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## Age differences in sexual risk behaviors and related factors among people living with HIV in Guangxi, China

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### Abstract

Sexual risk behaviors by people living with HIV (PLHIV) can result in secondary HIV transmission and other health problems. Given the dearth of research on age differences in sexual behaviors among PLHIV, the objective of the study is to compare sexual risk behaviors and related factors among PLHIV by age groups. Data used in the current study were derived from a cross-sectional survey conducted from 2012 to 2013 in Guangxi, China. PLHIV were selected randomly from 12 sites with the largest number of HIV/AIDS cases. The 2,987 PLHIV completing the survey were included in the study. Participants were asked about key sociodemographic characteristics, health condition, same-sex behavior, and sexual risk behaviors (number of sex partners, condom use consistency, and change in condom use after HIV diagnosis). Univariate logistic regression analyses were conducted to evaluate associations of sexual risk behaviors with age and other factors. Those variables with a p-value of less than 0.2 were entered into multivariate logistic regression models. All statistical analyses were conducted using SAS 9.4. Differences in sexual risk behaviors across age groups were observed. Compared with their younger counterparts, who were 50 years of age were more likely to have multiple partners, use condoms inconsistently, and use condoms less than before HIV diagnosis. Moreover, lower education attainment, being in the lowest or highest category of income, having a sero-concordant or sero-unknown steady partner or no steady partner, and having contracted HIV from steady or casual/commercial partners, or through injection drug use appeared to be predictive of at least one of the sexual risk behaviors examined in the study. The findings call for HIV prevention interventions to be tailored to different age groups. The interventions that can help reduce unprotected sex among older PLHIV are urgently needed.

### Keywords

sexual risk behavior; age difference; people living with HIV; China

## Introduction

The Joint United Nations Program on HIV and AIDS (UNAIDS) report indicated that in 2015, the number of people living with HIV (PLHIV) aged 50 and older hit a record high of about 5.8million,of whom 58% were men (UNAIDS, 2016). In some places in China, the HIV incidence among the older people continues to rise. Chinese Center for Disease Control and Prevention (China CDC) statistics showed that as of September 2016, 654,000 people were reportedly living with HIV, and cumulative number of deaths was 201,000. Between January 2016 and September 2016, sexual intercourse accounted for 94.2% of all new infections. The HIV incidence among both young students and the elderly rose significantly. New cases of HIV infection among men aged 60 and older was 13,000 in 2015, 3.6 times that in 2010 (Xinhuanet, 2016). Therefore, it is vital to improve HIV prevention among older people.

Knowledge of sexual behaviors among PLHIV greatly facilitates HIV prevention efforts (CDC, 2003), but current data on the elderly population are lacking. A study conducted in the United States indicated that among 290 PLHIV aged 50 and older, 26% used condoms regularly, 7% used condoms irregularly but only had sex with HIV sero-concordant partners, and 6% used condoms irregularly with partners with unknown serostatus (Lovejoy et al., 2008). Another study in the United States compared sexual behaviors between older and younger PLHIV, and identified that sexual activity declined with age but inconsistent condom use was commonly reported, and older PLHIV were more likely to engage in bisexual and homosexual behaviors than heterosexual behaviors (Önen, Shacham, Stamm, & Overton, 2010). Some studies identified that one quarter of the sexually active older people living with HIV or at risk for HIV infection had more than one sex partner, and only a little more than half of the older men living with HIV always used condoms with their partners. The factors including being HIV-negative, low power to negotiate safer sex, psychiatric disorders, greater importance of sex in one's life, and drug and alcohol abuse have been commonly identified associated with sexual risk behaviors (Illa et al., 2008; Lovejoy et al., 2008).

Notwithstanding these studies, however, there is a relative lack of research on sexual behaviors among older PLHIV in China. Moreover, direct comparisons of change in sexual behaviors following diagnosis with HIV have not been made across the age spectrum (Illa et al., 2008; Lovejoy et al., 2008; Rowniak, 2008; Sankar, Nevedal, Neufeld, Berry, & Luborsky, 2011). HIV diagnosis often alters sexual behaviors. For instance, some older individuals reported not being sexually active after HIV diagnosis (Siegel & Scrimshaw, 2003). On the other hand, some older PLHIV might engage in riskier sexual behaviors after diagnosis and be more resistant to behavior changes to reduce their risks (Maes & Louis, 2003). Sexual risk behaviors by PLHIV can directly affect both HIV prevention and transmission (CDC, 2003). Therefore, this study aims to explore differences in the tendency of engaging in sexual risk behaviors across age groups and the factors related with it among PLHIV in China.

## Methods

### Study design and participants

The current study was conducted from 2012 to 2013 in Guangxi, China. In short, we used a pre-established sampling scheme to select top 12 sites with largest cumulative HIV/AIDS cases from 17 cities and 75 counties in Guangxi. Approximately 10% HIV cases were randomly selected from a sampling pool with 29,606 HIV/AIDS cases in the 12 sites. With an approximate 10% refusal rate, a total of 3,002 PLHIV were recruited. The 2,987 PLHIV (99.5%) who completed the survey were included in the current study. The Institutional Review Boards at Wayne State University in the United States and Guangxi Center for Disease Control and Prevention in China reviewed and approved the research protocol.

### Measures

**Demographic information**—Participants were asked about individual and family characteristics including gender, age, ethnicity (Han, Zhuang, Yao, Miao, Dong, and others), year of schooling, and monthly household income in 6 categories of Chinese Yuan (<1,000, 1,000–1,999, 2,000–2,999, 3,000–3,999, 4,000–4,999, and ≥5,000). We combined the ethnicity categories other than Han into non-Han group, and the three high-level income categories 3,000–3,999, 4,000–4,999 and ≥5,000 into one group (≥3,000) because of the relatively small number of responses for each of these categories. We divided participants into three age groups (<30, 30–49, ≥50) for the purpose of comparisons across age strata.

**Health-related correlates**—If participants indicated that they had had sex encounters over the past half year, they were regarded as being sexually active. Self-reported health condition was assessed using the general health perception item from the Medical Outcomes Study HIV Health Survey (MOS-HIV) with 4-point scale response options including poor, fair, good, very good (Wu et al., 1997). Same-sex behavior was measured by asking participants to indicate the gender of their sex partners over the past six months. Participants were also asked to indicate HIV status of their steady sex partner with response options including yes, no, don't know, and no steady partners. Transmission route was measured by asking participants to identify the way through which they had contracted HIV from a list of options including sex with stable partners, sex with casual partners, sex with commercial partners, contaminated blood or blood products, injection drug use, others, and unknown. We combined some categories due to the relatively small number of participants therein and used four categories including sex with stable partners, sex with casual/commercial partners, injection drug use, and other/unknown.

**Sexual risk behaviors**—Participants were asked about the number of partners they had sex with over the past six months, and a dichotomous variable was created to indicate one partner and more than one partner. They were also asked about condom use for both vaginal and anal intercourse over the past six months. Response options include always, very often, sometimes, rarely, and never. Similarly, a dichotomous variable was created following a similar approach recommended by Noar and colleagues (2006) to indicate consistent condom use if participants reported always using condoms for both vaginal and anal intercourse, and inconsistent condom use otherwise. Change in condom use was also

assessed by the question about the change in condom use after finding out they were HIV-positive with response options including more than before, the same as before, and less than before HIV diagnosis. Accordingly, having multiple sex partners, inconsistent condom use, and less condom use than before HIV diagnosis were sexual risk behaviors to be examined in the study.

### Data analysis

The demographic characteristics and health-related correlates were compared across age strata using one-way ANOVA for continuous variables or  $\chi^2$  test for categorical variables. All potential correlates were evaluated in univariate logistic regression for their associations with sexual risk behaviors among those being sexually active. Those variables with a p-value of less than 0.2 were selected and entered into the multivariate logistic regression to identify associations of age with sexual risk behaviors while controlling for other demographic characteristics and health-related correlates.

## Results

### Older PLHIV compared to younger ones

Among the 2,987 PLHIV in the current study, 1,551 participants (51.9%) indicated that they had had sexual encounters over the past six months. Around 30% of older PLHIV (aged 50 and older) compared to more than 50% of their younger counterparts reported having sex over the past six months ( $\chi^2 = 212.81$ ;  $p < 0.0001$ ). Nearly 20% of older PLHIV who were sexually actively compared to less than 10% of their younger counterparts reported having engaged in same sex behaviors ( $\chi^2 = 14.04$ ;  $p = 0.0009$ ). Moreover, older PLHIV were more likely to be male ( $\chi^2 = 122.03$ ;  $p < 0.0001$ ), of Han ethnicity ( $\chi^2 = 8.98$ ;  $p = 0.0112$ ), in the lowest category of household income ( $\chi^2 = 14.60$ ;  $p = 0.0236$ ), have received fewer years of schooling ( $F = 76.59$ ;  $p < 0.0001$ ), and have a HIV-negative steady partner or not know their steady partner's HIV status ( $\chi^2 = 35.36$ ;  $p < 0.0001$ ). More than 50% of older PLHIV compared to some 30% of their younger counterparts reported having contracted HIV through sex with casual/commercial partners ( $\chi^2 = 198.09$ ;  $p < 0.0001$ ). (See Table 1.)

### Univariate logistic regression

Univariate logistic regression analyses indicated that older PLHIV were more likely to have engaged in sexual risk behaviors. Specifically, 11.9% of older PLHIV reported having more than one sex partner compared to 6.6% of PLHIV 30 to 49 years old (cOR = 1.96, 95% CI = 1.20, 3.20); 55.9% of them reported having used condoms inconsistently over the past six months compared to 45.2% of PLHIV 30 to 49 years old (cOR = 1.54, 95% CI = 1.14, 2.09); and 4.9% reported having used condoms less than before HIV diagnosis compared to 4.4% of PLHIV 30 to 49 years old (cOR = 1.68, 95% CI = 1.23, 2.29). Meanwhile, other factors potentially associated with having multiple partners include being male (cOR = 2.61, 95% CI = 1.67, 4.08), being in the higher categories of household income (cOR = 1.94, 95% CI = 1.07, 3.53 for 2000–2999 RMB; cOR = 2.65, 95% CI = 1.37, 5.15 for 3000 RMB), having a sero-discordant steady partner (cOR = 1.76, 95% CI = 1.04, 2.98), having a sero-unknown steady partner (cOR = 5.60, 95% CI = 3.05, 10.27), having no steady partner (cOR = 34.45, 95% CI = 19.11, 62.10), and having contracted HIV from their casual/commercial partners

(cOR= 11.22, 95% CI = 5.11, 24.64), through injection drug use (cOR= 10.13, 95% CI = 4.37, 23.51) and for other/unknown reasons (cOR = 2.67, 95% CI = 1.01, 7.11). Other factors potentially associated with inconsistent condom use include exclusively heterosexual behavior (cOR= 1.40, 95% CI = 1.01, 1.95), being in the lowest category of income (cOR = 1.45, 95% CI = 1.15, 1.82), having a sero-concordant steady partner (cOR= 2.52, 95% CI = 1.99, 3.19), having asero-unknown steady partner (cOR = 3.40, 95% CI = 2.24, 5.16), having no steady partner (cOR= 2.84, 95% CI = 1.73, 4.67), and having contracted HIV from steady partners (cOR= 1.33, 95% CI = 1.04, 1.70). Those who had a lower educational level (cOR= 0.94, 95% CI = 0.91, 0.98), had a sero-concordant (cOR= 1.43, 95% CI = 1.10, 1.85) or sero-unknown steady partner (cOR= 1.66, 95% CI = 1.08, 2.57) or no steady partner (cOR= 1.68, 95% CI = 1.00, 2.83) and had contracted HIV from steady partners (cOR= 1.54, 95% CI = 1.17, 2.04) were more likely to use condoms less than before HIV diagnosis. (See Table 2 & Table 3.)

### Multivariate logistic regression

Multivariate logistic regression analyses indicated that older PLHIV (> 50 years) were more likely to have multiple sex partners (aOR = 2.20, 95% CI = 1.26, 3.84), use condoms inconsistently (aOR= 1.65, 95% CI = 1.19, 2.30), and use condoms less than before HIV diagnosis (aOR= 1.73, 95% CI = 1.25, 2.40). Moreover, those who were in the highest category of income (aOR = 2.22, 95% CI = 1.03, 4.78), had a sero-unknown steady partner (aOR= 3.25, 95% CI = 1.70, 6.20) or no steady partner (aOR= 21.85, 95% CI = 11.54, 41.37) and had contracted HIV from their casual/commercial partners (aOR= 6.81, 95% CI = 2.83, 16.38) or through injection drug use (aOR= 6.89, 95% CI = 2.63, 18.06) were more likely to have multiple partners. Those who reported exclusively heterosexual behavior (aOR= 1.52, 95% CI = 1.08, 2.16), were in the lowest category of income (aOR= 1.37, 95% CI = 1.07, 1.75) and had a sero-concordant (aOR= 2.45, 95% CI = 1.89, 3.16) or sero-unknown steady partner (aOR= 3.40, 95% CI = 2.20, 5.25) or no steady partner (aOR= 2.55, 95% CI = 1.49, 4.35) were more likely to use condoms inconsistently. Those who received fewer years of schooling (aOR= 0.95, 95% CI = 0.92, 0.99), had a sero-unknown steady partner (aOR= 1.70, 95% CI = 1.09, 2.64) or no steady partner (aOR= 1.72, 95% CI = 1.01, 2.94), and had contracted HIV from their steady partners (aOR= 1.58, 95% CI = 1.14, 2.21) were more likely to use condoms less than before HIV diagnosis. (See Table 3.)

### Discussion

The finding that sexual activity significantly decreased with age and only 28.8% of PLHIV aged 50 and older had been sexually active is consistent with most of the previous studies (Önen et al., 2010; Lovejoy et al., 2008). Besides low testosterone levels, antiretroviral therapy (ART), psychological factors, and physical symptoms associated with HIV, response to HIV diagnosis in an attempt to protect their partners or because of fear of reinfection, stigma, or rejection is a factor frequently identified as contributing to decreased sexual activity among older PLHIV (Bogart et al. 2006; Siegel & Schrimshaw, 2003).

Despite significant decreases in their sexual activities, our findings indicate that older PLHIV were more likely to engage in sexual risk behaviors than their younger counterparts,

and more than half of them reported having contracted HIV through sex with casual/commercial partners compared to 30% of their younger counterparts. The proportion of inconsistent condom use among older PLHIV in our study was reportedly 55.9%, higher than that among the PLHIV studied in most western countries which ranged from 25% to 42% (Golub et al., 2010; Lovejoy et al., 2008; Önen et al., 2010). The findings that older PLHIV in comparison to their younger counterparts were more likely to engage in same-sex behaviors, have multiple sex partners, use condom inconsistently, and reduce condom use after HIV diagnosis were somewhat different from the study that found the proportion of men who have sex with men (MSM) among PLHIV increased with age, but sexual risk behaviors did not differ by age group (Önen et al., 2010). Previous studies conducted among populations at high risk for HIV infection such as injection drug users and MSM generated inconsistent findings with some identifying younger populations to be more likely to engage in sexual risk behaviors (Ludwig-Barron et al., 2014; Nyitray et al., 2011), and some identifying the other way around (Lelutiu-Weinberger et al., 2013; Rosenberg, Sullivan, DiNunno, Salazar, & Sanchez, 2011). The reasons for increased sexual risk behaviors among older PLHIV have not been extensively researched, but the phenomenon is likely multifactorial. Older persons, who might have been widowed or divorced, tend to look for casual sex partners, while lack of effective communication and information exchange may contribute to the inability of health care providers to provide appropriate interventions to prevent sexual risk behaviors among single older PLHIV. Older people often lack sense of self-protection and effective measures against HIV infection due to their low HIV-related knowledge and poor understanding of risk for HIV infection (Henderson et al., 2004). In China, it is very likely that adult children cannot accept their single parents' remarriage thus preventing them from being accompanied and taken care of by steady partners. The traditional ageism neglects and even denies the importance of sexuality in older people thus rendering them vulnerable to secretive and unprotected sex with sex workers which in turns results in their increased HIV infections (Wang, 2017).

Multivariate logistic regression analyses indicate that besides older age (50 and older), having a sero-unknown steady partner or no steady partner was also associated with having multiple partners, while those who had a sero-discordant steady partner were less likely to report inconsistent condom use. When the participants knew they had got HIV from their steady partners, they decreased condom use. Therefore, HIV status of the steady partners may greatly affect PLHIV's sexual risk behaviors. More consistent condom use with sero-discordant steady partners may be because PLHIV had sense of responsibility to protect others from HIV (Latka et al., 2007; Mizuno et al., 2010). The finding that those with higher education attainment were more likely to use condoms after knowing their HIV status makes sense because education can not only help improve sense of self-protection, knowledge and skills, but also help increase sense of responsibility to protect other persons (Latka et al. 2007; Mizuno et al., 2010). Those in the lowest category of household income were least likely to use condom consistently. One plausible explanation can be that some of them were low-paid sex workers and had to cater to their clients who tended to engage in binge drinking, drug abuse and non-use of condoms (Couture et al., 2011; Maher et al., 2011). Another plausible explanation is that low-income participants lacked support for sexual

health knowledge and condom acquisition, and sense of self-protection due to limited education (Cai et al., 2010; Magadi, 2013; Scorgie et al., 2012).

Our study had several limitations. First, all the data were self-reported and might be subject to recall errors and social desirability bias. Second, as all participants were recruited from rural areas of Guangxi, findings in the current study may have constrained generalizability to other settings. Third, some potentially important correlates such as HIV status of casual sex partners, and condom use with casual partners were not available for analysis.

Despite these limitations, our study is one of the first comparative studies of sexual risk behaviors (multiple sex partners, inconsistent condom use, and less condom use after HIV diagnosis) by age groups among PLHIV in China. Our study indicates that older PLHIV were more likely to have engaged in the three sexual risk behaviors mentioned above. The multiple regression analysis indicates that sexual risk behaviors among PLHIV were significantly associated with age group, sexual orientation, educational attainment, HIV status of steady partners, and HIV transmission routes while other potential correlates were controlled for. The findings highlight an urgent need for HIV prevention and intervention programs targeting older people. Sufficient information about HIV transmission and prevention, care provider training, and support in terms of treatment, health care and social support should be provided to older PLHIV. Furthermore, structural interventions that address health promotion among steady sex partners and socio-economic disparities of HIV infection are also needed.

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**Table 1**

Demographic characteristics and health-related correlates by age group

Characteristics	Age group (years)			
	Total	<30	30–49	50
<b>N(%)</b>	<b>2987(100.0)</b>	<b>386(12.9)</b>	<b>1867(62.5)</b>	<b>721(24.1)</b>
Sex encounters over the past 6 months				
Yes	1551(51.9)	252(65.6)	1085(58.2)	207(28.8)***
No	1436(48.1)	132(34.4)	778(41.8)	512(71.2)
Gender				
Male	1868(62.8)	148(38.3)	1209(64.8)	511(70.9)***
Female	1106(37.2)	238(61.7)	658(35.2)	210(29.1)
Ethnicity				
Han	2109(70.7)	262(67.9)	1298(69.7)	541(75.0)*
Others	873(29.3)	124(32.1)	565(30.3)	180(25.0)
Same-sex behavior				
Yes	173(11.6)	18(7.3)	118(11.3)	37(18.7)***
No	1320(88.4)	227(92.7)	924(88.7)	161(81.3)
Education in years (Mean/SD)				
	6.97(3.00)	7.85(2.70)	7.21(2.80)	5.86(3.30)***
Monthly household income(RMB)				
0–999	1572(53.1)	181(47.5)	1001(54.0)	384(53.9)*
1000–1999	870(29.4)	110(28.9)	555(30.0)	200(28.1)
2000–2999	334(11.3)	61(16.0)	192(10.4)	81(11.4)
3000	182(6.2)	29(7.6)	104(5.6)	47(6.6)
Self-report health status				
Very good	541(18.1)	108(28.0)	325(17.4)	105(14.6)***
Good	723(24.2)	98(25.4)	437(23.4)	187(25.9)
Normal	1342(45.0)	139(36.0)	858(46.0)	338(46.9)
Bad	379(12.7)	41(10.6)	245(13.1)	91(12.6)
Steady partner infected with HIV				
Yes	1267(43.7)	165(43.2)	817(45.0)	278(40.1)***
No	882(30.4)	105(27.5)	539(29.7)	234(33.8)
Don't know	327(11.3)	33(8.6)	189(10.4)	105(15.2)
No steady partners	426(14.7)	79(20.7)	270(14.9)	76(11.0)
Transmission route				
Steady partner	852(28.6)	150(39.2)	537(28.9)	163(22.7)***
Casual/commercial partner	1110(37.3)	118(30.8)	606(32.6)	382(53.2)
Injection drug use	471(15.8)	46(12.0)	398(21.4)	26(3.6)
Other/don't know	541(18.2%)	69(18.0)	319(17.2)	147(20.5)

\*  $p < .05$ ;\*\*  $p < .01$ ;

\*\*\*  
 $p$  .001 (two-tailed).

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**Table 2**

Demographic characteristics by sexual risk behaviors

Characteristics N(%)	# of sex partners			Consistent condom use			Condom use after HIV diagnosis			
	Total	One	two	Total	Yes	No	Total	More than before	Same	Less than before
Age group										
< 30	249(16.4)	222(89.2)	27(10.8)*	247(16.4)	119(48.2)	128(51.8)	250(16.3)	178(71.2)	61(24.4)	11(4.4)
30–49	1066(70.3)	996(93.4)	70(6.6) Ref	1060(70.3)	581(54.8)	479(45.2) Ref	1079(70.3)	811(75.2)	220(20.4)	48(4.4) Ref
50	201(13.3)	177(88.1)	24(11.9)**	202(13.4)	89(44.1)	113(55.9)**	206(13.4)	131(63.6)	65(31.6)	10(4.9)**
Gender	1524(100.0)	1403(92.1)	121(7.9)	1517(100.0)	791(52.1)	726(47.9)	1543(100.0)	1124(72.8)	350(22.7)	69(4.5)
Male	905(59.4)	810(89.5)	95(10.5)***	906(59.7)	479(52.9)	427(47.1)	922(59.8)	684(74.2)	200(21.7)	38(4.1)
Female	619(40.6)	593(95.8)	26(4.2) Ref	611(40.3)	312(51.1)	299(48.9) Ref	621(40.2)	440(70.9)	150(24.2)	31(5.0) Ref
Ethnicity										
Han	1066(70.1)	982(92.1)	84(7.9)	1061(70.1)	546(51.5)	515(48.5)	1081(70.2)	780(72.2)	248(22.9)	53(4.9)
Non-Han	455(29.9)	418(91.9)	37(8.1) Ref	453(29.9)	244(53.9)	209(46.1) Ref	459(29.8)	342(74.5)	101(22.0)	16(3.5) Ref
Same-sex behavior										
Yes	169(11.5)	158(93.5)	11(6.5) Ref	171(11.7)	98(57.3)	73(42.7) Ref	172(11.6)	124(72.1)	42(24.4)	6(3.5) Ref
No	1298(88.5)	1198(92.3)	100(7.7)	1285(88.3)	664(51.7)	621(48.3)*	1310(88.4)	958(73.1)	291(22.2)	61(4.7)
Education in years (Mean/SD)	7.26(2.88)	7.25(2.89)	7.32(2.84)	7.25(2.90)	7.34(3.00)	7.15(2.78)	7.26(2.89)	7.38(2.91)	7.08(2.82)	6.18(2.75)**
Monthly household income (RMB)										
0–999	736(48.8)	681(92.5)	55(7.5)	734(48.9)	346(47.1)	388(52.9)**	745(48.7)	531(71.3)	172(23.1)	42(5.6)
1000–1999	486(32.2)	456(93.8)	30(6.2) Ref	481(32.0)	276(57.4)	205(42.6) Ref	492(32.2)	372(75.6)	105(21.3)	15(3.1) Ref
2000–2999	182(12.1)	162(89.0)	20(11.0)*	183(12.2)	110(60.1)	73(39.9)	186(12.2)	133(71.5)	45(24.2)	8(4.3)
3000	104(6.9)	89(85.6)	15(14.4)**	104(6.9)	54(51.9)	50(48.1)	106(6.9)	79(74.5)	23(21.7)	4(3.8)
Self-report health status										
Very good	320(21.0)	294(91.9)	26(8.1)	315(20.8)	177(56.2)	138(43.8)	322(20.9)	234(72.7)	81(25.2)	7(2.2)
Good	375(24.6)	343(91.5)	32(8.5)	372(24.6)	204(54.8)	168(45.2)	379(24.6)	287(75.7)	76(20.1)	16(4.2)
Normal	690(45.3)	637(92.3)	53(7.7) Ref	688(45.4)	348(50.6)	340(49.4) Ref	699(45.4)	501(71.7)	159(22.7)	39(5.6) Ref
Bad	137(9.0)	128(93.4)	9(6.6)	140(9.2)	62(44.3)	78(55.7)	141(9.1)	100(70.9)	34(24.1)	7(5.0)
Steady partner infected with HIV										

Characteristics N(%)	# of sex partners			Consistent condom use			Condom use after HIV diagnosis			
	Total	One	two	Total	Yes	No	Total	More than before	Same	Less than before
Yes	835(55.1)	806(96.5)	29(3.5) Ref	837(55.4)	395(46.0)	452(54.0)***	845(55.0)	599(70.9)	213(25.2)	33(3.9)**
No	486(32.1)	457(94.0)	29(6.0)*	480(31.8)	327(68.1)	153(31.9) Ref	491(32.0)	385(78.4)	80(16.3)	26(5.3) Ref
Don't know	119(7.9)	99(83.2)	20(16.8)***	117(7.8)	41(35.0)	76(65.0)***	120(7.8)	81(67.5)	34(28.3)	5(4.2)*
No steady partner	76(5.0)	33(43.4)	43(56.6)***	76(5.0)	33(43.4)	43(56.6)***	80(5.2)	53(66.3)	22(27.5)	5(6.3)*
Transmission route										
Steady partner	494(32.6)	487(98.6)	7(1.4) Ref	488(32.4)	241(49.4)	247(50.6)*	498(32.5)	340(68.3)	133(26.7)	25(5.0)**
Casual/commercial partner	520(34.4)	446(85.8)	74(14.2)***	523(34.7)	298(57.0)	225(43.0) Ref	528(34.4)	408(77.3)	96(18.2)	24(4.5) Ref
Injection drug use	228(15.1)	199(87.3)	29(12.7)***	226(15.0)	110(48.7)	116(51.3)	230(15.0)	166(72.2)	54(23.5)	10(4.3)
Other/unknown	272(18.0)	262(96.3)	10(3.7)*	270(17.9)	137(50.7)	133(49.3)	278(18.1)	202(72.7)	66(23.7)	10(3.6)

\* *P* .05;

\*\* *P* .01;

\*\*\* *P* .001 (two-tailed).

P-values result from univariate logistic regression.

“Ref” is reference that is used to calculate cOR in each univariate logistic regression.

Table 3

Logistic regressions on factors associated with sexual risk behaviors

Characteristics	Multiple sex partners		Inconsistent condom use		Less condom use than before HIV diagnosis	
	cOR(95% CI)	aOR(95% CI)	cOR(95% CI)	aOR(95% CI)	cOR(95% CI)	aOR(95% CI)
Age group						
< 30	1.70(1.06,2.73) *	1.24(0.68,2.26)	1.29(0.98,1.70)	1.25(0.93,1.69)	1.20(0.89,1.63)	1.15(0.84,1.59)
30–49	Reference	Reference	Reference	Reference	Reference	Reference
50	1.96(1.20,3.20) **	2.20(1.26,3.84) **	1.54(1.14,2.09) **	1.65(1.19,2.30) **	1.68(1.23,2.29) **	1.73(1.25,2.40) **
Gender						
Male	2.61(1.67,4.08) ***	0.93(0.53,1.63)	0.93(0.75,1.14)	—	0.84(0.67,1.06)	0.98(0.74,1.30)
Female	Reference	Reference	Reference	—	Reference	Reference
Ethnicity						
Han	0.94(0.63,1.41)	—	1.12(0.90,1.40)	—	1.15(0.90,1.47)	—
Non-Han	Reference	—	Reference	—	Reference	—
Same-sex behavior						
Yes	Reference	—	Reference	Reference	Reference	—
No	1.19(0.62,2.26)	—	1.40(1.01,1.95) *	1.52(1.08,2.16) *	0.99(0.70,1.42)	—
Education in years						
0–999	1.01(0.95,1.08)	—	0.99(0.95,1.02)	—	0.94(0.91,0.98) **	0.95(0.92,0.99) *
Monthly household income (RMB)						
0–999	1.27(0.80,2.03)	1.16(0.68,1.98)	1.45(1.15,1.82) **	1.37(1.07,1.75) *	1.26(0.98,1.64)	—
1000–1999	Reference	Reference	Reference	Reference	Reference	—
2000–2999	1.94(1.07,3.53) *	1.77(0.91,3.46)	0.89(0.63,1.26)	0.90(0.63,1.30)	1.26(0.86,1.83)	—
3000	2.65(1.37,5.15) **	2.22(1.03,4.78) *	1.14(0.75,1.75)	1.15(0.73,1.80)	1.06(0.66,1.72)	—
Self-report health status						
Very good	1.02(0.62,1.67)	—	0.83(0.63,1.08)	0.93(0.70,1.24)	0.91(0.68,1.22)	—
Good	1.08(0.68,1.72)	—	0.81(0.63,1.04)	0.82(0.63,1.08)	0.80(0.60,1.06)	—
Normal	Reference	—	Reference	Reference	Reference	—
Bad	0.84(0.41,1.75)	—	1.27(0.88,1.82)	1.21(0.82,1.79)	1.04(0.70,1.54)	—
Steady partner infected with HIV						
Yes	Reference	Reference	2.52(1.99,3.19) ***	2.45(1.89,3.16) ***	1.43(1.10,1.85) **	1.27(0.97,1.67)
No	1.76(1.04,2.98) *	1.10(0.63,1.91)	Reference	Reference	Reference	Reference
Don't know	5.60(3.05,10.27) ***	3.25(1.70,6.20) ***	3.40(2.24,5.16) ***	3.40(2.20,5.25) ***	1.66(1.08,2.57) *	1.70(1.09,2.64) *
No steady partner	34.45(19.11,62.10) ***	21.85(11.54,41.37) ***	2.84(1.73,4.67) ***	2.55(1.49,4.35) ***	1.68(1.00,2.83) *	1.72(1.01,2.94) *
Transmission route						
Steady partner	Reference	Reference	1.33(1.04,1.70) *	1.23(0.93,1.62)	1.54(1.17,2.04) **	1.58(1.14,2.21) **
Casual/commercial partner	11.22(5.11,24.64) ***	6.81(2.83,16.38) ***	Reference	Reference	Reference	Reference
Injection drug use	10.13(4.37,23.51) ***	6.89(2.63,18.06) ***	1.32(0.97,1.81)	1.21(0.85,1.71)	1.31(0.92,1.86)	1.37(0.95,1.97)
Other/don't know	2.67(1.01,7.11) *	1.96(0.69,5.54)	1.22(0.91,1.64)	1.11(0.81,1.53)	1.25(0.89,1.74)	1.26(0.89,1.78)

\*  
 $p$  .05;

\*\*  
 $p$  .01;

\*\*\*  
 $p$  .001 (two-tailed).

Note: potential predictors with p-value < 0.2 in univariate logistic regression were entered into multiple logistic regression models.

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