

Published in final edited form as:

Sex Transm Dis. 2011 December ; 38(12): 1161–1166. doi:10.1097/OLQ.0b013e3182315772.

Role of sexual transmission of HIV among young non-injection and injection opiate users: A respondent driven sampling study

Jian Li, PhD^{*}, Hongjie Liu, PhD^{*}, Jianhua Li, MD[†], Jian Luo, BA[†], Don Des Jarlais, PhD[‡], and Nana Koram, PhD^{*}

^{*}Department of Epidemiology and Community Health, Virginia Commonwealth University, Richmond, Virginia, USA

[†]Yunnan Institute for Drug Abuse, Kunming, Yunnan, China

[‡]Baron Edmond de Rothschild Chemical Dependency Institute, Beth Israel Medical Center, New York, USA

Abstract

Background—Little research has investigated sexual transmissibility of HIV among young drug users in China. The objective of this study was to examine the role of sexual transmission on HIV infection among injection drug users (IDUs) and non-injection drug users (NIDUs).

Methods—Respondent-driven sampling (RDS) was used to recruit 426 young heroin/opium drug users in Yunnan, China. Logistic regression modeling was performed to examine interrelationships among risky sexual behaviors, drug-use modes, and drug-use practices.

Results—Substantial proportions of NIDUs and IDUs reported engagement in risky sexual behaviors including: (1) multiple sexual partners (42% of NIDUs vs. 37% of IDUs); (2) concurrent sexual partnerships (48% vs. 46%); (3) commercial sex partners (23% vs. 24%) and sex partners who were NIDUs (14% vs. 17%). Both NIDUs and IDUs reported low levels of condom use with non-regular partners (48% vs. 42%) and regular partner (24% vs. 27%), and having a history of recent methamphetamine use (21% vs. 18%). Compared to IDUs, NIDUs reported having had fewer sex partners who were IDUs, fewer IDU network peers, more NIDU network peers, and having lower levels of HIV knowledge and self-perceived HIV risk.

Conclusions—Generalization of the HIV epidemic from high-risk groups to the general population may be driven by risky sexual behavior among drug users. Reducing sexual transmission of HIV among both IDUs and NIDUs is the next major challenge for HIV intervention among drug users in China.

Keywords

HIV; Injection drug use; Non-Injection drug use; Sexual behavior; China

INTRODUCTION

Early in the epidemic of HIV in China, injection drug use (IDU) was a dominant HIV transmission mode.¹ It was estimated that there were 2.4 million injection drug users (IDUs) in China and the prevalence of HIV was nearly 20% among IDUs in 2005.² Investigation of

Correspondence: Hongjie Liu Ph.D., M.S., Address: 830 E. Main Street, 8th floor, Box 980212, Richmond, VA 23298, United States, Tel: 804-628-2517; Fax: 804-828-9773; hliu@vcu.edu.

Conflict of interests: None

the risk factors for HIV infection associated with syringe and paraphernalia sharing has contributed to the development of interventions targeting IDU in China.³ The success of these efforts is documented by the decreasing trend in needle-sharing and decline in the proportion of newly-reported HIV infected cases attributable to IDU over the past several years.⁴ According to studies conducted in four areas including Yunnan, 89% of IDUs reported sharing needles in 2001, 50% in 2004, and 30–40% in 2007.⁵ As reported in a recent study of HIV incidence among IDUs in Dehong Prefecture, an area in Yunnan, the estimated annual HIV incidence among IDUs decreased significantly from 15% in 2004 to 4.3% in 2008.⁶

Chinese surveillance data has clearly depicted substantial increases in the proportions of newly-diagnosed HIV infected individuals among heterosexual and homosexual populations.^{4,7} Although the majority of the cumulative AIDS cases were previously attributed to IDU, heterosexual contacts have now become the leading transmission among newly-diagnosed HIV infections in China. In 2009, an estimated 48,000 people were newly infected with HIV in China, among whom 42% were through heterosexual contacts and 24% were through IDU.⁸

The spread of HIV among non-injection drug users (NIDUs) has received attention because research has reported that HIV prevalence among NIDUs is at least as high as that among IDUs in some areas.^{9,10} For example, in two separate surveys in New York City,¹¹ HIV prevalence was 13% among IDUs and 12% among NIDUs in a drug treatment program study, and 15% and 17% in a respondent driven sampling storefront study. Non-injection drug use (NIDU), or high-risk sexual behaviors associated with NIDU, may be an important factor contributing to HIV infection. A study in Russia documents that the high prevalence of HIV among drug users, their sexual contact with non-drug users, and the high-risk sexual behaviors of this potential bridging population indicate the real potential for an increasingly generalized epidemic.¹² Unlike the established role of unsafe syringe use in HIV transmission among IDUs, the mechanisms of sexual transmissions of HIV among IDUs and NIDUs are poorly understood.^{13,14} Given the growing importance of sexual transmission in new HIV infections among both IDUs and NIDUs, it is imperative that research efforts, for the purpose of development of effective HIV interventions, examine and characterize the patterns of high-risk sexual behavior. Although parenteral risk for HIV infection has been well documented in China, little is known about sexual transmissibility of HIV among young drug users, especially among non-injection drug users.

We thus conducted a community-based survey among young drug users in Yunnan, China, using respondent-driven sampling (RDS). The objective of this study was to investigate the potential role of sexual transmission of HIV infection among IDUs and NIDUs.

METHODS

Study site and subjects

Methodology of the study has been previously reported.¹⁵ Briefly, this community-based survey was conducted in two contiguous small counties in Yunnan province in 2009. Eligibility criteria for participation in the study included individuals who (1) were 18–35 years old and resided in either of the two counties; and (2) had used heroin or/and opium (smoked, snorted, or injected) at least once a week in the past 30 days prior to the interview. The study protocol was approved by the Institutional Review Boards of Virginia Commonwealth University and the Yunnan Institute of Drug Abuse.

Respondent-driven sampling

Respondent-driven sampling (RDS) was used to recruit participants.¹⁶ In order to select productive RDS seeds, we conducted in-depth interviews among 28 drug users and held focus-group discussions among those who had experience working with drug users, including local public health staff and outreach volunteers who were drug users. Based on the findings of the in-depth interviews and with assistance from the outreach volunteers, we selected a group of 14 seeds who were diverse in age, drug use mode (IDU or NIDU), and resided in the two counties. These 14 seeds received an explanation of the study purpose and three coupons to recruit drug users from their network ties. All new recruits in the subsequent waves participated in an anonymous interview in a private room and were offered three coupons similar to the seeds.

Measures

Drug use mode—Participants who snorted or smoked drugs and reported that they had never injected heroin were defined as non-injecting drug users (NIDUs). Those who had ever injected drugs were defined as injecting drug users (IDUs).

Regular sex partner and non-regular sex partner—Respondents' regular sex partner included spouses or boy/girl friends. Their non-regular sex partner included casual sex partners, sex workers, or sex clients. The number of sexual partners was measured in the past 12 months.

Duration of drug use—Participants were asked to provide date (measured in month and year) of the first injection drug use or non-injection drug use. Duration of IDU or NIDU was calculated by subtracting the date that they were interviewed by the date of the first drug use.

Concurrent sexual partnerships—As documented in in-depth interviews, the majority of young drug users had regular sexual partners (i.e., spouses or boy/girl friends), we defined the concurrent sexual partnerships as “Having any other sexual partners during an individual's sexual relationship with his/her regular sexual partners.”

Condom use—Condom use with regular partners and non-regular partners was separately measured by asking respondents about condom use during the last 12 months. Consistent condom use was defined as using condoms in every or most sexual acts.

Drug and sex trade—Participants were asked whether they had ever exchanged sex for drugs or money. They were also asked if they had ever used drugs to exchange for sex. Those who reported either of the two practices were defined as having engaged in drug and sex trade.

Club drug use—Participants were asked whether they had ever used “club drugs”, including crystal methamphetamine, ecstasy, and ketamine.

HIV/AIDS knowledge—11 questions were used to measure knowledge regarding HIV transmission and prevention. Each correct answer was given one point, with a total score ranging from 0 to 11 points. Based on its distribution, it was dichotomized into low (0–9) and high (10–11) in data analysis.

Self-perceived risk for HIV infection—It was measured by asking participants' perception of their possibility of acquiring HIV. This variable was categorized into “having

no risk”, “having some risk” and “definitely having risk”. If subjects reported that they were HIV positive, they were defined as “definitely having risk”.

Data analysis

The Respondent Driven Sampling Analysis Tool (RDSAT, version 6.0.1) was used to estimate the RDS-adjusted proportions of NIDU and IDU. RDSAT is designed to estimate overall sampling weights based on recruitment weights and network degree.¹⁷ These weights were applied to the bivariate and multivariate analyses by using SAS procedures for analysis of survey data (version 9.1, SAS Institute, Cary, NC).^{18,19} Relationships among HIV-related risky sexual behaviors, drug-use modes, and drug-use practices were analyzed in a logistic regression model (‘proc surveylogistic’), controlling for demographic variables (gender, age, ethnicity, education, marital status, and job). The Cochran-Armitage trend test was used to assess whether the relationships between duration of drug use and engagement in sexual risk and needle sharing followed linear patterns.²⁰ Since RDS regression modeling techniques are still developing, a sensitivity analysis of regression outcomes was performed by comparing results from weighted and un-weighted regression models.¹⁹ The sensitivity analysis indicated that the results generated from the RDS-weighted univariate and multivariate analyses did not substantially differ from those estimated in un-weighted analyses. Only the results of weighted analyses are reported here.

RESULTS

RDS sample

A total of 426 subjects, including 14 seeds, were recruited over a period of approximately 2 months. Twelve seeds successfully recruited other drug users. The average number of recruitment waves from the seeds were 6. Two seeds, one male and one female, produced a recruitment chain larger than 10 waves and recruited 54% of the RDS sample.

The RDS sample reached the status of equilibrium at the recruitment of 412 drug users (14 seeds were excluded). The RDSAT estimated that the largest number of recruitment waves at which equilibrium would be reached would be 6 (the trait of the age group). The largest actual recruitment wave in the RDS sample was 14, which was larger than the largest simulated one, thus satisfying the equilibrium requirement. Out of the 16 tolerance indexes, 14 had a value of 0.01 or less, and 2 had a value of 0.03, indicating that the bias introduced by the nonrandom selection was gradually reduced, and the final RDS sample compositions converged to equilibrium.²¹

Characteristics of study subjects

Among 426, 168 (39%) were classified as NIDUs since they smoked heroin or opium and reported that they had never injected heroin, and 258 (61%) were categorized as IDUs, including 19 (7%) subjects who initially injected heroin without prior non-injecting use of heroin or opium, 194 (75%) who switched to IDU from NIDU, and 45 (17%) who reported that they had injected but then switched to non-injecting drug use.

Fifty-three percent of participants were of Han ethnicity (according to the 2010 census, depending on different areas in Yunnan, 43%–67% of the population is Han), had a middle school education or higher (66%), and were unemployed (52%). The RDS-adjusted proportion of NIDUs was 51%. Compared to IDUs, NIDUs were more likely to be young, of minority ethnicity, have a lower education level, and be employed (Table 1).

The proportion of self-reported needle-sharing was low among IDUs. Measured over life time of drug use, 3% of IDUs shared needles for half or more episodes of injections and

61% occasionally shared them. Measured in the last 30 days, only 10% of IDUs had ever shared needles.

Comparison of risky sexual behavior between injection and non-injection drug users

Crude and multivariate analyses document that a similar proportion of NIDUs engaged in risky sexual behaviors compared to IDUs (Table 2). Forty-two percent of NIDUs and 37% of IDUs had multiple sexual partners in the past 12 months. About half of NIDUs (48%) and IDUs (46%) engaged in concurrent sex partnerships. Compared to IDUs, NIDUs reported having had fewer sex partners who were IDUs, fewer IDU network peers, more NIDU network peers, and having lower levels of HIV knowledge and self-perceived HIV risk.

Condom use was low in both groups. Only 48% of NIDUs and 42% of IDUs consistently used condoms with non-regular partners, and 24% of NIDUs and 27% of IDUs consistently used condoms with their regular partners. A considerable proportion of NIDUs and IDUs reported having commercial sex partners (23% vs. 24%) and sex partners who were NIDUs (14% vs. 17%), and having used club drugs (21% vs. 18%), mainly, methamphetamine.

For those engaged in commercial sex, a considerable proportion of NIDUs and IDUs reported having multiple sexual partners in the past 12 months (95% vs. 84%), sex partners who were NIDUs (18% vs. 23%), sex partners who were IDUs (8% vs. 43%), and non-regular sex partners (53% vs. 64%). For those who used methamphetamine, a large proportion of NIDUs and IDUs reported having multiple sexual partners in the past 12 months (61% vs. 51%), sex partners who were NIDUs (24% vs. 30%), sex partners who were IDUs (6% vs. 23%), and non-regular sex partners (25% vs. 36%).

Engagement in sexual risk according to the duration of injection and non-injection drug use

IDUs who used drugs for one year or less were less likely to have sex partners who were IDUs and to share needles, compared to those who had a longer duration of drug use (Table 3). NIDUs with longer duration of drug use exhibited a higher proportion of having commercial sex partners. Engagement in other sexual behavior did not significantly differ in the different phases of drug use.

DISCUSSION

This study documents that sexual risk may play an important role in HIV acquisition and transmission and both injection and non-injection drug users may serve as a bridge linking the HIV epidemic between high- and low-risk populations. Effective HIV intervention programs should be developed and implemented to target both sexual and parenteral risks.

It has been well established that injection-equipment sharing was the primary factor in the parenteral transmission of HIV among drug users during the early phases of the HIV epidemic. The sexual transmission of HIV was consequently considered negligible in China and other countries.^{14,22} This study indicates that the role of sexual transmission of HIV among young drug users is also substantial since young drug users reported having had mixed types of sex partners (including commercial sex partners, sex partners who were either IDUs or NIDUs, regular partners, and non-regular partners), a higher level of unsafe sex, and a low level of needle sharing. Engagement in mixed sexual partnerships, coupled with inconsistent condom use, could link and speed HIV transmission among drug users, sexual partners, and the general population.²³

In this study, nearly half of young drug users had concurrent sexual partnerships. As illustrated by Morris,²⁴ an individual's concurrency can put his/her monogamous partner at

risk of acquiring HIV, especially when his/her concurrent partners include drug users who also have multiple sexual partners. Condom use with different types of partners was very low among young drug users, which is consistent with previous studies among drug users in China.^{4,25} The high prevalence of sexual mixing and concurrent sexual partnerships, along with inconsistent condom use, may speed the sexual transmission of HIV within and across drug-use networks and sex networks and may generalize the HIV epidemic into low-risk populations in China.

Traditionally, research and intervention efforts have been primarily focused on injection drug use. However, the findings of this study document that the risk of non-injection drug use in HIV infection may be similar to the risk level of injection drug use. NIDUs' sexual networks overlap with IDUs' networks; we found that 17% of IDUs' sexual partners were NIDUs and 4% of NIDUs' sexual partners were actually IDUs. In addition, NIDUs have overlapping drug-use networks with IDUs; 34% of NIDUs had one or more injection network peers and a similar proportion of IDUs had one or more peers of NIDU in their social networks. The close linkages between the two groups also occurred in the RDS recruitment process, with NIDUs recruiting 36% IDUs and IDUs recruiting 27% NIDUs. In addition, 21% of NIDUs also orally used meth. Use of meth increases sexual desire and reduces condom use.^{26,27} Although the level of sexual risk is similar in injection and non-injection drug users, non-injection drug users may be even more risky in the transmission of HIV since they had lower levels of HIV knowledge and self-perceived risk for HIV infection.

The high sexual risk and relative low parenteral risk of HIV transmission may be explained by harm-reduction programs that have been widely and rigorously implemented in areas where injection drug use prevails in China.²² These programs include needle exchange programs and methadone maintenance therapy (MMT) and primarily target injection drug use for parenteral risk, i.e., needle sharing. As suggested in this study, Chinese policies on harm reduction might reduce parenteral risk (needle-sharing). However, because these harm reduction programs do not include components of behavioral intervention,²² drug users may continue to engage in risky sexual behavior. Our previous study found that drug users who frequently received detoxification treatments did not change their risky sexual behavior.²⁸

Research among drug users in China has found that risky injection practices have been proven to be less common among new IDUs than long-term IDUs.²⁹ Our study indicates that fewer IDUs with a shorter duration of injection shared needles and had sex partners who were also IDUs. Fewer NIDUs with a shorter duration of drug use reported having commercial sex partners. No distinguishable trend exists for other risky sexual behavior with respect to duration of drug use for NIDU and duration of injection-use for IDU. According to the findings of HIV surveillance in Yunnan, HIV prevalence in Yunnan was increasing among older IDUs but decreasing among younger IDUs.⁴ Thus, interventions for reducing sexual transmission of HIV among IDUs and NIDUs should target both new and long-term drug users.

Several limitations in this study should be acknowledged. First, we could not use bio-data to confirm findings since HIV tests were not performed among subjects. Second, misclassification of NIDUs and IDUs might take place since the 45 drug users who switched to NIDU from IDUs were classified as IDUs. To examine if the misclassification caused bias, we performed data analysis in the whole sample (426 subjects) and a subsample of 381 (without the 45 subjects). The results generated from univariate and multivariate analyses in the two samples did not substantially differ (measured in the direction of associations and significance levels). Third, self-reported data on sexual behavior is a sensitive topic in Chinese culture, which may lead to social desirability bias. Forth, although it helped subjects

to easily and correctly recall sex-partner concurrency by taking their regular sexual partners as a reference, it is possible that some subjects might have concurrent sexual partners but did not have a regular sexual partner. Fifth, as this study was done in Yunnan and no other similar studies have been done in other areas in China, we do not know to what extent the findings can be generalized beyond Yunnan or China. Large-scale studies at multiple sites need to be conducted to verify our findings.

In conclusion, the findings of this study indicate that the generalization of the HIV epidemic from high-risk groups to the general population may be driven by risky sexual behaviors among drug users. Reducing sexual transmission of HIV among both IDUs and NIDUs is the next major challenge for HIV intervention in China. Effective intervention programs need to target both new and long-term drug users.

Acknowledgments

This work was supported by a research grant (R21 DA023893-01A1) from the NIH-NIDA. It was awarded to Hongjie Liu and Jianhua Li. We are grateful to the staff from Yunnan Institute of Drug Abuse for participation in the study and to all the participants who gave so willingly of their time to provide the study data. We wish to thank Jennifer Nield for help in preparing the manuscript.

References

1. Grusky O, Liu H, Johnson M. HIV/AIDS in China: 1990–2001. *AIDS Behav.* 2002; 6:381–93.
2. Mathers BM, Degenhardt L, Phillips B, et al. Global epidemiology of injecting drug use and HIV among people who inject drugs: a systematic review. *Lancet.* 2008; 372:1733–45. [PubMed: 18817968]
3. Wu Z, Sullivan SG, Wang Y, et al. Evolution of China's response to HIV/AIDS. *Lancet.* 2007; 369:679–90. [PubMed: 17321313]
4. Jia M, Luo H, Ma Y, et al. The HIV epidemic in Yunnan Province, China, 1989–2007. *J Acquir Immune Defic Syndr.* 2010; 53(Suppl 1):S34–40. [PubMed: 20104107]
5. Li X, He G, Wang H, et al. Consequences of drug abuse and HIV/AIDS in China: recommendations for integrated care of HIV-infected drug users. *AIDS Patient Care STDS.* 2009; 23:877–84. [PubMed: 19799494]
6. Duan, S.; Shen, S.; Bulterys, M., et al. [Accessed July 22, 2011.] Estimation of HIV-1 incidence among five focal populations in Dehong, Yunnan: a hard hit area along a major drug trafficking route; *BMC Public Health.* April. 2010 p. 180 Available at: www.biomedcentral.com/1471-2458/10/180
7. Wu Z, Wang Y. Introduction: China meets new AIDS challenges. *J Acquir Immune Defic Syndr.* 2010; 53(Suppl 1):S1–3. [PubMed: 20104098]
8. Ministry of Health. World Health Organization. 2009 estimates for the HIV/AIDS epidemic in China [UNAIDS China Web site]. Beijing: May 31st. 2010 People's Republic of China, Joint United Nations Programme on HIV/AIDS. Available at: www.unaids.org.cn/download/2009ChinaEstimationReport-En.pdf
9. Strathdee SA, Sherman SG. The role of sexual transmission of HIV infection among injection and non-injection drug users. *J Urban Health.* 2003; 80(Suppl 3):iii7–14. [PubMed: 14713667]
10. Des Jarlais DC, Arasteh K, McKnight C, et al. Gender and age patterns in HSV-2 and HIV infection among non-injecting drug users in New York City. *Sex Transm Dis.* 2010; 37:637–43. [PubMed: 20838366]
11. Des Jarlais DC, Arasteh K, Perlis T, et al. Convergence of HIV seroprevalence among injecting and non-injecting drug users in New York City. *AIDS.* 2007; 21:231–35. [PubMed: 17197815]
12. Nicolai LM, Shcherbakova IS, Toussova OV, Kozlov AP, Heimer R. The potential for bridging of HIV transmission in the Russian Federation: sex risk behaviors and HIV prevalence among drug users (DUs) and their non-DU sex partners. *J Urban Health.* 2009; 86 (Suppl 1):131–43. [PubMed: 19507037]

13. Castor D, Pilowsky DJ, Hadden B, et al. Sexual risk reduction among non-injection drug users: report of a randomized controlled trial. *AIDS Care*. 2010; 22:62–70. [PubMed: 20390482]
14. Strathee SA, Stockman JK. Epidemiology of HIV among injecting and non-injecting drug users: current trends and implications for interventions. *Curr HIV/AIDS Rep*. 2010; 7:99–106. [PubMed: 20425564]
15. Li, J.; Liu, H.; Luo, J.; Koram, N.; Detels, R. [Accessed July 22, 2011.] Sexual transmissibility of HIV among opiate users with concurrent sexual partnerships: an egocentric network study in Yunnan. *China Addiction*. Published Online First: April 4, 2011. Available at: <http://onlinelibrary.wiley.com/doi/10.1111/j.1360-0443.2011.03459.x/abstract>
16. Heckathorn DD. Respondent-driven sampling: A new approach to the study of hidden populations. *Soc Probl*. 1997; 44:174–99.
17. Heckathorn DD. Extensions of Respondent-Driven Sampling: Analyzing Continuous Variables and Controlling for Differential Recruitment. *Sociol Methodol*. 2007; 37:151–208.
18. Liu H, Liu H, Cai Y, et al. Money boys, HIV risks, and the associations between norms and safer sex: a respondent-driven sampling study in Shenzhen, China. *AIDS Behav*. 2009; 13:652–62. [PubMed: 18841459]
19. Jenness SM, Begier EM, Neaigus A, Murrill CS, Wendel T, Hagan H. Unprotected Anal Intercourse and Sexually Transmitted Diseases in High-Risk Heterosexual Women. *Am J Public Health*. 2011; 101:745–50. [PubMed: 20558790]
20. Armitage P. Tests for Linear Trends in Proportions and Frequencies. *Biometrics*. 1955; 11:375–86.
21. Heckathorn DD. Respondent-Driven Sampling II: Deriving Valid Population Estimates from Chain-Referral Samples of Hidden Populations. *Soc Probl*. 2002; 49:11–34.
22. Li, J.; Ha, TH.; Zhang, C., et al. [Accessed July 22, 2011.] The Chinese government’s response to drug use and HIV/AIDS: a review of policies and programs; *Harm Reduct J*. March. 2010 p. 4 Available at: www.harmreductionjournal.com/content/7/1/4
23. Aral, SO.; Hughes, J.; Gorbach, P., et al. The Seattle “Sexual Mixing,” “Sexual Networks,” and “Sexual Partnership Types” Studies. In: Morris, M., editor. *Network Epidemiology*. New York: Oxford; 2004. p. 139-174.
24. Morris M. Barking up the wrong evidence tree. Comment on Lurie & Rosenthal, “Concurrent partnerships as a driver of the HIV epidemic in sub-Saharan Africa? The evidence is limited”. *AIDS Behav*. 2010; 14:31–3. discussion 34–7. [PubMed: 19997971]
25. Liu H, Grusky O, Li X, et al. Drug users: a potentially important bridge population in the transmission of sexually transmitted diseases, including AIDS, in China. *Sex Transm Dis*. 2006; 33:111–17. [PubMed: 16432483]
26. Li J, Zhang R, Liu H. A preliminary study of methamphetamine use in Yunnan, China. *AIDS Patient Care STDS*. 2008; 22:543–44. [PubMed: 18601581]
27. Molitor F, Truax SR, Ruiz JD, et al. Association of methamphetamine use during sex with risky sexual behaviors and HIV infection among non-injection drug users. *West J Med*. 1998; 168:93–7. [PubMed: 9499742]
28. Liu H, Grusky O, Zhu Y, et al. Do drug users in China who frequently receive detoxification treatment change their risky drug use practices and sexual behavior? *Drug Alcohol Depend*. 2006; 84:114–21. [PubMed: 16443333]
29. Zhang L, Li J, Lai W, et al. Prevalence and correlates of needle-sharing among new and long-term injection drug users in southwest China. *Subst Use Misuse*. 2010; 45:2503–23. [PubMed: 20536355]

Table 1

Demographic characteristics of non-injection (NIDUs) and injection drug users (IDUs)

	Weighted %		OR ^a	95% CI ^b
	NIDUs	IDUs		
Gender				
Male	51.4	48.6	1.00	
Female	42.0	58.0	0.68	0.33–1.44
Age (years)				
18–25	79.2	20.8	1.00	
26–35	37.7	62.3	0.16^c	0.10–0.26
Ethnicity				
Minority group	60.7	39.3	1.00	
Han	43.1	56.9	0.49	0.33–0.73
Education				
No school or primary school	52.9	47.1	1.00	
Middle school	53.5	46.5	1.02	0.67–1.57
High school or college	29.8	70.2	0.38	0.18–0.80
Marital status				
Married	52.0	48.0	1.00	
Single	50.2	49.8	0.93	0.60–1.44
Occupation				
Employed	57.9	42.1	1.00	
Farmer	62.6	37.4	1.22	0.67–2.21
No job	42.9	57.1	0.55	0.32–0.93

^aOdds ratio^b95% confidence interval^c $P \leq 0.05$ in bold

Table 2

Comparisons of risky sexual behavior, drug use practice, and self-perceived risk for HIV infection between non-injection drug (NIDUs) and injection drug users (IDUs)

	Weighted %		Crude		Adjusted ^a	
	NIDUs	IDUs	OR ^b	95% CI ^c	OR	95% CI
Number of sexual partners in the past 12 months						
0-1	57.7	63.2	1.00		1.00	
2-3	29.2	24.4	1.31	0.83-2.05	1.24	0.73-2.13
4 or more	13.1	12.4	1.16	0.63-2.11	0.89	0.42-1.90
Having commercial sex partners						
No	77.4	76.4	1.00		1.00	
Yes	22.6	23.6	0.94	0.59-1.50	0.80	0.46-1.41
Having concurrent sexual partnership						
No	51.8	53.4	1.00		1.00	
Yes	48.2	46.6	1.07	0.71-1.61	1.06	0.66-1.71
Having sex partners who were NIDUs						
No	86.1	82.7	1.00		1.00	
Yes	13.9	17.3	0.77	0.43-1.37	0.88	0.45-1.73
Having sex partners who were IDUs						
No	95.8	72.4	1.00		1.00	
Yes	4.2	27.6	0.11^d	0.05-0.27	0.19	0.07-0.50
Condom use with regular partners in last 12 months						
Consistent use	23.5	27.3	1.00		1.00	
Inconsistent use	76.5	72.7	1.22	0.71-2.09	0.91	0.48-1.73
Condom use with non-regular partners in last 12 months						
Consistent use	48.1	41.8	1.00		1.00	
Inconsistent use	51.9	58.2	0.77	0.39-1.53	0.85	0.38-1.88
Number of NIDU network peers						
0	38.9	70.5	1.00		1.00	
1-2	36.5	18.2	3.63	2.26-5.85	3.66	2.12-6.32
3 or more	24.6	11.3	3.96	2.27-6.90	4.73	2.31-9.68

	Weighted %		Crude		Adjusted ^a	
	NIDUs	IDUs	OR ^b	95% CI ^c	OR	95% CI
Number of IDU network peers						
0	67.1	26.7	1.00		1.00	
1-2	21.5	28.7	0.30	0.18-0.50	0.36	0.20-0.65
3 or more	11.4	44.6	0.10	0.06-0.18	0.15	0.08-0.29
Engaging in drug & sex trade						
No	93.5	89.5	1.00		1.00	
Yes	6.5	10.5	0.60	0.29-1.25	0.66	0.26-1.70
Using club drugs						
No	78.6	81.8	1.00		1.00	
Yes	21.4	18.2	1.22	0.75-1.99	0.87	0.47-1.62
HIV knowledge						
Low (0-9)	33.3	17.8	1.00		1.00	
High (10-11)	66.7	82.2	0.43	0.28-0.68	0.62	0.36-1.06
Self-perceived HIV risk						
No risk	63.1	27.9	1.00		1.00	
Some risk	30.4	38.4	0.35	0.22-0.55	0.38	0.22-0.66
Definitely at risk	6.5	33.7	0.09	0.04-0.17	0.11	0.05-0.22

^a Adjusted for gender, age, ethnicity, education, marital status and job.

^b Odds ratio

^c 95% confidence interval

^d $P < 0.05$ in bold

Table 3

Engagement in sexual risk and needle sharing according to the duration of non-injection (NIDU) and injection drug use (IDU)

	Duration of drug use among NIDUs (year)					Duration of drug use among IDUs (year)				
	0-1	2-4	5-9	10-	p-value	0-1	2-4	5-9	10-	p-value
Number of sexual partners in the past 12 months					0.83					0.49
0-1	56.8	57.1	66.7	54.2		56.8	64.1	62.9	64.7	
2 or more	43.2	42.9	33.3	45.8		43.2	35.9	37.1	35.3	
Having concurrent sexual partnership					0.11					0.18
No	47.4	48.7	57.1	62.5		48.5	56.6	37.1	63.5	
Yes	52.6	51.3	42.9	37.5		51.5	43.4	62.9	36.5	
Condom use with regular partners in last 12 months					0.10					0.59
Consistent use	31.9	18.9	18.7	15.8		16.7	35.7	21.1	29.6	
Inconsistent use	68.1	81.1	81.3	84.2		83.3	64.3	78.9	70.4	
Condom use with non-regular partners in last 12 months					0.88					0.12
Consistent use	54.2	35.7	50.0	50.0		76.9	37.5	31.0	39.4	
Inconsistent use	45.8	64.3	50.0	50.0		23.1	62.5	69.0	60.6	
Having commercial sex partners					0.03^a					0.31
No	81.5	81.0	71.4	62.5		73.0	79.2	64.5	82.9	
Yes	18.5	19.0	28.6	37.5		27.0	20.8	35.5	17.1	
Having sex partners who were NIDUs					0.13					0.13
No	89.7	87.8	81.0	79.2		97.0	84.9	74.2	81.9	
Yes	10.3	12.2	19.0	20.8		3.0	15.1	25.8	18.1	
Having sex partners who were IDUs					0.18					0.03
No	98.3	95.1	95.2	91.7		90.9	81.1	58.1	70.5	
Yes	1.7	4.9	4.8	8.3		9.1	18.9	41.9	29.5	
Using club drugs					0.05					0.05
No	72.8	81.0	90.5	83.3		75.7	75.5	80.6	87.6	
Yes	27.2	19.0	9.5	16.7		24.3	24.5	19.4	12.4	
Sharing needles with others over life time					-					<0.01
Never	-	-	-	-		70.3	52.8	33.9	18.1	
Occasionally	-	-	-	-		24.3	47.2	64.5	78.1	

	Duration of drug use among NIDUs (year)					Duration of drug use among IDUs (year)				
	0-1	2-4	5-9	10-	p-value	0-1	2-4	5-9	10-	p-value
Half of the time or more	-	-	-	-	-	5.4	0	1.6	3.8	
Sharing needles with others in the past 30 days					-					0.60
Never	-	-	-	-	-	86.5	84.9	96.8	89.5	
Occasionally	-	-	-	-	-	8.1	15.1	3.2	9.5	
Half of the time or more	-	-	-	-	-	5.4	0	0	1.0	

^a*P*<0.05 in bold