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Alcohol Use and Sexual Risk Behaviors and Outcomes in China: A Literature Review

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Abstract

This review systematically examines the empirical evidence regarding the association between alcohol use and sexual risk behaviors and outcomes among the Chinese population in mainland, China. Articles published in English (n = 11) and in Chinese (n = 7) from 1980 to 2008 documented consistent associations between alcohol use and several sexual risk behaviors, sexual coercion, sexual violence, and HIV/STIs across both the general population and high-risk groups, except for men having sex with men. This review suggests that alcohol use is associated with diverse sexual risk behaviors and outcomes across a variety of social groups in China, consistent with the evidence from the Western countries and Sub-Saharan Africa. Alcohol use is an important but under-researched correlate of sexual risk behaviors and outcomes in China. This review indicates the importance of research assessing alcohol use among both genders and with standardized measures, and suggests the importance of integrating alcohol use control in sexual risk reduction and prevention efforts in China.

Keywords

Alcohol use; Sexual risk behaviors; HIV/STIs; Sexual violence; China

Introduction

Alcohol use and sexual risk behaviors and outcomes are major public health concerns worldwide. Sexual risk behaviors and outcomes are broadly viewed as vulnerability, threat, and adverse consequences occurring in “the ongoing process of physical, psychological, and socio-cultural well-being related to sexuality” [1, p. 6]. Accounting respectively for 3.5 and 3.0% of the total disability-adjusted life years globally, alcohol-related problems and unsafe sex co-occur and amplify considerable contributions to the global burden of disease [2,3]. The global literature suggests that alcohol consumption is associated with a number of sexual risk behaviors and outcomes, including sexually transmitted infections (STIs, including HIV/AIDS, chlamydia, gonorrhea, and trichomonas), premarital intercourse, multiple sexual partners, unprotected sex, sexual violence, and unwanted pregnancy [4,5]. Etiologically, alcohol influences *sexual risk behaviors* through direct psychoactive effects on cognitive processes, including reasoning skills, sexual arousal and desire, inhabitations, judgment, and sense of responsibility, which are often moderated by individual expectation, drinking environment, socioeconomic/cultural characteristics of community [6–8]. Individual beliefs,

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stereotyping, and alcohol's psychoactive effects contribute to alcohol-involved *sexual assault and violence* [9]. As the most commonly used legal substance, alcohol use is among the most prevalent behaviors associated with HIV/STIs [4]. Drinking-related exposures to sexual risk behaviors, high-risk partners, and drinkers' increased biological susceptibility could lead to an increased risk of STIs [10]. Additionally, the alcohol-sexual risk linkage deserves special attention in health promotion efforts because their co-occurrence in the same physical location (e.g., high-risk bars) or during a particular context (e.g., exchange of drugs and alcohol for sex) is an etiological foundation for effective and efficient setting-based interventions and structural interventions [11].

Studies conducted in Western countries and Sub-Saharan Africa have documented consistent associations of alcohol use with sexual risk behaviors, sexual violence, and HIV/STIs. A number of studies using experimental research methodologies had reported consistent causal relationships between alcohol use and sexual risk taking and sexual assault [12]. However, event-level studies reported inconsistent association between alcohol use and unprotected sex [13,14]. A global review of English articles published during 1995–2003, including one study in China, reported a consistent association between problem drinking and STIs [10]. Within the context of Sub-Saharan Africa, two reviews reported consistent associations between alcohol use and risk for HIV/STIs [4,15]. Because the local and national experiences, socio-cultural context, and alcohol control policies influence the impact of alcohol consumption on health risk [6–8,16], regional and country-specific investigation of this association is critical to better contextualize the alcohol-sexual risk linkage. Despite considerable increases in alcohol-sexual risk research [17] in high-income countries, the knowledge base of this association remains limited in low- and middle-income countries [3,18–20], including China.

Alcohol consumption has increased considerably in China in the past three decades, accompanying with rapid social changes, including a rapidly expanding economy, urbanization, industrialization, and globalization [21–23]. Increases in alcohol consumption from 2002 to 2005 were observed across all age groups, especially among young participants aged 18–19 years (women from 34 to 63%, men from 70 to 85%) in random samples of urban populations in Wuhan city [24]. A study on a cluster sample of 24,992 respondents aged 15 or above in cities and rural areas in 5 provinces in 2001 reported 1-year drinking rates of 74.9, 38.8, and 59.0%, for men, women, and the total sample, respectively [25]. Overall, the global burden of disease with regard to alcohol was considerable in China, as the second leading risk factor at 5.6%, ranking between high blood pressure (7.3%) and tobacco (4.9%) in 2001 [26, 27].

In China, changing attitudes toward sex and sexual risk behaviors (e.g., wide acceptance of premarital sex, tolerance toward extramarital sex) were associated with increasing diversity of sexual risk behaviors [28]. Compared with global trends, the significant changes in sexual risk behaviors, especially increased commercial sex, low condom use, and early sexual initiation, in China imply increased vulnerability to an HIV epidemic [29]. The HIV/AIDS epidemic continues rising in China, with current government estimates of infected persons exceeding 700,000; and 56.9% of new cases are thought to have been infected through unprotected sex [30,31]. Although injecting drug users and contaminated blood were the major sources of HIV transmission in the past, sexual transmission has rapidly increased and become the dominant source among the new infection cases since 2005 (e.g., 49.8% in 2005) [32,33]. The sharp increases in the prevalence of HIV infection and the proportion of sexual transmission indicate the need for effective prevention and intervention strategy [33–36]. Among emerging social factors facilitating the rapid and continued increase of sexual transmission in China, is the possible role of alcohol consumption. Sexual risk health outcomes related to alcohol use are relatively new in China and thus data regarding the magnitude and the nature of the association are not widely available to inform comprehensive public health policies and programs [37].

We designed this study to systematically review the literature on the association between alcohol use and sexual risk behaviors and outcomes in China and summarize key components of the studies, including location, population, design, and measurement issues. We identify gaps in the existing literature, and suggest directions for future public health research and practices.

Method

Inclusion Criteria

A comprehensive literature search was conducted to identify articles meeting the following criteria: articles published in English or Chinese-language journals from 1980 to 2008, and empirical articles that investigated the association between alcohol consumption and sexual risk behaviors and outcomes in mainland China. Related articles among Chinese populations in Hong Kong and Taiwan were not included in this review because their social contexts and healthcare systems are different from those in mainland China.

Data Source and Presentation

The literature search was conducted in January 2009 using the key words *China, Chinese, alcohol use, drinking, drunk, drunkenness, intoxication, sexually transmitted infections, HIV/AIDS, premarital and extramarital intercourse, sexual violence, sexual coercion, unwanted pregnancy, and commercial sex.* The English publications were searched through PubMed, EBSCO, JSTOR, the Cochrane Database of Systematic Reviews, PsycInfo, and FirstSearch electronic databases. The Chinese publications were searched, using the same key words translated in Chinese, through the Chongqing VIP information (CQVIP) database that covers 1810 core Chinese scientific journals [38]. A total of 35 articles were initially retrieved from the databases. Seventeen of the articles were excluded because of lack of specifics regarding the association between alcohol use and sexual risk behaviors and outcomes. The reference lists of the remaining 18 articles and recent alcohol-related reviews [7–11] were then hand-searched to identify other possible articles, but no additional studies were found. The 18 articles in our review, included seven (five quantitative and two qualitative) in Chinese and eleven (nine quantitative and two qualitative) in English. We grouped and presented 18 articles by categories of sexual risk in the text, with eight (including four qualitative studies) on sexual risk behaviors, five studies on sexual coercion and violence, and six on HIV/STIs, including one article containing both sexual risk behaviors and STIs [39]. All quantitative studies were presented in Table 1 by sample, study design, measures of alcohol use and sexual risk behaviors and outcomes, and main findings.

Results

Alcohol Use and Sexual Risk Behaviors

Four quantitative studies [39–42] and four qualitative studies [43–46] investigated the association between alcohol use and several sexual risk behaviors, including unprotected sex, premarital sex, multiple sexual partners, commercial sex, sex under influence of substance, among drug users, migrants, female sex workers (FSWs) and their male clients, and men having sex with men (MSM).

Two quantitative studies among drug users reported positive associations with relatively large odds ratios (OR) (2.72 and 11.50) between alcohol use and sexual risk behaviors. In a population-based study among a probability sample of 1,153 current drug users (82% men) from drug rehabilitation institutions and communities in one province of southwestern China, Yang et al. [42] reported that taking drug/alcohol during sex was reported by 94 and 21.7% among those with and without unprotected casual sex, respectively, and was significantly

associated with unprotected casual sex in the 30 days prior to the survey (OR, 11.50; $P < 0.01$). Lau et al. [40] conducted a cross-sectional study among a random sample of travelers returning from mainland China to Hong Kong. Among 1,167 men aged 18–30 having used substances in mainland China, 72.5% consumed alcohol before the last episode of substance use. Among those using substance exclusively in mainland China, alcohol consumption was significantly associated with sexual activities (e.g., commercial sex) subsequent to the last episode of substance use (OR, 2.72; 95% confidence interval (CI), 1.41–5.25).

A quantitative study among 2,153 sexually experienced migrants in Beijing and Nanjing reported positive associations with a medium odds ratios (1.30–1.99) between alcohol use and a number of sexual risk behaviors except for unprotected sex [41]. About 34.6% of sexually experienced migrants were intoxicated at least once last month (40.2% males, 23.7% females). Migrants with recent experiences of intoxication during the previous month were more likely to engage in premarital sex (OR, 1.30; 95% CI, 1.02–1.67), have multiple sexual partners (OR, 1.57; 95% CI, 1.07–2.31), purchase sex (OR, 1.88; 95% CI, 1.29–2.74), and sell sex (OR, 1.99; 95% CI, 1.29–3.06). However, there was no significant association between a history of intoxication and unprotected sex (inconsistent use/non-use of condoms) (no OR was reported).

One quantitative study and one qualitative study examined alcohol use and sexual risk behaviors among MSM. Jiang et al. [39] conducted a cross-sectional study of MSM recruited from 10 of the 17 gay bars in 5 cities in Jiangsu Province. Among 144 MSM, 18.2% consumed 5 or more drinks at least once in the past 3 months. Compared with nondrinkers or lighter drinkers, these drinkers were more likely to experience unprotected anal intercourse (OR, 2.32), although the association did not reach statistical significance at the level of 0.05 (95% CI, 0.70–7.70). A qualitative study among focus groups of 15 migrant money boys, defined as male migrants who sold sex to men, and 15 general male migrants in Shanghai reported that migrant money boys drank less alcohol than those of general migrant men, although money boys were more likely to use drugs to enhance sexual drive [44].

Three qualitative studies reported impacts of alcohol consumption on sexual risk behaviors among FSWs and male clients in China. Choi and Holroyd [43] conducted semi-structured interviews with 32 FSWs in a city in southwestern China. They found that some FSWs could not afford to refuse to serve inebriated clients; and FSWs explained their failure to use condoms with inebriated clients as a consequence of alcohol's negative effect on clients' reasoning and the delay of ejaculation. Guo et al.[45] conducted in-depth interviews of 49 male clients of FSWs in Dehong Prefecture, Yunnan province. They reported that drinking before having sex with FSWs was common among male clients; and inebriation was a reason for not using condoms. Zuo et al. [46] conducted in-depth interviews of 47 male clients in a re-education center in Shenzhen, Guang-dong Province. They found that encounters with FSWs were related to drinking in entertainment places.

Alcohol Use, Sexual Coercion, and Violence

Five quantitative studies investigated the association between alcohol use, sexual coercion, and violence among diverse populations, including the general population, women seeking an abortion, FSWs, and students [47–51]. Two quantitative studies conducted among the general population reported positive associations between alcohol use and intimate partner violence (IPV) with odd ratios of 1.26 and 3.09. Guo et al. [47] conducted a cross-sectional study based on face-to-face interviews of community-based sample of 12,044 mothers with a child 6–18 months in 6 cities in Tianjing, Liaoning Province, Henan Province, and Shangxi Province. Sexual violence was the most prevalent form of IPV. According to the study, among those women with abuse experience, 18.0% of women themselves and 78.9% of their husbands used alcohol; among women, drinkers were more likely to be victims of IPV than non-drinkers (OR, 1.75; 95% CI, 1.39–2.20); and among their husbands, drinkers were more likely to be

perpetrators than non-drinkers (OR, 1.26; 95% CI, 1.02–1.57). In a nationally representative sample of adults aged 20–64, Parish et al. [48] reported that 22% of 1,665 women ever used alcohol; and 43% of 1,658 men were inebriated in the previous year. A female drinker was more likely to hit (OR, 2.85; 95% CI, 1.13–7.23) or be hit (OR, 1.68; 95% CI, 1.01–2.78) by her partner; and a male being inebriated in the previous year was more likely to hit his partner (OR, 3.09; 95% CI, 1.56–6.12).

Quantitative studies among women seeking an abortion and FSWs reported positive associations between alcohol use and sexual coercion. In a case–control study among unmarried abortion seekers aged below 22 years in randomly selected hospitals in Changsha, Hunan Province and Dalian, Liaoning Province [49], cases (n = 1137) were those who had ever experienced sexual coercion; and 1,246 controls were those who had never experienced sexual coercion. Alcohol abuse prior to sexual intercourse was more likely to be associated with sexual coercion (17 vs. 3.1%, OR = 3.50, P< 0.001). Among 454 establishment-based FSWs in a rural county, FSWs experienced sex coercion were more likely to report drinking alcohol before having sex with their clients (41.4 vs. 27.2%, P < 0.05) [50].

In a cross-sectional study of 3,910 college students recruited from two universities using stratified clustered sampling in one province [51], alcohol use was defined as at least one time use of alcohol (25 g liquor, 100 ml wine, or 200 ml beer) per month. Alcohol users were more likely to become victims (OR, 2.96; 95% CI, 2.35–3.73) or perpetrators (OR, 1.88; 95% CI, 1.29–2.75) of campus violence, defined as six types of behaviors including verbal and physical sexual assault.

Alcohol Use and HIV/STIs

Six quantitative studies investigated the association between alcohol use and HIV/STIs among MSM, women, and STI patients [39,52–56]. Two quantitative studies among MSM reported an inconsistent association between alcohol use and STIs. In a study among 144 MSM in Jiangsu Province [39], newly acquired STIs were assessed with PCR of urethral swabs for gonorrhea and trachomatis, and assay of blood samples for HIV, syphilis, HBV, HCV, and HSV-2. Heavy drinkers were more likely to experience newly acquired STIs (OR, 2.37), although the difference did not reach statistical significance at the level of 0.05 (95% CI, 0.56–10.03). In a cross-sectional study of 541 MSM in Beijing, Ruan et al. [52] found that 20.7% of MSM drank alcohol at least weekly in the previous 3 months; 14.6% drank more or got high in the previous month; and 3-month drinking rate was 42.1%. Blood assay test was used to diagnose HIV and syphilis. Syphilis infection was associated with drinking alcohol more than weekly in the past 3 months (OR, 1.9; 95% CI, 1.1–3.2), but was not associated with drinking alcohol more or getting high in the past month (OR, 1.1; 95% CI, 0.6–2.0). Drinking alcohol was not associated with HIV infection (no OR was reported).

Zhang [53] conducted a prospective longitudinal study of 16,797 women aged 25–75, who attended a cervical cancer screening program between 1974 and 1985. Alcohol use was assessed by asking if the respondents had they ever used alcohol, the number of drinks per week (0, 1–9, ≥10), and the duration in years of drinking (0, 1–9, ≥10). Compared with abstainers, drinkers had an increased relative risk (RR) for trichomonas vaginalis (RR, 1.56; 95% CI, 1.20–2.03). Compared with abstainers, women who had 1–9 drinks per week experienced the increased relative risk of an incident trichomonas infection (RR, 1.70; 95% CI, 1.30–2.23). However, women who drank 10 or more per week were less likely to experience an incident trichomonas infection (RR, 0.69), although this association did not reach statistical significance at the level of 0.05 (95% CI, 0.22–2.15).

Three quantitative hospital-based case–control studies among STI patients reported positive associations between alcohol use and STIs. Wang and Zhang [54] conducted a study in Huaibei,

Anhui Province. Cases (n = 186) were clinical patients who were diagnosed with Condyloma Acuminata. Clinical patients, who were the same gender and age in the same hospital but not diagnosed with Condyloma Acuminata, served as controls (n = 115). Among cases, 74.3% of men and 21.9% of women drank. Among controls, 53.0% of men and 2.0% of women drank. Among both genders, alcohol users were more likely to report Condyloma Acuminata (P <0.004 for men, P = 0.002 for women). Ou Yang et al. [55] conducted a study of 332 individuals with STIs and 332 controls matched by gender and age in Loudi city, Hunan Province. Drinking alcohol was measured by “more than 5 times per week”, or “more than 100 ml each time”. Alcohol users were more likely to have STIs (OR, 2.68; 95% CI, 2.03–5.90). Zhang et al. [56] conducted a hospital-based case–control study of 150 patients with trichomonal vaginitis and 150 controls at Yingchuan, Ningxia Province. Women with an alcohol abusing partner were more likely to have trichomonal vaginitis (OR, 2.53; P = 0.01); 57.3% of patients reported having a partner who abused alcohol compared to 34.7% of controls.

Discussion

Existing English and Chinese publications included in this review document consistent associations between alcohol use and several sexual risk behaviors, sexual coercion, sexual violence, and HIV/STIs, across both high-risk groups and general populations in China. The association between alcohol use and unprotected sex were inconsistent. Insufficient data and inconsistent associations of alcohol use with sexual risk behaviors or HIV/STIs were reported among MSM. Possible explanations for these inconsistent associations include global rather than event-level assessments [41], and the difficulty in disentangling the potential association between drugs and unprotected sex versus alcohol and unprotected sex. Two studies reported gender difference in the effect sizes of the association between alcohol use and partner violence [47,48], suggesting a potential moderation effect of gender. Taken together, these results suggest that alcohol use is associated with increased and diverse sexual risk across a variety of social groups in China. The findings are consistent with the empirical evidence from Western countries and Sub-Saharan Africa [4,10,15].

This review suggests that alcohol use is an important but under-researched correlate of sexual risk behavior and outcomes in China. Over the past three decades, we were only able to identify 18 articles, concentrated in the 2000s and in large cities in coastal areas in China. These existing studies are limited in number and scope in relation to the measures of alcohol use and sexual risk behaviors and outcomes in China. For example, we did not identify any study on the association between alcohol use and sexual risk in Yunnan Province, one of the major epicenters of the HIV epidemic in China [57,58]. Despite that unwanted pregnancy has been one of the commonly investigated sexual risk among students and young adults in developed countries [7], no study investigated it as an alcohol-related sexual risk in China, except that abortion seekers were the sample in one study in this review [49]. Our review only identified one intervention study with alcohol use as a secondary outcome of sexual risk reduction [56], indicating a lack of intervention approach integrating alcohol use into sexual risk reduction in China. Future investigations, both observational and interventional, are needed in diverse geographic locations, subpopulations, multiple outcomes to assess the alcohol-sexual risk linkage.

This review reveals several limitations in study design in the existing literature. First, cross-sectional or case–control study designs were generally employed to assess the associations between alcohol use and sexual risk. Causal relationships cannot be established based on these retrospective and observational studies. Second, only a few studies used random sampling or demonstrated the representativeness of their samples [40,42,48]. Therefore, potential selection bias of sampling may limit the generalizability of the findings from most of the reviewed studies. Third, although there is a salient gender difference in alcohol use in China [24,25],

only 3 of the 6 quantitative studies that included both genders conducted gender-specific analysis [47,48,54], indicating a lack of consideration of gender-specific associations between alcohol use and sexual risk. Fourth, although three categories of sexual risk could co-occur in most of the social groups, only one of the 18 articles examined two of the three categories of sexual risk [39], with the rest focusing on only single category. Fifth, the current literature is limited with regard to the ability to address confounders and/or modifiers in the relationship between alcohol use and sexual risk.

Several measurement issues in assessing alcohol use and sexual risk in the existing literature deserve attention. First, some studies only utilized general terms of “alcohol use” or “sexual activities” without a clear definition or specification [40,47,54]. The 18 articles included different types of alcohol measurements and lacked appropriate standardization, making it difficult to compare the prevalence or rates of alcohol use across studies. Second, problem drinking (e.g., intoxication) is under-investigated in these studies to differentiate the impact of alcohol use from alcohol abuse and dependence [4]. Third, the findings regarding the inconsistent association between alcohol use and unprotected sex need to be interpreted with caution because they were based on global assessments rather than event-level measures of alcohol use. Only a few quantitative studies (3/14) examined the association between alcohol use and sexual risk in the context of sexual encounter [42,49,50].

To the best of our knowledge, this review is the first effort to systematically synthesize the Chinese and English literature on the association between alcohol use and sexual risk behaviors and outcomes among diverse populations in China. However, this review is subject to several limitations. First, unpublished studies or reports were not included, although they may constitute a large part of the literature related to the topics of this review. Second, we did not synthesize the effect sizes (e.g., OR, RR) across studies due to the heterogeneity in specific measures of alcohol use and sexual risk, target population, and statistics reported.

The findings in the current review have several important research, program, and policy implications in alcohol use and sexual risk reduction in China. First, in response to needs in research on alcohol-sexual risk linkage in China, future study needs to better assess the patterns, situation/context, and consequences of alcohol use. The moderation or mediation effect between alcohol use and sexual risk behaviors and outcomes should consider situational and contextual variables, including alcohol expectancies, conflict, and community [6,7,59,60]. Increasing attention and more research are needed to examine gender-specific association with diverse populations, and culturally appropriate, standard, and event-level measures of alcohol use and sexual risk. The inconsistent findings regarding the associations between alcohol use and sexual risk among Chinese MSM population and between alcohol use and unprotected sex deserve further investigation.

Second, the consistent association between alcohol use and diverse sexual risk (sexual risk behaviors, sexual coercion and violence, and HIV/STIs) make alcohol use an appropriate target of a potentially modifiable risk factor associated with sexual risk. After more than one decade of governmental attention and funding support from external donors on HIV/STI prevention, China needs to attend to this alcohol-sexual risk linkage and integrate alcohol risk reduction in comprehensive prevention program to combat HIV/STI epidemic [17,61]. Researchers, clinicians, and public health workers should consider alcohol-related screening and intervention [62,63] at multiple settings, including schools, universities, clinics, social service agency, and community programs. Incrementally expanding existing service delivery systems to include sexual risk reduction efforts with a component of alcohol risk reduction may increase the effectiveness and efficiency of these services collectively [64]. Culturally competent prevention and treatment programs should consider the needs of alcohol and sexual risk reduction among diverse populations with different ages, education, and socio-cultural

contexts. Cultural adaptation of effective western models and programs on HIV risk reduction has been explored among FSWs [65] and college students [66] in China, and warrant further modification and validation with a consideration of alcohol use.

Third, consistent alcohol-sexual risk associations among both high-risk groups (e.g., FSWs, migrants) and general populations (e.g., students, women) in China call for both alcohol use prevention and risk reduction. These efforts should include population-based education focusing on reducing alcohol use through changes in individual knowledge and attitudes, and an environmental/structural approach through changes in perceived social norms, and public and/or institutional policies, for example, minimum drinking age, increase of alcohol price, and taxation [37,67,68]. Furthermore, tailored programs and policy are needed to target on early initiation of alcohol use among children and adolescents, catching the window of opportunities at home, school, college campus, clinics, and community.

Finally, alcohol use among Chinese women warrants special attention. Women are biologically and socially vulnerable to alcohol problems and sexual risk [4,69–71], especially those in developing countries [72]. Although traditional Chinese culture discouraged use of alcohol by women [73], there has been a dramatic increase in alcohol use among women of all ages in China, especially younger women [24]. Our review identified consistent associations between alcohol use and sexual risk among Chinese women from both general populations and high-risk groups, which indicates harmful drinking-related sexual risk among Chinese women. The findings in our review highlight the importance to strategically develop and enhance research, intervention activities, and policy consideration for alcohol use and its related sexual risk among women in the context of rapid social changes in China.

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Table 1

Summary of 14 quantitative studies on the association between alcohol use and sexual risk behaviors and outcomes in China, 1980–2008

Author	Sample	Study design	Alcohol measures	Sexual risk measures	Odds ratio/relative risk (95% confidence interval)		
					Women	Men	Both
Zhang [53]	16,797 women in Jingan, Jiangxi	LO	Alcohol use	Trichomonas	1.56 (1.20–2.03)		
Cheng et al. [49]	2,383 unmarried abortion seekers, <22, Changsha, Dalian	CC	Alcohol abuse during sexual intercourse	Sexual coercion	3.50, $P < 0.001$		
Zhang et al. [56]*	300 patients, Yingchuan, Ningxia	CC	Partner alcohol abuse	Trichomonas	2.53, $P = 0.01$		
Guo et al. [47]*	12,044 mothers with a young child in 6 cities	CS	Alcohol use of each partner	IPV	V 1.75 (1.39–2.20)	P 1.26 (1.02–1.57)	
Parish et al. [48]	1,665 women and 1,658 men in the nation	CS	Use alcohol (females)	IPV	P 2.85 (1.13–7.23)	P 3.09 (1.56–6.12)	
			Be inebriated last year (males)		V 1.68 (1.01–2.78)		
Lin et al. [41]	2,153 migrants in Beijing, and Nanjing, Jiangshu	CS	Intoxicated ≥1 P1M	Premarital sex			1.30 (1.02–1.67)
				Multiple sexual partners			1.57 (1.07–2.31)
				Purchase sex			1.88 (1.29–2.74)
				Sell sex			1.99 (1.29–3.06)
Wang et al. [54]*	301 patients, Huaibei, Anhui	CC	Alcohol use	Condyloma Acuminata	21.9 versus 2.0% $P = 0.002$	74.3 versus 53.0% $P < 0.004$	
Wang et al. [51]*	3,910 college students in one province	CS	Alcohol use ≥1 monthly	Campus violence including physical sexual assault			V 2.96 (2.35–3.73) P 1.88 (1.29–2.75)
Jiang et al. [39]	144 MSM in Jiangsu Province	CS	Heavy drinking	Unprotected anal sex; STIs: gonorrhea, trachomatis, syphilis, HIV, HBV, HCV, HSV-2		2.32 (0.70–7.70) 2.37 (0.56–10.03)	
Yang et al. [42]	1,153 drug users in one province in southwestern	CS	Take drug/alcohol during sex	Self-reported unprotected causal sex			11.50, $P<0.01$, 82% men
Lau et al. [40]	1,167 young males from Hong Kong	CS	Drink before the last episode of substance use	Sexual activities in conjunction with the last episode of substance use in mainland		2.72 (1.41, 5.25)	

Author	Sample	Study design	Alcohol measures	Sexual risk measures	Odds ratio/relative risk (95% confidence interval)		
					Women	Men	Both
Ou Yang et al. [55]*	664 women in clinics in Loudi city, Hunan	CC	Drinking alcohol (≥5 times weekly or ≥100 ml each time)	Sexually transmitted infections	2.68 (2.03–5.90)		
Wang et al. [50]	454 female sex workers in a rural county	CS	Drink before selling sex	Sexual coercion	41.4 versus 27.2% P <0.05		
Ruan et al. [52]	541 MSM in Beijing	CS	Drink ≥1 times weekly P1M	Syphilis		1.9 (1.1–3.2)	
			Drink more or got high P3M	Syphilis		1.1 (0.6–2.0)	
				HIV		Not significant	

Notes: Studies were presented in the tables in the order of publication years (descending) and authors' names alphabetically

*Studies in Chinese

MSM men having sex with men, *IDU* intravenous drug users, *IPV* intimate partner violence, *P3M* in the past 3 months, *P1M* in past month, *V* Victims, *P* Perpetrators Study design classification: *CS* cross-sectional, *CC* case control, *LO* longitudinal