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Contextual Influence on Condom Use in Commercial Sex Venues: a Multi-level Analysis among Female Sex Workers and Gatekeepers in Guangxi, China

Yiyun Chen¹, Xiaoming Li², Zhiyong Shen³, Yuejiao Zhou³, Zhenzhu Tang³, and Tania B. Huedo-Medina⁴

¹Department of Psychology, University of Connecticut, Storrs, CT, U.S.A

²Carman and Ann Adams Department of Pediatrics, Prevention Research Center, Wayne State University School of Medicine, Detroit, Michigan, U.S.A

³Guangxi Center for Diseases Control and Prevention, Nanning, Guangxi, China

⁴Department of Allied Health Sciences, University of Connecticut, Storrs, CT, U.S.A

Abstract

This study aims to assess the influence of commercial sex venues on consistent condom use among female sex workers (FSWs) and to examine associations between individual and venue level factors and consistent condom use with clients. Analysis was based on a sample of 637 FSWs and 123 gatekeepers from 51 venues in Guangxi, China. Multi-level logistic regression using Bayesian simulation via Markov Chain Monte Carlo was applied to investigate whether FSWs' individual propensity to use condom with clients was statistically dependent on the venue of working. Multi-level modeling revealed considerable variability across venues in the likelihood of consistent condom use with clients among FSWs. Characteristics at both individual and venue levels helped to explain the observed variation. Certain venue-level factors exerted their influence on condom use over and above the effect of individual-level characteristics. The contextual influence exerted on condom use behaviors among FSWs may imply a potential to harness the path to individual behaviors from a higher and more dominant level, and shed light on the design of more effective sexual risk reduction intervention among venue-based FSWs.

Keywords

condom use; contextual influence; sex workers; China

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Corresponding author: Yiyun Chen, 406 Babbidge Road, Unit 1020, Department of Psychology, University of Connecticut, Storrs, CT 06269 USA, Phone: 860-7710095, star.chen@uconn.edu.

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INTRODUCTION

In the search for factors related to poor health behaviors, an increasing attention has been given to the importance of the connections between individuals and contextual settings which shape individual behaviors (Duncan, Jones, & Moon, 1998). The unequivocal evidence of variation in individual health-related behaviors between different social settings or “context” has led to the acknowledgement of multi-level influences that can be exerted on individual behaviors (Britton, 1990; Macintyre, 1986). The observed variability of behaviors across settings may be accounted for by the characteristics at individual level, and by the “contextual” effect associated with external social and physical environment. The latter effect may arise from extra-individual processes that do not necessarily reflect individual choices (Suzuki, Yamamoto, Takao, Kawachi, & Subramanian, 2012). A comprehensive understanding of contextual level influence on health risk behaviors such as unprotected sex may help to increase the effectiveness of relevant interventions (Wellings et al., 2006).

Venue-based sexual risk reduction among female sex workers (FSWs), a population at elevated risk for infection and transmission of HIV and other sexually transmitted infections (STIs), has aroused much attention in the field of HIV/STIs behavioral prevention (Pitpitan, Kalichman, Eaton, Strathdee, & Patterson, 2013). However in contrast to an increasing evidence that points to the variation in sexual risk behaviors by sex work venues (Safika, Levy, & Johnson, 2013), there has been an apparent paucity of attempts by researchers to explore the contextual influence at venue level (Pitpitan et al., 2013). As sex workers are often affiliated with a commercial sex venue (i.e., venue-based), their behaviors are highly subject to the influence of people who supervise their work (Y. Y. Huang, G. E. Henderson, S. M. Pan, & M. S. Cohen, 2004; Xia & Yang, 2005) and reinforcement by cultural norms within the venue (Hong, Fang, Li, Liu, & Li, 2008). Moreover, the illegality and secrecy of sexual transaction in certain countries further enhanced FSWs’ social isolation and their dependency on the place of work for resources and protection (Chen, Li, Zhou, Wen, & Wu, 2013). Sex work venues, as a result, form an appropriate unit of analysis to incorporate elements that reflect contextual impact on sexual risk among FSWs.

Among contextual level factors identified in sex work venues, the role of gatekeepers has been repetitively proposed as a critical structural element to affect FSWs’ behaviors (Chen et al., 2012; Li, Li, Stanton, Fang, & Zhao, 2010). Gatekeepers in commercial sex industry refer to individuals who manage sex workers, commonly known as madams, managers, bosses, brothel owners or pimps (Yang et al., 2005). They not only act as intermediaries of sex trade, but also as protectors for sex workers (Kerrigan et al., 2003; D. E. Morisky, Chiao, Stein, & Malow, 2005; Zhang et al., 2013). Gatekeepers are the point personnel in a venue that take charge of the complex interactions between FSWs and other relevant social parties (e.g. clients, law enforcement authorities, health professionals, etc.). The highly imbalanced gatekeeper-FSWs-power relationship, consolidated by institutional factors like stigmatization and criminalization, renders gatekeepers with undue control and influence over FSWs. Their attitudes and preference, which could be easily turned into venue-level norms and policies, sits at the core of structural-level factors that exert influence over FSWs’ behavioral choices. Previous studies found FSWs’ perception of gatekeepers’ attitude and support for condom use positively associates with consistent condom use with clients (Li,

Li, & Stanton, 2010). Gatekeepers who provide condoms in the workplace contribute to increased condom use (D. E. Morisky, Stein, Chiao, Ksobiech, & Malow, 2006). In contrast, lack of gatekeeper support and abusive relationships with gatekeepers both interfered with consistent condom use (Yang et al., 2005). However in none of the previous studies, gatekeepers' information was actually obtained directly from gatekeepers. Instead, relevant measures of gatekeepers were retrieved indirectly through FSWs, an approach that may reduce the accuracy of the measures.

In response to the insufficient understanding the contextual influences of sexual risk behaviors among FSWs and the absence of measures from gatekeepers of sex work venues, the current study adopted a multi-level analytical approach utilizing information obtained directly from gatekeepers, to decompose the influence on sexual risk behaviors into corresponding levels. We used a sample of FSWs and gatekeepers recruited in China, a country that has experienced a resurgence of commercial sex since early 1980s along with its economic development. Commercial sex is illegal in China despite the fact that it has grown into a full-blown business. Although sex workers and clients can only be caught "at the scene" according to the law, sex workers are still under threat of periodic strike-down campaign from the government (Tucker, Ren, & Sapio, 2010). While accurate numerations of commercial sex venues and FSWs are not available, the estimated number of FSWs is between 1 to 10 million in China (Hong & Li, 2008; Y. Huang, G. E. Henderson, S. Pan, & M. S. Cohen, 2004).

Based on existing literature regarding contextual influence on personal behaviors, we assume that there will be a substantial variation in sexual risk behaviors across different venues, and such variability can be explained by the personal-level characteristics of FSWs as well as factors operationalized at the venue level. In addition, venue-level factors may exert influence on sexual risk behaviors over and above personal-level attributes. We would test these assumptions by decomposing individual and contextual level influence on FSWs condom use behaviors in the current study.

METHOD

Participants and procedures

Participants were recruited from two famous tourist cities in Guangxi, China. There were an estimated 2,000 FSWs in approximately 150 commercial sex venues in each city. Commercial sex industries in two cities are similar in terms of their size and structure. Our recruitment covered a range of different types of commercial sex settings, including night clubs, hotels, saunas, karaoke, bars, hair salons, and massage parlors. In collaboration with local centers for disease control and prevention (CDC), we used a two-stage convenience sampling strategy. The first stage of recruitment was carried out at the venue level, and after obtaining consent from venue owners and relevant gatekeepers, we continued with second stage recruitment of FSWs within each venue. In proportion to the size of venues, we recruited more participants in certain larger venues such as night clubs and recreational centers that typically have hundreds of FSWs than in other smaller venues (e.g. hair salons, massage parlors, etc.) which usually only have a few to a dozen of FSWs. Participants who consented to participate were asked to complete a self-administered questionnaire, which

was specifically tailored to each group (FSWs or gatekeepers). The survey was carried out in a private room or space at the participating venues and trained interviewers were available to provide assistance upon requests. The interviewers were local CDC staff who had experience in working with FSWs and their gatekeepers. All interviewers received intensive training on research ethics and interview skills prior to the field data collection. The study protocol was approved by the Institutional Review Boards at the Wayne State University and the Beijing Normal University. The original sample consisted of 700 FSWs and 140 gatekeepers from a total of 81 different venues. The analytic approach in the current study requires a match between FSWs and their supervising gatekeepers within the same venue. However among 30 venues which were typically small, data were available only from either the FSWs or the gatekeepers, not the both. This resulted in a matched sample of 637 FSWs (91%) and 123 gatekeepers (88%) from 51 venues, with an average of 10.5 FSWs and 2.4 gatekeepers per venue. Statistical analyses revealed no significant difference in major variables of interests between participants who were excluded due to non-matching and those who were matched and included in the final analysis.

Measures

Individual level (FSWs') factors—FSWs reported their age, alcohol use, condom use frequency, condom use self-efficacy, concerns about condom use, sex-related discussion with clients, norms of condom use, and depression.

Consistent condom use was measured using the question: “How many times did you use condoms during the most recent three sexual intercourses with clients?” Responses range from 0 times to three times. All responses were dichotomized into 1= consistent and 0 = inconsistent condom use. Consistent condom use was defined as using condoms for all 3 times during recent three sexual acts.

Alcohol use was measured using AUDIT-C, a shorter version of the 10-item alcohol use disorder identification test (AUDIT). The three-item AUDIT-C measures the typical frequency and the amount of alcohol use as well as the frequency of binge drinking. AUDIT-C is scored on a 0–12 scale with a higher score indicating a greater extent of alcohol use. A cut-point of 3 is usually used in clinical setting to identify women who are hazardous drinkers or have active alcohol use disorders (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998; DVA, 2010).

Condom use self-efficacy was measured through 10 items (e.g., “I trust myself to be able to discuss condom use with my partner”; “I can persuade my partner to use condoms if he doesn’t want to”; “I can insist on using condom even if under the influence of substance”). Responses were based on a four-point scale (1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree). The final measure was generated by taking the composite score of the 10 items (Cronbach alpha = 0.94).

Concerns about condom use (Cronbach’s alpha=0.87) is a composite score of nine items (e.g., “If I insist on condom use, it will kill the mood”; “if cops find I carry condoms during work, I will be in trouble”; “if I insist on condom use, my client will be displeased”), with the same response option as condom use self-efficacy.

Discussion of sex-related topic with clients was measured by asking FSWs if they had discussed with clients on the following topics: condom use, HIV prevention, prevention of sexually transmitted diseases (STI), previous sex partners they had, other current sex partners they have. Responses to each of the five questions were binary-coded (no=0 or yes=1). The sum of the responses was used as a composite score ranging from 0 to 5 with a higher score indicating more communication between the participants and their clients on sex-related topics.

Descriptive norm of condom use was measured by four items: how many of “sisters” (a common term used by FSWs referring to other FSWs working in the same venue) used condoms with their stable partners; used condom with clients; believed they should use condoms every time when they have sex; believed they should still use condoms even when having sex with an known client. Responses were based on a five-point scale ranged from “none of them” to “every one of them”. The four items has a Cronbach alpha of 0.85.

The Center for Epidemiologic Studies Depression Scale(CES-D) was used to measure depressive symptoms with a higher score indicating a more severe degree of depressive symptoms. For the descriptive purpose, we categorized the final score into three categories: <15, 15–21, and >21 based on an established scoring system (Radloff, 1977). The 20-item scale has a Cronbach alpha of 0.86 for the current sample.

Venue-level (gatekeepers’) factors—Gatekeepers responded to measures of relationship with FSWs, perceived negative impact of FSWs’ condom use on the business of their venue, whether they had ever asked their FSWs to test for HIV/STI, and if they have personally been sought by FSWs in the venue for advice on condom use. Venue-level measures were generated by taking the average of gatekeepers’ responses for each venue if there were more than one participating gatekeepers within a venue.

Relationship with FSWs: Gatekeepers were asked to rate their relationship with FSWs based on 8 different statements (e.g., “I’m on good terms with FSWs”; “FSWs usually follow what I tell them to do”; “I take a good care of FSWs”). Participants responded on a four-point scale ranging from 1=“not true at all” to 4=“very true”. Response to one item (“I only care about profitability.”) was reversely recorded. The sum of scores from 8 items (Cronbach alpha= 0.84) was used as a final score for each gatekeeper with a higher score suggesting a better and closer relationship the gatekeepers had with FSWs.

Perceived negative impact of FSWs’ condom use: Gatekeepers responded on their level of agreement to 9 statements (e.g. if cops find condoms in my venue, I will be in trouble; if FSWs insist on condom use, clients will not be willing to come again; if FSWs insist on condom use, she will earn less money.) with responses ranged from 1= Strongly disagree to 4= Strongly agree. A sum of total scores from the 9 items (Cronbach alpha=0.92) was generated for each gatekeeper with a higher score indicating more perceived negative impact of FSWs’ condom use.

Being sought by FSWs for advice on condom use, and encouraging HIV/STIs testing among FSWs were each measured by one question. Gatekeepers indicated if any FSWs in the venue

had ever asked them for advice on condom use and if they had asked their FSWs to undergo HIV/STI testing on a regular basis. They responded either yes=1 or no=0 to each question.

Analytic approach

Descriptive analysis—We presented description of each relevant variable by the FSWs' frequency of condom use with clients. We categorized age into four groups (<20, 20–25, 25–30, and >30), alcohol use into two groups (none or low risk drinking, and hazardous drinking), and depression score into three groups (<15, 15–21, and ≥21) for descriptive purpose. Group difference was examined by Pearson Chi-squared test with Rao and Scott correction for categorical variables, or adjusted Wald F-test for continuous variables. Both tests were chosen to take care of the clustering nature of the data. Age, income and alcohol use were presented as categorical variables in the descriptive analysis for the ease of interpretation. Descriptive analysis was performed in STATA version 12 (StataCorp, 2011).

Multilevel modeling—Following descriptive analysis, we presented bivariate associations between variables and consistent condom use, expressed by unadjusted odds ratio with 95% credible intervals estimated using Bayesian simulation via Markov Chain Monte Carlo, with a non-informative prior probability distribution. All major study assumptions were then tested in three models, through multilevel multiple logistic regressions with Bayesian estimation. The first model is a variance component model, also known as the “empty” or null model (model 1). This model allowed us to detect the existence of a potential contextual dimension for consistent condom use. Thereafter, we included the individual characteristics in the model (model 2) to detect for the individual-level characteristics that may explain variability in condom use. As a final step of our analysis, we included measures from gatekeepers (model 3) to investigate the degree to which venue-level characteristics could explain the residual variability in FSWs' condom use. All predictors were kept in their continuous form in regression analysis. Model convergence was confirmed through diagnostic plots and potential scale reduction (PSR) convergence criterion (Gelman & Rubin, 1992). Relevant information is available upon request to the first author. Multilevel analyses were performed in both MLwiN, version 2.27 (Browne, 2012) and Mplus version 7 (Muthén & Muthén, 1998–2010) to check for consistency.

RESULTS

Sample description and bivariate associations

A detailed description of individual- and venue-level characteristics was presented in Table 1. No apparent difference in age composition was found by the frequency of recent condom use. For both inconsistent and consistent condom users, there were younger FSWs below age 25. The proportion of hazardous drinkers was significantly higher among inconsistent condom users. Consistent condom users appeared to have higher condom use self-efficacy, engage in more discussion with clients on a variety of sex-related topics, and perceive stronger norms of condom use. Between 35–45% of FSWs reported mild to major depression with no difference being found between inconsistent and consistent condom users. Consistent condom users are more likely to come from venues where gatekeepers on

average reported a better relationship with their FSWs, and where more gatekeepers reported that they have been sought by FSWs for advice on condom use.

Multilevel analysis

The contextual dimension of recent consistent condom use with clients was obtained in the null model (model 1). As shown in Table 2, 31% of total individual differences in consistent condom use were attributable to the difference between venues. The median odds ratio (MOR) of 3.19 with a 95%CrI (2.14–5.06) indicates that the median likelihood of consistent condom use would increase by 3.19 times if FSWs moved from a venue where the probability of consistent condom use was lower to one where the probability was higher.

Venue-level difference in probability of consistent condom use may be attributable to the differences in the individual composition of venues. The inclusion of individual characteristics in model 2 led to a 75.8% drop in venue-level variance of consistent condom use, indicating that two-thirds of the variance in the probability of consistent condom use across venues was attributable to individual level difference within venues. However, the residual heterogeneity between venues (MOR=1.77) was of greater relevance to condom use than was the impact of any individual level variables in the model. It appears that the odds of consistent condom use were lower for elder FSWs within a venue (AOR: 0.96, 95%CrI: 0.92–0.99), as well as for FSWs who engaged in more alcohol use (AOR: 0.82, 95%CrI: 0.76–0.88), and for those who expressed more concerns over the potential costs of condom use (AOR: 0.95, 95%CrI: 0.91–1.00). On the other hand, the odds of consistent condom use appeared higher for FSWs who reported more discussion with clients on various sex-related topics (AOR: 1.25, 95%CrI: 1.12–1.40), and those who perceived a stronger peer norm of condom use within a venue (AOR: 1.18, 95%CrI: 1.12–1.26). The effects of individual-level variables on condom use remained almost the same after adjusting for venue-level characteristics.

Venue-level disparities in consistent condom use were further reduced with the inclusion of venue-level characteristics in the final model. Only 2.5% of variance persisted with a MOR highly proximal to the value one (MOR=1 indicates an absolute absence of venue-level differences). Also of note is that venues where gatekeepers held a better relationship with FSWs appeared to have better odds for having more consistent condom users (AOR: 1.18, 95%CrI: 1.05–1.32). So were the venues with more gatekeepers reported being sought by FSWs for advice on condom use (AOR: 2.49, 95%CrI: 1.09–5.06). FSWs from venues where more gatekeepers have advised FSWs to get HIV/STI testing were three times more likely to use condom consistently than those from venues where HIV/STI testing was less recommended by gatekeepers (AOR: 3.00, 95%CrI: 1.01–6.67).

Unlike individual level characteristics, the fixed effect of venue-level characteristics cannot be interpreted in a venue-specific manner and therefore would need to be considered along with the magnitude of venue-level residual variations (Larsen, Petersen, Budtz-Jorgensen, & Endahl, 2000). Based on suggestions from previous literature, we adopted 80% interval of odds ratio (IOR-80) to integrate venue-level fixed effect with random variations at the venue-level (Larsen & Merlo, 2005). As was shown from the results, the IOR-80 for gatekeepers' relationship with FSWs comprised the value one, implying that the effect of

gatekeepers' relationship on condom use was not strong enough to be distinguished from the cacophony of "noise" at the venue-level. In contrast, the IOR-80 for being sought for advice and requiring HIV/STD testing clearly excludes value one, indicating that the associations found between the two variables and consistent condom use were strong enough to be noticeable when compared with the remaining residual heterogeneity at the venue-level.

DISCUSSION

Given commercial sex is an illegal industry in China, the regulation of each venue largely depends on gatekeepers of the venue and their personal preference (rather than any "formal policy"). Rules and regulations in a venue are typically unwritten and informal in this essentially illegal and thus less regulated industry. Sex work venues are often operated on norms that are largely shaped by gatekeepers' personal attitudes and values. And venue-level policies are a demonstration of gatekeepers' personal perception. Therefore, gatekeepers-related variables could form contextual level influences over FSWs.

This study demonstrates that choices of condom use among FSWs were not only affected by individual characteristics but also subject to influences embedded in the entertainment venue. Venue-level factors may explain FSWs' condom use behaviors over and above individual-level characteristics. Findings from the study revealed a strong contextual-level influence on sexual risk-taking among FSWs and provided implications for interventions on sexual risk reduction in sex work venues.

The relationship between age and condom use has been discussed in previous literature of FSWs in developing countries. Some studies found older FSWs were more able to negotiate with clients or decline unprotected sex (Bharat, Mahapatra, Roy, & Saggurti, 2013), but other researchers have found that older age was associated with an elevated inconsistent condom use with irregular partners (Tran, Detels, & Lan, 2006). The current study documented an interesting change in the direction of the association between age and consistent condom use. Age appeared to be positively, albeit not significantly, associated with consistent condom use in unadjusted analysis. Yet older FSWs turned out to be less likely to use condom consistently once we controlled for other sample characteristics. The change of association detected in the current study and controversial findings in previous literature may suggest a possible multi-faceted role that age plays on condom use behavior among FSWs. Alternatively it could also suggest that the role of age in condom use needs to be understood in the context of other individual and environmental characteristics. Future research is needed to further look into this issue.

Many studies have reported alcohol use as a risk factor for inconsistent condom use (Heravian et al., 2012; Li, Li, & Stanton, 2010). This study also provides evidence to support similar findings. In addition, the novelty of the current study lies in its examination of the relationship between alcohol use and condom use within the context of sex work venues. Other researchers have found that alcohol use among FSWs may itself be susceptible to contextual level influence from gatekeepers (D. Morisky, Chiao, Ksobiech, & Malow, 2010). A combination of previous evidence and the current finding depicts an urgency to address the issue of alcohol use in commercial sex venues. More multi-level

studies are needed to explore the potential impact of venue-level characteristics on alcohol use among FSWs in order to design interventions to reduce alcohol use and undermine the negative impact of alcohol use on sexual behaviors in the context of sex work venues.

Inconsistent condom use was shown to be associated with a series of factors among FSWs, including potential loss of income, violence from clients, and deprivation of social support (Choi & Holroyd, 2007). These consequences foreshadow an inauspicious situation which makes it rather difficult for FSWs to insist on condom use. Indeed, the findings in the current study support such an assumption. FSWs who expressed more concerns over negative consequences of condom use were less likely to use condoms consistently in the study. Given a prevalent repulsion among male clients against condom use (Chen et al., 2012) and an unbalanced power relationship between gatekeepers and FSWs (Choi & Holroyd, 2007), such a finding was not unexpected. As clients play a dominant role in making decisions of condom use during commercial sex, interventions to reduce negative reactions from clients due to FSWs' insistence on condom use shall be considered as a potential approach to improve condom use in commercial sex settings.

Relationship between gatekeepers and FSWs (G-F relationship) is a critical element in the organizational structure of commercial sex in China (Y. Y. Huang et al., 2004; Xia & Yang, 2005). The current study represents one of the first attempts to quantify the G-F relationship from the perspective of gatekeepers. The effect of perceived G-F relationship on FSWs' consistent condom use with clients manifested the crucial role of a good G-F relationship in the effort of reducing sexual risk among FSWs. Since a better G-F relationship may also help generate a favorable climate within venues, health workers could take advantage of this possibility in generating motivations for gatekeepers to participate in intervention programs.

We also found that FSWs working in venues where gatekeepers had advised them to undergo HIV/STI testing were high likely to use condom consistently. Perceived gatekeepers support for condom use, as was found in some previous studies, is positively associated with condom use among FSWs (Hong et al., 2008; Li, Li, Stanton, et al., 2010; Yang et al., 2005). But the current finding pushes the boundary of knowledge slightly further by implying that gatekeepers' encouragement of HIV/STI testing in the venue could also improve consistent condom use among FSWs. We speculate that being advised by gatekeepers to test for HIV/STI could promote awareness of sexual health among FSWs and lead to an increase in condom use. Although this assumption would require validation by future studies, the finding at least highlights the extent of influence that gatekeepers may have inside venues, and shed light on the potential of implementing structural HIV intervention in sex work venues (Sumartojo, 2000).

A related finding in the current study is that FSWs were more likely to use condoms if they worked in venues where more gatekeepers reported to have been consulted by FSWs on condom use. This finding could either reflect a supportive attitude of condom use among gatekeepers or a higher awareness of condom use among FSWs in the venue or both. According to a qualitative study, keeping a healthy and attractive workforce is in the best interest of gatekeepers (Hong, Zhang, Li, Zhou, & Guo, 2014). But health promotion interventions often face strong objection due to potential interference with gatekeepers'

financial interest (Chen et al., 2012). Future intervention efforts therefore need to take gatekeepers' business interests into consideration in order to take advantage of their unique influence over protective health behaviors (such as consistent condom use) among FSWs. And more studies could be used to examine a potential reciprocal relationship between gatekeepers' attitude on condom use and FSWs' awareness of condom use.

Findings from this study may be interpreted with cautions because of some potential limitations. First, data presented in the study were cross-sectional and therefore none of the associations found in the study should be interpreted as causal. Second, the study used a convenient sample of FSWs and gatekeepers which may reduce the generalizability of the findings to other FSWs populations. Third, measures used in the current study are self-reported and thus their validity and accuracy could be undermined by social desirability and recall bias. Despite these limitations, the study findings strongly suggest the existence of contextual level influence of consistent condom use among FSWs in commercial sex venues and provide useful implications to the design of venue-based interventions on sexual risk reduction among FSWs.

CONCLUSION

The study used multi-level analysis to evaluate the relevance of commercial sex venues for understanding FSWs' individual propensity of condom use, and to investigate individual characteristic that are relevant to condom use within a given venue. This is also one of the first quantitative studies that used measures directly from gatekeepers to assess venue-level influence on FSWs sexual risk behaviors. The study findings portray the influential factors at different level within the context of commercial sex that can exert impacts on sexual risk behaviors, and provide data that can inform the design of venue-based interventions of sexual risk reductions among venue-based FSWs.

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Highlights

- We modeled on information retrieved directly from sex workers and gatekeepers.
- We examined the multi-level associations between sexual risk and relevant variables.
- Sexual risk behaviors varied significantly across different venues.
- Venue-level factors explained sexual risk beyond the impact of individual factors.

Table 1

Description of individual and venue level characteristics by FSWs' condom use status with clients in recent 3 times of sexual interactions

	Inconsistent condom users (n=193)	Consistent condom users (n=480)	p-value	Unadjusted OR [95% CrI]
Individual-level (FSWs') characteristics				
FSWs' age (% , n)			0.145	1.00 [0.98–1.04]
15–20	36.00(63)	64.00(112)		
20–25	28.76(65)	71.24(161)		
25–30	22.22(30)	77.78(105)		
>30	22.22(30)	77.78(105)		
AUDIT-C scoring ranges (% , n)			<0.001	0.85 [0.79–0.90]
<3 (none or low risk drinking)	17.19(44)	82.81(212)		
3 (hazardous drinking)	36.05(146)	63.95(259)		
Condom use self-efficacy [10–40] (Mean, SD)	28.66 (5.57)	31.27(5.35)	0.022	1.08 [1.04–1.12]
Concerns about condom use [9–36] (Mean, SD)	20.73(4.58)	19.62(4.82)	0.007	0.96[0.92–0.99]
Sex-related discussion [0–5] (Mean, SD)	2.45(2.07)	3.59(1.62)	<0.001	1.35 [1.21–1.50]
Descriptive norm [4–20] (Mean, SD)	13.40(4.25)	16.36(3.62)	<0.001	1.19 [1.14–1.23]
CES-D scoring range (% , n)			0.209	0.97 [0.95–0.99]
<15 (no depression)	25.87(104)	74.13(298)		
15–21 (mild to severe)	34.82(39)	65.18(73)		
21 (possibly major)	31.45(50)	68.55(109)		
Venue-level (Gatekeepers') characteristics (Mean, SD)				
Perceived negative impact of FSWs' condom use [9–36]	14.32(3.24)	15.14(4.43)	0.183	1.11 [0.98–1.22]
Relationship with FSWs [8–32]	23.31(2.18)	24.23(2.30)	0.040	1.02 [0.85–1.28]
Being sought for advice on condom use by FSWs [0–1]	0.56(0.33)	0.65(0.33)	0.053	4.14 [1.07–11.33]
Encourage HIV/STI testing among FSWs [0–1]	0.80(0.24)	0.85(0.27)	0.359	2.08 [0.29–5.77]

Table 2

Measures of association and variation between characteristics on individual and venue-level and FSWs' recent consistent condom use with clients, obtained from multilevel logistic models

	Variance component model	Model with individual level variables	Model with venue-level variables	
Measures of association	AOR [95% CrI]	AOR [95% CrI]	AOR [95% CrI]	[80% IOR]
<i>Individual-level (FSWs') variables</i>				
Age		0.96 [0.92–0.99]*	0.95 [0.91–0.99]*	
Alcohol use (AUDIT-C)		0.82 [0.76–0.88]*	0.84 [0.78–0.91]*	
Self-efficacy		1.04 [1.00–1.09]	1.04 [0.99–1.09]	
Concerns for using condoms		0.95 [0.91–1.00]*	0.95 [0.90–0.99]*	
Sex-related discussion with clients		1.25 [1.12–1.40]*	1.24 [1.10–1.40]*	
Descriptive norm		1.18 [1.12–1.26]*	1.19 [1.12–1.26]*	
CES-D		0.99 [0.96–1.01]	0.98 [0.95–1.00]	
<i>Venue level (Gatekeepers') variables</i>				
Perceived negative impact of FSWs' condom use			1.05 [0.99–1.13]	[0.64–1.72]
Relationship with FSWs			1.18 [1.05–1.32]*	[0.72–1.93]
Being sought for advice on condom use by FSWs			2.49 [1.09–5.06]*	[1.41–3.76]
Encourage HIV/STI testing among FSWs			3.00 [1.01–6.67]*	[1.64–4.38]
Measures of venue-level variation				
Venue level variance (95% CrI)	1.477 (0.638–2.891)	0.358 (0.013–1.045)	0.083 (0.001–0.469)	
PCV		–75.8%	–76.8%	
MOR(95% CrI)	3.19 (2.14–5.06)	1.77 (1.03–2.65)	1.32 (1.03–1.92)	
ICC	0.310	0.098	0.025	

AOR=adjusted odds ratio; CrI=credible interval; IOR=interval odds ratio; PCV= proportional change in variance; MOR=median odds ratio; ICC= intraclass correlation.

* Significant AOR based on 95% CrI.