80 (.47, 1.35)		.35*** (.19, .65)
Male		1.00		–		–
Female		1.04 (.78, 1.38)		–		–
Lowest wealth tertile		1.00		1.00		1.00
Mid wealth tertile		.75 (.49, 1.15)		1.02 (.65, 1.60)		.73 (.36, 1.49)
Highest wealth tertile		1.23 (.74, 2.03)		1.83* (1.00, 3.35)		1.01 (.40, 2.55)
Early sex: >20 years		1.00		1.00		1.00
20 years and less		.44*** (.30, .62)		.45*** (.28, .73)		.45** (.26, .77)
Odds ratios and confidence intervals comparing migrant status groups (second group as reference)						
R–RU OR	1.99	2.04	3.83*	3.74*	1.16	1.18
R–RU (CI)	(.80, 4.92)	(.78, 5.32)	(1.37, 10.71)	(1.27, 11.05)	(.39, 3.42)	(.35, 3.99)
R–UU OR	.73	.66	1.05	.96	.42***	.37***
R–UU (CI)	(.44, 1.21)	(.39, 1.13)	(.50, 2.19)	(.46, 2.03)	(.25, .69)	(.21, .66)
RU–UU OR	.37*	.32*	.27*	.26*	.36**	.32*
RU–UU (CI)	(.16, .83)	(.14, .75)	(.09, .81)	(.08, .79)	(.13, .99)	(.11, .96)

R = rural nonmigrants; RU = rural-to-urban migrant; UU = urban-to-urban migrant; OR = odds ratio; AOR = adjusted odds ratios; CI = confidence interval.

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

advantaged than other groups, followed by urban-to-urban migrants. Not surprisingly, urban nonmigrants are the most advantaged of any group. Over 87% of rural-to-urban migrants are in the lowest wealth tertile compared with only 13.6% of urban nonmigrant youth ($p < .001$). Most rural-to-urban migrants only finished junior secondary education. In contrast, urban nonmigrants are more likely to complete senior secondary school and college/university compared with rural-to-urban migrants, of whom only 3.8% go on to college or beyond. In addition, rural-to-urban migrant workers were predominantly employed in unskilled work.

Overall, nearly 56% of the sample population was only working. Surprisingly, over one in six youth in the sample were neither attending school nor employed, with rural nonmigrants nearly six times more likely to fall into this category than urban-to-urban migrants (34.7% vs. 6.0%, respectively). A higher percentage of migrants were working full-time compared with nonmigrants—87.6% of rural-to-urban migrants were working only compared with approximately half of urban nonmigrants. No rural-to-urban migrants lived with their parents compared with 79.7% of urban nonmigrants. Migrants were more likely than their nonmigrant peers to live in dormitories or with friends ($p < .001$).

Because official household registration, or hukou, is tied to an individual's place of birth, it is not surprising that rural-to-urban migrants were universally not registered in urban Shanghai (where they are currently living). Only .6% of urban nonmigrants were not officially registered to live in Shanghai compared with 98.4% of rural-to-urban migrants. Moreover, 97.7% of urban nonmigrants spoke the local language of Shanghai compared with only 42.1% of rural-to-urban migrants ($p < .001$). Turning to migrant-specific characteristics, the mean number of years living in Shanghai was 3.0 years for rural-to-urban and 5.1 years for urban-to-urban migrants. The vast majority of rural-to-urban migrants (90.7%) moved for job opportunities, and this was nearly 2.5 times that of urban-to-urban migrants.

Multivariate results

Multivariate models indicate that rural-to-urban migrants were 71% less likely to use condoms at first sex compared with urban nonmigrants (confidence interval [CI] = .11–.80) and 68% less likely to use condoms compared with urban-to-urban migrants (CI = .14–.75). Rural-to-urban migrants were also half as likely to use condoms compared with rural nonmigrants (CI = .78–5.32). Rural nonmigrants were also 40% less likely to use condoms at first sex compared with urban nonmigrants (CI = .43–.83) (Table 2).

In gender-stratified models, both male and female rural-to-urban migrants were less likely to report condom use at first sex compared with urban nonmigrants, although this was statistically significant for men (odds ratio [OR] = .27, CI = .09–.78) and not women (OR = .31, CI = .09–1.09). Rural-to-urban migrants of both sexes were also less likely to report condom use at first sex compared with urban-to-urban migrants, and the estimate of the association was significantly different from 0 for both groups (men: OR = .26, CI = .08–.79; women: OR = .32, CI = .11–.96). Male rural nonmigrants were 3.7 times more likely to use a condom during their first sexual experience compared with rural-to-urban migrants (CI = 1.27–11.05). Among young women born in rural areas, the estimate of the difference between migrants and nonmigrants was not significantly different from 0. Compared with female urban nonmigrants, rural nonmigrant girls were 64% less likely to use condoms at first sex (CI = .24–.55).

As to correlates of condom use, early sexual debut was a risk factor for both men (OR = .45, CI = .28–.73) and women (OR = .45, CI = .26–.77). For men, those in the highest wealth tertiles were much more likely to use condoms at first sex compared with lowest wealth tertiles (CI = 1.00–3.35). For women, older cohorts were less likely to have used condoms at first sex compared with younger age cohorts; individuals aged 20–24 years were 65% less likely to use condoms the first time they had sex

Table 3
Bivariate and multivariate correlates of consistency of contraception with first partner, by gender

Demographic characteristics	All (N = 959)		Male (N = 560)		Female (N = 399)	
	OR (CI)	AOR (CI)	OR (CI)	AOR (CI)	OR (CI)	AOR (CI)
Urban nonmigrants	1.00	1.00	1.00	1.00	1.00	1.00
Rural nonmigrants	.31*** (.20, .47)	.30*** (.17, .52)	.63 (.37, 1.08)	.65 (.35, 1.22)	.08*** (.04, .16)	.08*** (.03, .21) ^x
Rural-to-urban migrants	.26* (.09, .72)	.39 (.11, 1.36)	.10** (.02, .45)	.14* (.03, .75)	.32 (.09, 1.10)	.48 (.11, 2.01)
Urban-to-urban migrants	1.20 (.75, 1.93)	1.71 (.91, 3.23)	1.10 (.58, 2.10)	1.56 (.67, 3.64)	1.44 (.87, 2.39)	1.77 (.83, 3.75)
Younger (15–19 years)		1.00		1.00		1.00
Older (20–24 years)		.70 (.36, 1.34)		.90 (.43, 1.86)		.49 (.24, 1.01)
Male		1.00		—		—
Female		1.11 (.74, 1.66)		—		—
School only		1.00		1.00		1.00
Neither school/job		1.01 (.53, 1.94)		1.10 (.53, 2.26)		.60 (.20, 1.79)
Both school/job		.96 (.49, 1.90)		.62 (.22, 1.77)		.69 (.37, 1.30)
Job only		.56* (.31, .99)		.41* (.17, .97)		.51 (.23, 1.15)
Live with parents		1.00		1.00		1.00
Alone		.29 (.08, 1.11)		.07** (.01, .46)		.86 (.25, 2.99)
Relatives		.51 (.23, 1.09)		.44 (.15, 1.31)		.86 (.29, 2.54)
Friends/dorm		.69 (.35, 1.35)		.71 (.33, 1.55)		.92 (.43, 2.01)
Early sex: >20 years		1.00		1.00		1.00
20 years and less		.42** (.25, .72)		.35** (.17, .71)		.52 (.25, 1.08)
Odds ratios and confidence intervals comparing migrant status groups (second group as reference)						
R–RU OR	1.21	.77	6.12*	4.53	.24*	.18**
R–RU (CI)	(.412, 3.54)	(.21, 2.82)	(1.41, 26.49)	(.93, 21.95)	(.06, 1.01)	(.04, .88)
R–UU OR	.26***	.18***	.58	.42*	.05***	.05***
R–UU (CI)	(.15, .44)	(.00, .36)	(.28, 1.18)	(.18, .96)	(.02, .13)	(.02, .14)
RU–UU OR	.21**	.23**	.09***	.09**	.22*	.27*
RU–UU (CI)	(.08, .57)	(.08, .64)	(.02, .39)	(.02, .39)	(.06, .79)	(.07, 1.01)

R = rural nonmigrants; RU = rural-to-urban migrant; UU = urban-to-urban migrant; OR = odds ratio; AOR = adjusted odds ratios; CI = confidence interval.

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

compared with 15–19-year-olds (CI = .19–.65), indicating some change over time.

In models that adjusted for age, gender, activity status, family structure, and early age of sex, rural nonmigrants have a lower likelihood of consistent contraceptive use compared with urban nonmigrants (OR = .30, CI = .17–.52). Other factors associated with consistent contraceptive use included having only a job compared with being in school only (OR = .56, CI = .31–.99) and reporting early sex (OR = .42, CI = .25–.72) (Table 3).

We performed a subset analysis comparing rural migrants to urban migrants using multivariate logistic regression and controlling for recency of migration and background characteristics. Urban-to-urban migrants continued to demonstrate an advantage for consistency of contraception, whereas recency of migration did not predict consistent use (results not shown). These analyses were not replicated by gender because of power issues.

Gender differences in the associations with consistency of use were similar to those for condom use. Adjusting for background characteristics, male rural-to-urban migrants were less likely to report consistent use compared with male urban nonmigrants (OR = .14, CI = .03–.75) and male urban migrants (OR = .09, CI = .02–.39). Although female rural-to-urban migrants also demonstrated lower likelihood of consistent use with their first partner compared with urban nonmigrants, the female estimate was not significantly different from 0. In contrast, female migrants were more advantaged compared with young women in rural areas who never migrated. Female rural nonmigrants were 82% less likely to report consistent use compared with rural-to-urban female migrants (CI = .04–.88) and 95% less likely to report consistent use compared with urban-to-urban female migrants (CI = .02–.14).

As to correlates of contraceptive consistency, no associations were found for women; among men, risk factors included only

working compared with being in school (OR = .41, CI = .17–.97), living alone compared with living with parents (OR = .07, CI = .01–.46), and experiencing sex at an early age (OR = .35, CI = .17–.71).

Discussion

Despite China’s exceptionally large migrant population and increasing STI trends, to the best of our knowledge, this is the first study that has evaluated condom use among 15–24-year-olds by migration status. These findings suggest that rural-to-urban migrants, in particular, are at a greater disadvantage compared with other groups. They are most likely to be in the lowest wealth group, have less education, more likely to live alone or in work dormitories, and migrate for employment opportunities. Migration may place youth at particular risk for several reasons. Adoption of risky sexual behaviors in urban areas is heightened with increased exposures to the commercial sex industry, drugs and alcohol, and different peer networks [4].

The results from this study indicate that patterns of migration and gender clearly impact condom use and contraceptive consistency. First, the low rates of condom use and contraceptive consistency are of particular concern. Youth in our sample showed an even larger disparity in unprotected sex between migrant/nonmigrant groups compared with previous studies [2]. This may be because most migrants in this study are living away from their parents and are working, which may place them at even greater risk than school-going youth. Migrant youth were less likely to report consistent contraceptive use compared with nonmigrants. Other qualitative studies have suggested that lack of sexual knowledge and sex education explains the low condom use among migrant populations [28]. Young men who migrate from rural areas to urban areas showed greater sexual risk be-

haviors. This is cause for concern given that migrant males are more likely to report visiting female sex workers [17,29], and male clients are more likely to be at risk for HIV [17]. Other studies have found lower levels of education, socioeconomic factors, and separation from spouses as risk factors for unprotected sex among male migrants [29,30].

In contrast, nonmigrant rural women are at particular risk for poor sexual behaviors. This is corroborated by other studies, which demonstrate that young women in rural areas are most likely to experience earlier age of sexual initiation, lower HIV/AIDS knowledge, and higher sexual risk behaviors [30]. Furthermore, as migration patterns in China are characterized as “temporary and circular,” the highest-risk groups in this study (rural-to-urban male migrants and rural female nonmigrants) may further fuel concerns that young men returning home to girlfriends and wives may serve as agents for the spread of infectious diseases [5,24,31].

There are several covariates associated with unprotected sex. Older cohorts were at greater risk of unprotected sex at first sexual experience compared with younger cohorts, suggesting a change in knowledge and attitudes over time. In addition, early age of sexual debut was a risk factor for both unprotected sex and inconsistent condom use with first sexual partner, highlighting the importance of promoting delay in sexual initiation among young populations.

Most migration studies in China have focused on rural-to-urban migrants, but it is clear that urban-to-urban migration makes up a substantial proportion of the migrant population. Urban-to-urban migrants should be analyzed separately from rural-to-urban migrants because their behavior appears to be more similar to urban nonmigrants. Urban-to-urban migrants are advantaged along several demographic factors compared with rural-to-urban migrants; they are more likely than rural migrants to be in the mid and upper wealth tertiles, be students, have higher educational levels, work in professional sectors, live with parents, be registered in Shanghai as an official migrant, and move for school or to be with family. Moreover, rural migrants are more likely to be “recent” migrants compared with urban migrants. This is counter to other findings in the United States that suggest recent migration (6 years or less) is associated with lower health risk behaviors among youth compared with migrants who have lived in an area for >6 years [32]. In the subset analyses performed only on migrants, however, urban-to-urban migrants continued to demonstrate an advantage for consistency of contraceptive use, controlling for recency of migration. Urban-to-urban migrants should be carefully monitored in the coming years given China’s rapid urbanization and other literature suggesting higher risk among urban-to-urban migrant men [30].

This study has several limitations. First, because the data are from a cross-sectional survey, causality between migration and unprotected sex behaviors cannot be established. Second, all data are self-reported. Therefore, responses may be subject to social desirability bias because sexual behaviors remain stigmatized in China. However, the use of computer-assisted self-interview has been shown to demonstrate improved reliability and internal consistency, to reduce missed questions, and to encourage honest reporting to sensitive questions among similar populations [33–36]. Results are also subject to recall bias, as participants are asked to recall their first sexual partner; however, over 80% of the study population had experienced their first sexual encounter within the past 3 years. Third, these data are taken from rural and urban areas of Shanghai; because Shanghai is the

most modern of Chinese cities, these results may not be generalizable to other young migrant populations elsewhere in China. Moreover, estimates comparing different groups once the data are stratified by gender may be unreliable because of sample size issues; however, there are sufficient numbers to compare each population to urban nonmigrants, the reference category with the largest sample size. Fourth, the study’s measure of “consistent contraceptive use” does not directly measure consistency of condom use, but rather, any form of contraception including withdrawal, contraceptive pills, and other methods. Finally, future studies would benefit from richer migration data. Because of limitations in the study measures, the effects of migration history on unprotected sex cannot be established, including circular migration and multiple migrations.

Despite these limitations, the study adds to existing literature on migration in China, with a better understanding of young migrants, their sexual behaviors and sexual health risks. Although it is beyond the scope of this article to discuss specific strategies and interventions, two groups of migrants are notably at risk for adverse health outcomes: (1) rural-to-urban migrants, particularly young men, and (2) young women in rural areas. One potential strategy is to target rural areas for both of these groups by targeting young men before they leave their hometowns as well as women who might not have the opportunity to migrate. In addition, because many migrants are living alone or in work dormitories, collaboration between work sites and local health departments should be promoted, including work-based sex education and condom distribution programs.

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