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Alcohol and Other Drug Use, Partner Violence, and Mental Health Problems Among Female Sex Workers in Southwest China

Chen Zhang,
Rollins School of Public Health, Emory University, Atlanta, Georgia, USA

Xiaoming Li,
Carman and Ann Adams Department of Pediatrics, Prevention Research Center, Wayne State University School of Medicine, Detroit, Michigan, USA

Yiyun Chen,
Carman and Ann Adams Department of Pediatrics, Prevention Research Center, Wayne State University School of Medicine, Detroit, Michigan, USA

Yan Hong,
Department of Social and Behavioral Health, School of Rural Public Health, Texas A&M Health Science Center, College Station, Texas, USA

Qiao Shan,
Carman and Ann Adams Department of Pediatrics, Prevention Research Center, Wayne State University School of Medicine, Detroit, Michigan, USA

Wei Liu, and
Guangxi Center for Disease Control and Prevention, Nanning, China

Yuejiao Zhou
Guangxi Center for Disease Control and Prevention, Nanning, China

Abstract

In this study we investigated the association between mental health problems and negative experience among female sex workers (FSWs) in China. A total of 1,022 FSWs completed a self-administered survey on their demographic characteristics, mental health status, substance use behaviors, and experience of partner violence. We found that alcohol use was independently predictive of mental health problems when both partner violence and illicit drug use were accounted for in the multivariate logistic regression models. The findings underscore the urgent

Address correspondence to Chen Zhang, Global Health Institute, Rollins School of Public Health, Emory University, 1599 Clifton Road, NE, Room 6.406, Atlanta, GA 30307, USA. chen.zhang2@emory.edu.

need for effective alcohol reduction interventions and mental health promotion programs among FSWs in China and other developing countries.

Mental health problems are increasingly recognized as a risk factor for elevated HIV infection among female sex workers (FSWs) by researchers worldwide, as they increase risks of HIV related vulnerability through direct links to several high-risk behaviors including unprotected sex and substance use (Surratt, Kurtz, Chen, & Mooss, 2011; Lau, Tsui, Ho, Wong, & Yang, 2010). However, scholars who conducted research among FSWs have only focused on their sexual risk behaviors (e.g., inconsistent condom use) and the consequences (e.g., sexually transmitted diseases and HIV infection) (Hong & Li, 2008). Only a few researchers have examined the mental health problems among this particularly vulnerable population (Vanswesenbeeck, 2001; Surratt et al., 2011; Lau et al., 2010). Based upon existing studies, we found that FSWs had a higher rate of mental health problems, including depressive symptoms, suicidal behaviors, anxiety, and post-traumatic syndrome disorders (PTSD) compared to the general woman population (Li et al., 2010; El-Bassel et al., 1997; Alegria et al., 1994; Rossler et al., 2010). In a study conducted among Puerto Rican sex workers, Alegria et al. (1994) indicated that 70.1% of them had depressive symptoms. The fact that as high as 35% of FSWs had suicidal ideation and 18.7% of them had attempted suicide in the previous three months were revealed by Shahmanesh et al. (2009) in another study conducted in India.

FSWs are an especially vulnerable population for psychological disorders, as their life is enmeshed with substance use, violent victimization, social or economic vulnerability and other negative events (Surratt et al., 2011). Researchers examined direct and indirect relationships among FSWs' mental health problems and potential risk factors including alcohol use, and drug use as well as the experience of partner violence (Li et al., 2010; Alegria et al., 1994; Boyle et al., 1997). In a longitudinal study, among participants who reported having mental health problems, 64% of them reported having previous or current excessive alcohol consumption, and 19% reported having injection drug problems at some point in their lives (Ward & Day, 2006). Meanwhile, FSWs who reported violence perpetuated by their partners had serious health repercussions including elevated risks of HIV infection, unwanted pregnancy or abortion, depression, substance abuse, suicide and even death (Zhang, et al., in press; Surratt et al., 2011; WHO, 2002).

In global literature, scholars suggest prevalent alcohol use problems among FSWs, especially among women who work in alcohol-serving venues where alcohol use is considered as an integral part of commercial sex (Kumar, 2003; Wojcicki, 2002). FSWs and their clients usually use alcohol as a mean to facilitate sex trades (Li et al., 2010). Alcohol use among FSWs during their sexual encounters is widespread worldwide with 81.2% to 100% of them ever using alcohol (Li et al., 2010). However, most researchers have only examined the pairwise relationship between alcohol use and mental health problems (Li et al., 2010). Few researchers have investigated the associations between alcohol use and psychological problems when other risk factors are also considered. Such data are particularly scarce in developing countries including China.

In the past two decades, there has been a resurgence of commercial sex in China, which was mainly driven by both elevated income disparities and changes of social norms towards sexuality (Hong & Li, 2008; Gil, Wang, Anderson, Lin, & Wu, 1996). The estimated numbers of commercial sex workers ranged from 4 to 10 million. The majority of them worked at either entertainment establishments (e.g., karaoke, night clubs, dancing halls, bars) or personal sectors (e.g., hair salons, massage parlors), with a small portion of "free lances" (Huang, Henderson, Pan, & Cohen, 2004; Hong & Li, 2008). Many scholars have documented a high prevalence of mental health problems, such as depression and suicidal behaviors among Chinese FSWs (Wang et al., 2007; Hong, Fang, Li & Zhao, 2007a; Hong, Fang, Li & Zhao, 2007b), but limited data are available regarding the unique role of alcohol use in mental health problems among FSWs in China in the context of partner violence and illicit drug use. Therefore, our study was designed to examine whether alcohol use is independently predictive of FSWs' mental health problems when illicit drug use and experience of partner violence are both accounted for. Acknowledgement of the association of risk factors and mental health problems among this vulnerable population would help to increase efforts to improve the psychological well-being of FSWs in China and worldwide.

MATERIALS AND METHODS

Participants and survey procedure

We collected the data from two cities (Beihai and Guilian) of Guangxi Zhuang Autonomous Region (Guangxi) from 2008 to 2009. Guangxi is located in southwest China and the two cities are famous tourism spots which attract millions of tourists each year. The flourishing and lucrative tourism industry created a demand for commercial sex. It is estimated that 2,000 FSWs work in more than 150 commercial sex venues in each city (Guangxi CDC, 2009).

Participants in this study were recruited from 60 entertaining establishments (e.g., Karaoke [KTV], bars, mini-hotels, restaurants) and personal service sectors (e.g., hair salons, massage parlors), which represent most known commercial sex venues in Beihai and Guilin. Prior to the data collection, the research team conducted an ethnographic-mapping to identify commercial sex venues in the sampling areas. Upon the completion of the ethnographic mapping, owners/managers or other gatekeepers of these venues were contacted for their permission to conduct research on their premises. Once we obtained permission from the owners or managers, trained outreach health workers from the local CDC approached the women in these venues to ask for their participation. All female workers in these establishments who did not deny the involvement in commercial sex were eligible to participate in the study. A total of 1,022 women agreed to participate, provided written informed consents and completed a self-administered questionnaire. The survey was conducted in separate rooms or private spaces in the venues or sites where participants were recruited. No one was allowed to stay with the participant during the survey except the interviewer who provided the participant with assistance when necessary. The questionnaire took about 45 minutes to complete. Each participant received a small gift with a cash value equivalent to US$4.50 upon the completion of the survey. All procedures of this study were

reviewed and approved by the Institutional Review Boards at Wayne State University in the U.S. and Beijing Normal University in China.

Measures

Participants were asked to provide information on their age, ethnicity, home residency (types of household registration), educational attainment, marital status, length of working in the city (in months), and monthly income (in Chinese currency *yuan*). For the purpose of data analysis in the current study, we categorized ethnicity into Han and non-Han, educational attainment into no more than middle school versus at least middle school, marital status into ever married versus never married, and home residency into rural versus urban. Venues were categorized into four types by the mean income of FSWs at each venue: level one were those venues with mean income higher than 3,000 yuan each month (in this study, only FSWs working in saunas had mean income higher than 3,000 yuan), level two were those venues with mean income between 2,000 to 3,000 yuan (night clubs, KTV, bars, and dancing halls), level three were those venues with mean income between 1,000 to 2,000 yuan (massage parlors, hair salons), and level four were those venues with mean income less than 1,000 yuan (restaurants, mini hotels, and streets). These venues were further classified as alcohol-serving (restaurants, bars, night clubs, and KTV) or non-alcohol-serving venues (mini-hotels, streets, massage parlors, hair salons, and saunas) based on whether alcohol-serving was a part of their routine business practice.

Mental health problems were measured using three indicators: suicidal behaviors, depression, and loneliness. Suicidal behaviors were measured using two items related to suicidal ideation and suicidal attempt (e.g., “had seriously considered killing yourself”; “had tried to kill yourself”). Respondents who answered “yes” to one or both of these two questions were categorized into “ever” having suicidal behaviors and the rest was into “never”. Depression was measured using Center for Epidemiologic Studies Depression Scale (CESD) (Radloff, 1977), which was validated among Chinese populations (Lin, 1989). Using a cut-off score of 16 that was used to identify individuals with an elevated depressive symptom (Roberts & Vernon 1983), we divided participants into two groups: “high depression” (women with CESD score ≥ 16) vs. “low depression” (women with CESD score <16). The Cronbach’s alpha for CESD scale was 0.89 in the current study. Loneliness was measured using the UCLA Loneliness Scale (Russell, Peplau, & Ferguson, 1978). The Chinese version has been validated among populations in China (Wu, et al., 2009). The Cronbach’s alpha was 0.74 with the mean score of 43.30 (ranging from 20-75) for the current study sample. For the purpose of analysis, we divided participants into two groups with the mean score 44 to identify individuals with more loneliness problems (≥ 44).

Alcohol use behavior was measured using the Alcohol Use Disorders Identification Test (AUDIT) (Babor, Biddle-Higgins, Saunders, & Monteiro, 2001; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). The AUDIT has been developed from a World Health Organization (WHO) project with 10 items covering three domains of drinking behaviors (hazardous alcohol use, dependence symptoms, and harmful alcohol use). The Cronbach’s alpha for the 10 AUDIT items was 0.79 for the current study sample. The range of AUDIT score is from 0 to 40 with a higher score indicating a more severe alcohol use problem.

Illicit drug use behavior was measured using a question on their overall drug use “have you ever used illicit drugs? (yes/no)”. The response to this question of drug use was categorized into “never” or “ever”.

Measures of partner violence included violence perpetrated by stable partners and violence perpetrated by clients. Both scales were adapted from the World Health Organization (WHO)’s Women’s Health and Life Experience Questionnaire (WHO, 2003) and previous studies on partner violence in China (Zhao, Guo, Wang, Wu, & Wang, 2006; Zhang et al., in press). The Cronbach’s alpha was 0.85 for the partner violence perpetrated by stable partner scale and was 0.84 for the partner violence perpetrated by clients scale in the current study. For the purpose of data analysis in the current study, responses to ever experiencing partner violence either from stable partner or clients were combined into a single variable (e.g., partner violence) response (“never” vs. “ever”).

Data analysis

First, we employed Chi-square (for categorical variables) and independent t-test (for continuous variables) to assess associations of different mental health problems among FSWs with demographic characteristics, alcohol use, illicit drug use, and partner violence experience. Second, we explored bivariate relationships between mental health problems and explanatory variables. Third, two multivariate logistic regression models were employed to examine associations of alcohol use with each of the mental health problems while other factors were controlled. We used model one to examine the association between alcohol use and mental health problems while controlling for demographic characteristics. In model two, we added “illicit drug use” and “partner violence” as additional factors. Based upon the empirical method employed by previous studies (Sherman & Latkin 2001), only variables whose p-value was less than 0.20 in the bivariate analyses were included into final logistic regression models. To control for potential intra-class correlation by venue due to cluster-sampling, we used random effect modeling. Both unadjusted and adjusted odds ratios (aORs) from the logistic regression models and their 95% confidence intervals (95% CIs) were used to depict the relationships between alcohol use and measures of mental health problems. All statistical analyses were performed using SAS 9.0.

RESULTS

Demographics and risk factors with mental health problems

As shown in Table 1, participants had a mean age of 24.89 (*SD* = 6.67). The majority of them (84.5%) were of Han ethnicity. More than half of the women (55.6%) came from rural areas. The majority (71.8%) was never married and most of them had an education less than middle school (63.9%). The average length of working in the city was 43.98 months (*SD* = 35.81). The mean monthly income was 2,660 yuan (*SD* = 2,350). The income varied considerably among individuals and across different venues: about one third of the FSWs worked in venues with mean income higher than 3,000 yuan per month, half of them worked in venues with mean income between 2,000 to 3,000 yuan each month, and the rest were in venues with monthly income less than 2,000 yuan. Half of them worked in alcohol-serving

venues that had government permits to sell alcoholic beverages as part of their routine business practice.

The prevalence of suicidal behaviors among FSWs was 9.5% (97 out of 1,022). Nearly half of the sample reported depression (501 out of 1,022) or loneliness problems (516 out of 1,022). Mental health problems were significantly associated with age, residency, as well as levels and types of work venues. Specifically, women who were younger, with rural residency, working in lower income-level and alcohol-serving venues were more likely to report mental health problems.

Mental health problems were all significantly associated with alcohol use and illicit drug use behaviors as well as partner violence ($p < .05$). FSWs who reported having alcohol use problems were more likely to report suicidal behaviors, depression and loneliness. Eighteen percent of participants reported having drug use problems. Among FSWs who had drug use problems, 41.2% of them had suicidal behaviors, 22.6% had elevated depressive symptoms, and 21.5% of them reported loneliness problems. About 62% of FSWs had ever experienced partner violence either from their stable partners or clients. Victims of partner violence had significantly higher rates of mental health problems than FSWs who did not report victimization of partner violence ($p < .05$) (Table 1).

Results from bivariate and multivariate logistic regression models

Bivariate logistic regression was used to examine relationships between independent and dependent variables (Table 2). Variables that were significantly and positively associated with suicidal behaviors in the bivariate analyses were alcohol use (OR=1.06, 95% CI=1.04, 1.09), drug use (OR=3.78, 95% CI=2.43, 5.87), and partner violence (OR=2.89, 95% CI=1.70, 4.90). Age was negatively and significantly associated with suicidal behaviors (OR=0.95, 95% CI=0.91, 0.99). Factors positively and significantly associated with depression were alcohol use (OR=1.05, 95% CI=1.03, 1.07), drug use (OR=1.90, 95% CI=1.37, 2.64), partner violence (OR=1.75, 95% CI=1.35, 2.26), home residency (OR=1.30, 95% CI=1.01, 1.67), levels of work venues (OR=1.16, 95% CI=1.00, 1.35), and whether the venues serve alcohol (OR=1.32, 95% CI=1.03, 1.69). Loneliness was significantly and positively associated with alcohol use (OR=1.03, 95% CI=1.01, 1.05), drug use (OR=1.59, 95% CI=1.15, 2.20), partner violence (OR=1.85, 95% CI=1.43, 2.40), home residency (OR=1.30, 95% CI=1.01, 1.67), and whether the venues serve alcohol (OR=1.47, 95% CI=1.15, 1.88); but it was negatively associated with age (OR=0.98, 95% CI=0.96, 0.99) and marriage status (OR=0.68, 95% CI=0.52, 0.90).

All variables with a p-value less than 0.20 in the bivariate analyses were entered into the multivariate logistic regression. As shown in Table 3, alcohol use was a significant predictor for measures of mental health problems including suicidal behaviors and depression after controlling key demographic characteristics (model one). Compared with women without alcohol use behaviors, women who used alcohol were more likely to have suicidal behaviors (aOR=1.06, 95%CI=1.03, 1.09) and elevated depressive symptoms (aOR=1.06, 95%CI=1.04, 1.08), but no significant association has been detected with loneliness symptoms ($p > .05$). By adding “illicit drug use” and “partner violence’ in model two, alcohol use still remained statistically significant in the relationships to suicidal behaviors

(aOR=1.05, 95%CI=1.01, 1.08) and depression (aOR=1.05, 95%CI=1.03, 1.07) (model two). In addition, women who had drug use problems, ever experienced partner violence and worked in lower-income level venues were at higher risks of mental health problems ($p < .05$).

DISCUSSION

In the current study, we found that alcohol use was independently contributing to mental health problems over and beyond the effect of partner violence and illicit drug use among this vulnerable population, which suggested that alcohol-risk reduction interventions could be an efficacious strategy to protect FSWs from mental health problems. Moreover, understanding the dynamics between alcohol use and sex work is a key component to addressing mental health problems among FSWs. Alcohol use may serve as self-medication to cope with constant stressors (e.g., depression) in lives of FSWs, implying a potential vicious circle where alcohol use is associated with mental health problems which in turn is related to future alcohol use problems (Li et al., 2010). Future studies, ideally with a longitudinal design, are needed to examine causal relationships between alcohol use and mental health problems.

However, we did not find a significant association between alcohol use and loneliness in the multivariate regression models. Although we found loneliness having a significant relationship with alcohol use in the bivariate association, such a relationship tended to be weaker than those with other psychopathologies (e.g., depression and suicidal behaviors). It is possible that the association between alcohol use and loneliness was confounded by other variables in the current study. Another explanation could be that alcohol use is a “social activity”, as it is more likely to happen in occasions with involvement of other people or to facilitate social events, people who feel lonely logically tend to use it less in comparison with other drugs which people can use alone or use without any social meaning. More research is needed to better measure and understand the mechanisms through which alcohol use, drug use and other factors may influence FSWs’ loneliness problems.

In addition, we found that women working at the low-tier venues tended to have more severe mental health problems than women working in the higher-level venues. Women working in the bottom of the hierarchy usually are new arrivals to the sex industry with the least assistance available (Choi & Holroyd, 2007; Xia & Yang, 2010). They are more likely to encounter negative life events including experiencing partner violence (Zhang et al., 2011), contracting STD/HIV (Fang et al., 2007), fears of their sex work being discovered by family members (Fang et al., 2007), and financial desperate (Choi & Holroyd, 2007) compared to their peers who work in higher-level venues. Stressors in the life context of FSWs working at lower-tier venues increased their vulnerability of psychosocial disorders.

There are several limitations in the current study. First, our study was conducted in Guangxi, a multi-ethnic region of China. The sample may not be representative of FSWs in other areas of China. Second, we cannot make a casual interpretation of the relationships between psychosocial problems and alcohol use as well as other correlates due to the nature of cross-sectional data. Third, information on some important aspects of FSWs’ life that might be

associated with their mental health status, such as childhood sexual abuse experience (Timko, Sutkowi, Pavao, & Kimerling, 2008), was not available in the current study because of time constraints of the survey. Fourth, due to the illegal and highly stigmatized and marginalized status of the sex work in China, our data were subject to a volunteer bias and socially desirable reporting bias. Fifth, participants in the current study were recruited through venue-based sampling, which might have resulted in under-sampling FSWs who worked on streets or “freelance”.

We extended existing literature by examining the association between alcohol use and mental health problems while controlling several potential confounders in the current study. There are several important implications for future alcohol use reduction interventions as well as mental health promotion programs among FSWs in China and other developing countries. First, health professionals working to reduce mental health problems among vulnerable women may consider incorporating alcohol use/abuse screenings as a routine procedure. Mental health professionals and health workers may identify FSWs who experience problematic drinking by periodical screenings, and can provide them with timely assistance to curb alcohol misuse problems at the initial stage. Second, as FSWs are a very diverse group with heterogeneous needs, we advocate tailored mental health interventions to integrate with existing HIV prevention and health promotion programs. For instance, by attending workshops that train development of coping skills, vulnerable women may deal with stressors they encounter in a more appropriate and strategic way rather than abusing substance including alcohol. Empowerment-based programs are also recommended, as women may have more control over their life if they have alternative job skills by participating capacity-building oriented programs, which would be a benefit for their mental health status (Hong, Fang, Liu, Li, & Tai-Seale, 2009). Third, further alcohol reduction interventions should be designed to focus on FSWs as well as their work places. Interventions targeting venues such as night clubs, bars and KTV may have promising effects as these places are typically where alcohol use as well as work-related stressors frequently occur between FSWs and their clients. Further interventions employing venue-based approach may particularly benefit from creating a supportive social and working environment for this vulnerable group. Fourth, future efforts are also needed to provide this socially marginalized population with accessible, affordable, and non-judgmental mental health services as well as necessary referral sources with long-term support. In addition, developing confidential and flexible community-based outreach programs are urgently needed, especially within resource-limited settings.

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Table 1:

Demographic information among FSWs by mental health problems (N=1,022)

		Suicidal behaviors		Depression		Loneliness	
	Total (N=1022)	**Never (n=925)**	**Ever (n=97)**	**Never (n=501)**	**Ever (n=521)**	**Never (n=516)**	**Ever (n=506)**
DEMOGRAPHICS							
Age	24.89 (6.67)	25.07(6.75)	23.16(5.66) **	24.99 (6.33)	24.79 (6.99)	25.45 (6.73)	24.33(6.57) **
Ethnicity							
Han	84.5%	85.2%	78.4%	85.4%	83.7%	84.5%	84.6%
Non-Han	15.5%	14.8%	21.6%	46.2%	53.8%	15.5%	15.4%
Residency							
Urban	44.4%	44.2%	46.4%	47.7%	41.2%*	46.6%	42.1%
Rural	55.6%	55.8%	53.6%	52.3%	58.8%	53.4%	57.9%
Marital Status							
Never married	71.8%	71.0%	79.4%	69.9%	73.7%	68.0%	75.7% **
Ever married	28.2%	29.0%	20.6%	30.1%	26.3%	32.0%	24.3%
Education							
<=Middle School	63.9%	64.4%	58.8%	62.7%	65.1%	63.4%	64.4%
>Middle School	36.1%	35.6%	41.2%	37.3%	34.9%	36.6%	35.6%
Venue Levels							
Level 1 (more than 3000 yuan)	27.0%	27.6%	21.6%	31.3%	22.8% ***	30.8%	23.1% *
Level 2 (2000-3000 yuan)	57.0%	56.1%	66.0%	52.3%	61.6%	53.1%	61.1%
Level 3 (1000-2000 yuan)	7.2%	7.0%	9.3%	9.0%	5.6%	7.4%	7.1%
Level 4 (less than 1000)	8.7%	9.3%	3.1%	7.4%	10.0%	8.7%	8.7%
Income (1,000 yuan, Mean, SD)	2.66 (2.35)	2.62 (2.29)	3.07 (2.86)	2.69 (2.41)	2.64 (2.30)	2.72 (2.51)	2.61 (2.18)
Length of working (Mean, SD)	43.98 (35.81)	44.05 (35.44)	43.27 (39.35)	43.94 (34.41)	44.01 (37.14)	43.94(35.19)	44.02 (36.47)
Alcohol-serving venues [1]							
Not alcohol-serving venues	48.1%	48.8%	42.3%	51.7%	44.7% *	52.9%	43.3% ***
Alcohol serving venues	51.9%	51.2%	57.7%	48.3%	55.3%	47.1%	56.7%
RISK FACTORS							
Alcohol use (mean, SD)	9.05 (7.36)	8.70 (7.28)	12.33 (7 39) ****	7.69 (6.85)	10.36 (7.60) ****	8.31 (7.24)	9.80(7.42) ***
Drug use	18.1%	15.7%	41.2% ****	13.4%	22.6% ****	14.7%	21.5% ***
Partner violence	62.3%	60.3%	81.4% ****	55.7%	68.7% ****	55.2%	69.6% ****

Notes:

1: Alcohol-serving venues including KTV, Bar, Night club, and Restaurants; Non-alcohol-serving venues include min hotel, streets, sauna, hair salon, and massage parlor;

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*
p<.05

**
p<.01

***
p<.005

****
p<.0001

Table 2:

Bivariate logistic regression on demographic characteristics and mental health problems among FSWs (N=1,022)

	Suicidal behavior		Depression		Loneliness	
	Unadjusted Odds Ratios(95%CI)	**P-value**	**Unadjusted Odds Ratios(95%CI)**	**P-value**	**Unadjusted Odds Ratios(95%CI)**	**P-value**
DEMOGRAPHICS						
Age	0.95 (0.91,0.99)	0.008	1.00 (0.98,1.01)	0.630	0.98 (0.96,0.99)	0.008
Length of work	1.00 (0.99,1.01)	0.838	1.00 (1.00,1.00)	0.973	1.00 (1.00,1.00)	0.971
Had >middle school educ.	1.27 (.83,1.95)	0.270	0.90 (0.70,1.16)	0.426	0.96 (0.74,1.23)	0.726
Ethnicity	1.59 (0.95,2.66)	0.079	1.14 (0.81,1.61)	0.441	0.99 (0.71,1.39)	0.969
Income	1.07 (0.99,1.15)	0.075	1.07 (0.99,1.15)	0.075	0.98 (0.93,1.03)	0.481
Residency	0.91 (0.60,1.39)	0.673	1.30 (1.01,1.67)	0.040	1.30 (1.01,1.67)	0.040
Marriage status	0.64 (0.38,1.06)	0.084	0.83 (0.63,1.09)	0.172	0.68 (0.52,0.90)	0.007
Venue level[1]	0.94 (0.73,1.22)	0.633	1.16 (1.00,1.35)	0.049	1.11 (0.96,1.29)	0.156
Alcohol serving venues[2]	1.30 (0.85,1.98)	0.225	1.32 (1.03,1.69)	0.026	1.47 (1.15,1.88)	0.002
RISK FACTORS						
Alcohol use	1.06 (1.04,1.09)	0.000	1.05 (1.03,1.07)	0.000	1.03 (1.01,1.05)	0.001
Drug use	3.78 (2.43,5.87)	0.000	1.90 (1.37,2.64)	0.000	1.59 (1.15,2.20)	0.005
Partner violence	2.89 (1.70,4.90)	0.000	1.75 (1.35,2.26)	0.000	1.85 (1.43,2.40)	0.000

Notes:

1: **Venue level**: level 1 means that monthly income more than 3,000 yuan; level 2 means that the monthly income between 2,000-3,000yuan; level 3 means that the monthly income between 1,000-2,000yuan; level 4 means the monthly income less than 1,000 yuan.

2: *Alcohol-serving venues* including KTV, Bar, Night club, and Restaurants; Non-alcohol-serving venues include min hotel, streets, sauna, hair salon, and massage parlor.

* p<.05

** p<.01

*** p<.005

**** p<.0001

Table 3:

Multivariate logistic regression models of mental health problems and alcohol use by controlling confounding variables among FSWs

	Suicidal behavior				Depression				Loneliness			
	Model 1[3]		Model 2[4]		Model 1[3]		Model 2[4]		Model 1[3]		Model 2[4]	
	Adjusted Odds Ratios(95%CI)	P-value	Adjusted Odds Ratios(95%CI)	P-value	Adjusted Odds Ratios(95%CI)	P-value	Adjusted Odds Ratios (95%CI)	P-value	Adjusted Odds Ratios (95%CI)	P-value	Adjusted Odds Ratios(95%CI)	P-value
Alcohol use	1.06(1.03,1.09)	0.000	1.05(1.01,1.08)	0.003	1.06(1.04,1.08)	0.000	1.05 (1.03,1.07)	0.000	1.02(1.00,1.04)	0.081	1.01(0.99,1.03)	0.255
Drug use	---	---	2.74(1.69,4.46)	0.000	---	---	1.42 (0.99,2.03)	0.054	---	---	1.25(0.87,1.78)	0.231
Partner violence	---	---	2.48(1.44,4.24)	0.001	---	---	1.68 (1.29,2.19)	0.000	---	---	1.90(1.45,2.47)	0.000
Age	0.97(0.92,1.02)	0.28	0.99(0.94,1.05)	0.785	n/a	n/a	n/a	n/a	0.97(0.95,1.00)	0.090	0.98(0.95,1.01)	0.153
Ethnicity	1.47(0.87,2.50)	0.15	1.38(0.80,2.37)	0.248	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Income	1.07(0.99,1.16)	0.09	1.07(0.98,1.16)	0138	1.01(0.95,1.07)	0.728	1.00 (0.94,1.06)	0.966	n/a	n/a	n/a	n/a
Residency	n/a	n/a	n/a	n/a	1.28(0.99,1.66)	0.062	1.27 (0.98,1.66)	0.066	1.18 (0.91,1.52)	0.214	1.18(0.91,1.52)	0.224
Marriage status	0.95(0.48,1.88)	0.89	0.93(0.46,1.88)	0.831	1.27(0.93,1.75)	0.139	1.22 (0.88,1.70)	0.222	1.33 (0.91,1.97)	0.145	1.35(0.91,2.00)	0.131
Venue level[1]	n/a	n/a	n/a	n/a	1.28(1.07,1.53)	0.006	1.28 (1.07,1.53)	0.007	1.35 (1.12,1.64)	0.002	1.35(1.11,1.65)	0.023
Alcohol serving venues[2]	n/a	n/a	n/a	n/a	1.17(0.87,1.58)	0.288	1.12 (0.83,1.51)	0.469	0.88 (0.65,1.17)	0.374	0.83(0.61,1.11)	0.208

Notes:

1: *Venue level*: level 1 means that monthly income more than 3,000 yuan; level 2 means that the monthly income between 2,000-3,000yuan; level 3 means that the monthly income between 1,000-2,000yuan; level 4 means the monthly income less than 1,000 yuan.

2: **Alcohol-serving venues** including KTV, Bar, Night club, and Restaurants; Non-alcohol-serving venues include min hotel, streets, sauna, hair salon, and massage parlor.3. *Model1:* Y=Demo+AA (**Y:** suicidal behaviors, depression symptoms and loneliness); 4. **Model2:** Y= Demo + AA + PV + drug-abuse (**Y:** suicidal behaviors, depression symptoms and loneliness);

3. *Model1:* Y=Demo+AA (**Y:** suicidal behaviors, depression symptoms and loneliness);

[4] **Model2:** Y= Demo + AA + PV + drug-abuse (**Y:** suicidal behaviors, depression symptoms and loneliness);

* p<.05

** p<.01

*** p<.005

**** p<.0001