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## Joint effects of alcohol and stimulant use disorders on self-reported sexually transmitted infections in a prospective study of Cambodian female entertainment and sex workers

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### Abstract

Female entertainment and sex workers (FESW) have high rates of alcohol and amphetamine-type stimulant (ATS) use, increasing risk for HIV/sexually transmitted infections (STI), and other negative outcomes. A prospective cohort of 1,198 FESW in a HIV/ATS use prevention intervention in Cambodia was assessed for alcohol and stimulant use disorders (AUD and SUD) using the Alcohol and Substance Use Involvement (ASSIST) scale. STI history was measured by self-report at baseline and at quarterly follow-up visits. Participants were asked if they had been diagnosed with an STI by a medical provider in the past 3 months. Marginal structural models were used to estimate joint effects of AUD and SUD on recent STI. At baseline, one-in-four screened AUD positive and 7% screened positive for SUD. At 18-months, 26% reported 1 recent STI. Accounting for time-varying and other known confounders, the adjusted odds ratio (AOR) for recent STI associated with AUD alone and SUD alone were 2.8 (95% CI: 1.5–5.1) and 3.5 (95% CI: 1.1–11.3), respectively. The AOR for joint effects of AUD and SUD was 5.7 (95% CI: 2.2–15.2). AUD and SUD are independently and jointly associated with greater odds of STI among Cambodian FESW. Further research is critical for understanding how AUD and SUD

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potentiate biological and behavioural pathways that influence STI acquisition and to inform HIV riskreduction interventions in FESW.

## Keywords

Sexually transmitted infections; sex workers; drug users; sexual behaviour; women; risk factors

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## Introduction

While significant progress has been made in reducing the HIV epidemic in Cambodia,<sup>1</sup> some populations remain at high risk, notably women working in the entertainment and sex work sectors.<sup>2,3</sup> In Cambodia, women engaged in high-risk and transactional sex are a heterogeneous group working in variety of environments and venues, whom collectively can be referred to as female entertainment and sex workers (FESW). HIV prevalence in Cambodian female entertainment and sex workers (FESW) decreased from 23% in 2007 to 9% in 2009, which could be attributed in part to effective HIV prevention interventions, but also to increasing challenges associated with reaching women at increased risk of HIV infection.<sup>2,3</sup> In 2008, the Cambodian sex work landscape underwent major changes with the implementation of new anti sex-trafficking and sexual exploitation laws, greatly impacting FESW. Following the passage and implementation of the ‘Law on Suppression of Human Trafficking and Sexual Exploitation’, brothel-based sex work was banned, and the most direct effect was on direct sex trade, which went ‘underground’, or women moved into indirect work.<sup>3,4</sup> Brothels were closed, as transactional sex was illegal, and many women were forced to engage in ‘hidden’ sexual transactions in streets and parks or in entertainment venues, such as clubs and karaoke bars.

FESW have high rates of alcohol consumption and drug use, which can lead to increased sexual risks, exposure to violence, HIV and STI acquisition, and other negative health outcomes.<sup>5-7</sup> In Cambodia, FESW frequently work in entertainment settings, including bars, clubs, beer gardens and karaoke venues, where alcohol consumption is prevalent.<sup>3,6,8</sup> Alcohol is often part of sexual transactions and consumed by both FESW and their male clients before sexual intercourse.<sup>9-11</sup> According to global literature, prevalence of daily alcohol consumption by FESW ranges from 12–78%.<sup>5</sup> Alcohol use in FESW, especially before sex with clients, has been associated with negative outcomes, including unprotected sex, violence victimization and higher risk of HIV and STI acquisition.<sup>10,12-14</sup> In previous studies, we found that self-reported unhealthy alcohol use was prevalent among Cambodian FESW: 24% reported being drunk for more than 20 days in the month prior to interview.<sup>2</sup> In another more recent study conducted in Cambodia, unhealthy alcohol use, including risky drinking and alcohol-use disorders,<sup>15</sup> was reported by 85% of the FESW and by 47% of their male sex clients.<sup>8</sup> The high prevalence of unhealthy alcohol consumption in sex work venues could potentially fuel transmission of HIV and STI in Cambodia.

Research has also identified drug use and, in particular, amphetamine-type stimulant (ATS) use as a serious problem associated with HIV risk among FESW in Southeast Asia<sup>16-21</sup> which threatens to reverse downward trends in HIV infection rates in the region. ATS use

has been associated with risky sexual behaviors and incident HIV and STI in many groups, including FESW.<sup>22-26</sup> In Cambodia, our group found 26.3% of FESW reported recent ATS use (last 3 months).<sup>21</sup> ATS use among Cambodian FESW was also associated with having a higher number of sex partners, incident STIs and experience of violence.<sup>21,27</sup> In Vietnam, hepatitis C, HIV, and STI-risk increased with the use of non-injection drugs, specifically amphetamine-type stimulants.<sup>17,28-31</sup> In China, drug-using FESWs had substantially higher HIV and STI prevalence.<sup>32-34</sup>

Taken together, alcohol consumption and ATS use have important negative health consequences for FESW, including increased sexual risk behaviors and experiencing violence victimization, which increase exposure to HIV and STI acquisition. Concomitant risk factors including depression, exposure to violence, and characteristics of sex work venue have been suggested as potential mediators in the relationship between substance use, and risky sexual behaviors and risk of STI acquisition.<sup>21,27,35</sup> Furthermore, risk factors such as depression and exposure to violence are associated with having a history of prior alcohol consumption or drug use.<sup>36,37</sup> Most studies have looked at the effects of alcohol and drug use on HIV and STI transmission separately and without considering concomitant risk factors. We hypothesized that both time-varying levels of alcohol and ATS use are subject to time-varying confounding and likely affected by prior exposure (Figure 1). Therefore, unbiased estimation of the joint effects of the alcohol and ATS use on STI acquisition likely requires the use of joint marginal structural models. We examined the joint effects of alcohol and ATS use on recent STI infection in FESW in 10 provinces in Cambodia. We hypothesized that FESW with alcohol use disorder (AUD) will have higher rates of recent STI infection and that concomitant ATS use disorder (SUD) will further increase rates of STI infection.

## Methods

### Study setting

Data for the present study were obtained from 1,198 FESW enrolled in a cluster randomized stepped-wedge trial of an HIV and ATS use prevention intervention conducted in 10 provinces in Cambodia (Phnom Penh, Battambang, Banteay Meanchey, Siem Reap, Kandal, Kampong Spueu, Kampong Chhnang, Kampong Cham, Sihanouk, and Pailin). The Cambodian Integrated HIV and Drug Prevention Implementation program (CIPI) study was implemented within an existing HIV-prevention program targeting FESW called “SMARTgirl”.<sup>38</sup> Detailed descriptions of both the study and intervention protocol are described elsewhere.<sup>39,40</sup> Data were collected at outcome assessment visits conducted at baseline, and every 6-months for a period of 18 months from June 2013 to November 2016. The study received ethical approvals from the Cambodian National Ethical Committee, University of California at San Francisco, University of New Mexico and FHI360.

### Study population, recruitment and data collection

Eligibility criteria for study participation were: (1) being biologically female; (2) age 18 years; (3) reporting 2 different sexual partners and/or transactional sex within the last month; (4) understanding spoken Khmer language; and (5) able to provide voluntary

informed consent. Participants were paid US\$4 at the 6- and 12-month follow up visits, and US\$8 at the 18-month visit. Remuneration of US\$2 was offered for transportation, and refreshments and condoms were provided at all visits.

Participants were recruited in multiple venues including SMARTgirl clubs, entertainment establishments (karaoke bars, beer gardens, nightclubs, massage parlors), as well as other sex work venues (brothels, streets, parks and guest houses). Trained outreach workers described the study, answered questions, and invited interested women to attend the local study site to participate in the study. Eligibility screening was conducted at the local study site, usually a SMARTgirl Club. The intervention consisted of a 16-week conditional cash transfer and aftercare program delivered to women who screened positive for an ATS use disorder (i.e., moderate or high risk on this ASSIST *and* were positive on urine toxicology screening (ATS Tox+).<sup>39</sup> A recruitment target of 120 women per province was set for baseline with an expected intervention eligibility rate of 25%. The study was powered to detect between small and medium effect sizes according to Cohen's guidelines.<sup>40,41</sup>

A total of 1198 women completed the baseline assessment and 257 enrolled in the intervention. Up to 600 FESW were resampled from the baseline (preintervention) sample for follow-up assessments conducted at 6-months, 12-months, and 18-months. All intervention participants and convenience sample of 300 non-intervention participants were targeted for follow-up assessments. All assessment visits were included in the present analysis.

## Measures

At baseline, women completed an interviewer-administered structured behavioural questionnaire covering socio-demographic factors including age, number of years of school completed and marital status. Women were also asked to report the number of days working as brothel-based, freelance, or entertainment-based sex workers in the past month. The primary sex work venue was then categorized as entertainment-based or brothel/freelance. Women were asked whether or not their workplace required drinking alcohol with customers. Sexual risk measures included number of sexual partners and number of new sexual partners in the past 3 months. Participants also provided a self-collected vaginal swab to measure prostate specific antigen (PSA) using OneStep ABACard® p30 rapid PSA test (Abacus Diagnostics, Inc., West Hills, CA) as an indicator of recent unprotected vaginal sex.<sup>42</sup> Inconsistent condom use was measured by self-report for the last 3 paying and non-paying sexual partners as well as a positive PSA test. For the purposes of multivariate modeling, condom use with paying partners was classified as 'always protected' for women reporting no paying partners. Women were also asked if they or their partner used ATS prior to or during sex with the last 3 partners. Alcohol and ATS use disorders (AUD and SUD) were assessed using the World Health Organization (WHO) Alcohol and Substance Use Involvement (ASSIST) scale.<sup>43</sup> The ASSIST scales for alcohol use disorder and stimulant use disorder had scores ranging from 0–27, and were categorized into the following risk categories, (low risk: <4, moderate risk: 4–26, and high risk: 27). In the present analysis AUD and SUD were defined as high risk (27+) vs. low or moderate risk (0–26). Recent STI was self-reported and measured as "Has a doctor, nurse, or other health care provider

told you in the last 3 months that you had a Sexually Transmitted Disease (STD) or infection?” Self-reported HIV status was assessed separately from self-reported STI and HIV test results were made by linking identifiers with the national surveillance data.<sup>44</sup> The WHO Multi-Country Study of Women’s Health and Domestic Violence was used to assess recent exposure to sexual and physical violence.<sup>45</sup> Psychological distress was assessed with the K10 Kessler Psychological Distress scale.<sup>46</sup> Measures of economic wellbeing included self-reported monthly income, debt, housing instability, and food insecurity. Food insecurity was defined as reporting “sometimes”, “always”, or “usually” to “having no food to eat of any kind in your household because of lack of money or resources to get food in the last 3 months” (adapted from<sup>47</sup>). Housing instability was measured as “in the past 3 months, how often were you worried about having a place to stay for you or your family because of lack of resources or money for housing?” (adapted from<sup>48</sup>). Women were asked if they had a debt they were working to pay off. Participants completed the behavioral questionnaire and the PSA testing at baseline and six-month follow-up assessments.

### Statistical analyses

Behavioral and health characteristics were assessed with frequencies and percentages for categorical variables and medians and interquartile ranges for continuous variables. Comparisons between groups were performed with the Chi-square test for categorical items and the Kruskal-Wallis test for continuous items.

Three logistic regression models were estimated: crude, adjusted, and a weighted marginal structural model (MSM). The marginal structural model was used to estimate the joint effects of AUD and SUD on self-reported STI in the past 3 months. We accounted for the impact of potential informative censoring occurring when participants were lost-to-follow-up due to reasons related to the study using inverse probability of censoring weighting methods.<sup>49</sup> Censoring and probability weights were constructed using both baseline fixed characteristics (age, years of education, and sex work venue) and time-varying covariates (AUD, SUD, condom use with paying partners, positive PSA test result, psychological distress, income, required drinking alcohol in the workplace, ATS use with sex partners, number of sex partners, food insecurity, housing instability, and violence victimization). All visits were included and current and lagged values of each factor were used to construct weights. Censoring and probability weights were constructed separately for each outcome (AUD and SUD), and then multiplied together to create a joint weight using a two-step process.<sup>50</sup> Weights were stabilized to reduce the range of values and were centered around 1.3.

All models accounted for clustering by province and adjusted for intervention participation. The crude model estimated the association between AUD and SUD and self-reported STI in the past 3 months. The adjusted model accounted for baseline condom use with paying partners, psychological distress, age, sex work venue, income, food insecurity, housing instability, number of sex partners, drug use with sex partners, work place drinking, PSA test results, recent sexual or physical violence victimization, and months followed in the study. Multivariable models excluded observations without complete case information. Missing data were relatively rare (<1%) on STI reports, baseline condom use with paying partners,

housing instability, drug use with sex partners, and PSA test results. Complete case data were available for AUD, SUD, psychological distress, age, sex work venue, income, food insecurity, number of sex partners, and recent sexual or physical violence victimization. All analyses were conducted in Stata version 15, College Station, TX.

## Results

Participants were recruited between November 2013, and July 2015. Follow-up data collection ended in November 2016. Of 1,559 women screened, 1,428 (92%) were eligible and 1,198 of those (84%) completed a baseline assessment. Follow-up assessments were completed by 596 participants at 6-months, 544 at 12-months, and 556 at 18-months.

At baseline 18% of the 1,198 FESW enrolled in the study reported a recent STI. Twenty-six percent reported 1 recent STIs during the 18-month follow-up. Most participants were 30 years of age (79%), did not have a primary partner (68%), currently worked in an entertainment venue (81%), and reported a median monthly income of US\$200 (Interquartile Range [IQR] = 120, 300) (Table 1). Overall, women reported a median of seven male sex partners (IQR = 4, 17) in the past 3 months and a median of 4 (IQR = 1, 9) new partners (Table 2). Self-reported condom use was common with paying partners (77%) but less with non-paying partners (19%). At baseline, 25% and 7% screened positive for AUD and SUD respectively. Half (54%) reported that their job required drinking alcohol with customers. Approximately 18% of the women had moderate or severe risk of psychological distress. The proportion of STI reported during follow-up ranged from 23% in women without stimulant use disorder to 38% in those with both AUD and SUD. Women who were older, had lower monthly income, tested HIV positive, had debt, worked in brothels or freelance, and had AUD were significantly more likely to report a recent STI. In addition, women who tested positive for PSA, experienced food insecurity and housing instability were more likely to report a recent STI (Table 2).

Crude estimates for the odds of reporting a recent STI with screening positive for AUD alone was 2.3 (95% CI: 1.3–4.0) (Table 3). The crude OR for SUD alone was 2.1 (95% CI: 1.1–4.0). The OR for the joint effect of AUD and SUD was 3.5 (95% CI: 2.1–5.6). After accounting for several known confounders including sexual risk behaviors, the adjusted odds ratio (AOR) for recent STI associated with AUD alone was 2.1 (95% CI: 1.3–3.4) and the AOR ratio for SUD alone was 1.8 (95% CI: 0.9–3.7). The AOR for the joint effect of AUD and SUD was 2.5 (95% CI: 1.6–4.0).

In the joint marginal structural model, the AOR for recent STI associated with AUD alone was 2.8 (95% CI: 1.5–5.1). The AOR for SUD alone was 3.5 (95% CI: 1.1–11.3). The AOR for the joint effect of AUD and SUD was 5.7 (95% CI: 2.2–15.2). A test for trend in proportion reporting recent STI over the 18-month follow-up was not statistically significant. Tests for interaction in crude, adjusted and marginal structural models were not statistically significant.



## Discussion

AUD and SUD were independently and jointly associated with greater odds of self-reported STI among Cambodian FESW even after accounting for sexual risk-taking behaviors, and concomitant factors including psychological distress, exposure to violence, and characteristics of sex work venue. Women with both AUD and SUD had the greatest odds of reporting a STI during follow-up. We found a strong association between AUD and STI in the absence of SUD, which support previous findings.<sup>10,12</sup> The increase in the AOR for recent STI associated with AUD alone, SUD alone, and the joint effect of AUD and SUD in the MSM compared to the unadjusted odds, suggests the presence of time-dependent confounding. To our knowledge, this study is among the first to observe independent as well as joint effects of AUD and SUD on over five-fold greater odds of self-reported STI after adjusting for time-dependent confounding.

Many studies have shown that alcohol use is associated with prevalent and incident HIV and STI infection as well as risky sexual behaviors, such as unprotected sex, multiple partnerships and transactional sex.<sup>51-53</sup> Also consistent with other studies is the magnitude of the association between SUD and STI.<sup>25</sup> Unlike the present study, these studies are limited by the use of standard adjustment approaches. In our previous study, ATS use was associated with a five-fold increased risk of STI acquisition among Cambodia FESW.<sup>21</sup> In the present study, the AOR for SUD in the absence of AUD was 3.5. ATS use has been shown to increase libido, lower inhibitions, enhance sexual pleasure and prolong sexual intercourse.<sup>54-56</sup> ATS has also been associated with risky sexual behaviors including high number of sex partners, unprotected sex, and sexual intercourse with more risky partners; all increasing the risk of HIV and STI acquisition.<sup>21,56-59</sup> In our qualitative study, Cambodian FESW reported that clients intoxicated with alcohol or ATS often requested unprotected sex.<sup>4</sup>

Although we found no evidence for an interaction between AUD and SUD on STI prevalence, women having both AUD and SUD had a higher risk of STI than women with only AUD or SUD or neither disorder. A possible explanation for the lack of interaction between AUD and SUD is that women who worked in entertainment venues represented the majority of the study sample and are more likely to drink alcohol and use ATS infrequently compared to brothel-based and freelance sex workers.<sup>4</sup> Because brothel-based and freelance sex workers represented only 19% of the study sample, we may have failed to detect an interaction effect.

Our study has some limitations to consider when interpreting the results. Data on recent STI and alcohol and ATS use, were self-reported and may be subject to recall and social-desirability bias. As a result, the estimates of risk may be conservative and biased towards the null. However, self-report of alcohol and ATS use has been shown to be accurate in this population.<sup>8,60</sup> The proportion of women reporting any STI at baseline was 18% and similar to our previous study where 15.4% of the FESW screened positive to STI tests (*Chlamydia trachomatis* and *Neisseria gonorrhoeae*).<sup>21</sup> Secondly, because participants were not sampled probabilistically our results may not be generalizable to the larger population of FESW in

Cambodia. Nevertheless, efforts were made to recruit women from multiple sex work venues in ten provinces in Cambodia, increasing the representativeness of our sample.

Despite these limitations, our findings are strengthened by the longitudinal study design and high retention rates at follow-up assessments. Adding to the strengths is the use of MSM methods, which allow for improved adjustment for confounding than standard adjustment approaches that can introduce biases.<sup>61</sup> The MSM method assumes no unmeasured confounders and that the marginal structural model for the effect of AUD and SUD on STI is correctly specified. We also assume the models for inverse probability weights and censoring weights are correctly specified. Although strong assumptions, standard statistical methods also require the same assumptions in order to make a causal inference. The advantage of MSM methods over traditional methods is that this approach accounts for time dependent confounding by covariates that are affected by previous measurements of outcomes and covariates.<sup>50</sup>

ATS and alcohol use are critical public health issues with significant health consequences for FESW, including risky sexual behaviors and violence victimization, which increase exposure to STI, including HIV acquisition. The burden of unhealthy alcohol use and ATS use disorders in this vulnerable population demonstrates the importance of better understanding their influence on HIV and STI transmission to improve our fight against these epidemics. Our results also highlight the need to develop more comprehensive HIV and STI prevention programs addressing both alcohol and other drug use problems, but also other risks such as mental health issues, gender-based violence and economic insecurity that affect FESW. Given the independent effects of both AUD and SUD also observed in our study, prevention programs targeting FEWS may also benefit from integration of prevention interventions designed to specifically address the risks/harms associated with alcohol and stimulant use in this population. In Cambodia, women who work in entertainment venues are more likely to drink alcohol, whereas women working “freelance” or in brothels are more likely to use stimulants,<sup>3</sup> supporting the need for interventions tailored to specific sex work settings and social milieus. Sex work context and risk have shifted among young FESW in Phnom Penh, following implementation of anti-prostitution and anti-trafficking laws. Compared to previous studies, the present study found a lower prevalence of sexual risk and HIV infection. Women engaging more directly in transactional sex have become harder to sample and access.<sup>3</sup> Future prevention research and programs need to consider how new policies and demographic changes in FESW impact HIV transmission.

Our findings also underscore the need for further research to understand how AUD and SUD potentiate biological as well as behavioral vulnerability for STI acquisition in FESW. The findings suggest the presence of time-dependent confounding which was accounted for by the marginal structural model. Finally, there is a need to explore how interventions integrating evidence-based AUD and SUD treatments can optimize the effectiveness of existing HIV prevention activities for FESW.

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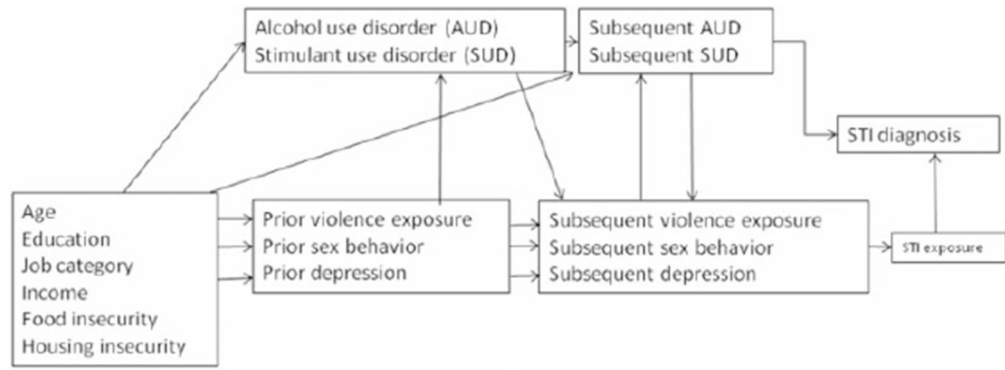
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**Figure 1.** Causal diagram for the effects of alcohol and ATS use disorders on STI diagnosis.

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**Table 1.** Sociodemographic and workplace characteristics of FESW in 10 provinces in Cambodia (N = 1198).

Characteristic	Total (n = 1198)		STI reported at any study visit (n = 313)		No STI report at any study visit (n = 885)		p-Value
	N	%	N	%	N	%	
Median age (in years)	26	(22,30)	27	(23,30)	26	(22,30)	0.02
Marital status							0.10
Married/Living together	382	31.9	103	32.9	279	31.5	
Separated/Divorced/Widowed	494	41.2	140	44.7	354	40.0	
Single	322	26.9	70	22.4	252	28.5	
Education (years of school completed)							0.14
None	194	16.2	58	18.5	136	15.4	
Primary (1–6)	634	52.9	171	54.6	463	52.3	
Secondary ( 7)	370	30.9	84	26.8	286	32.3	
Main sex work venue (past month)							0.04
Entertainment	967	80.7	240	76.7	727	82.2	
Brothel/freelance (eg., park, street, guest house)	231	19.3	73	23.3	158	17.9	
Currently work for employer, boss, manager, or supervisor (yes)	872	72.8	234	74.8	638	72.1	0.36
Monthly Income (US\$)							<0.01
<100	258	21.5	87	27.8	171	19.3	
>100–250	534	44.6	127	40.6	407	46.0	
>250	406	33.9	99	31.6	307	34.7	
Have debt	548	45.7	176	56.2	372	42.0	<0.01
Workplace requires drinking alcohol with customers (yes)	642	53.6	172	55.0	470	53.1	0.57



**Table 2.** Sexual behaviour, substance use, and health characteristics of FESW in 10 provinces in Cambodia (N = 1198).

Characteristic	Total (n = 1198)		STI reported at any study visit (n = 313)		No STI report at any study visit (n = 885)		p-Value
	N	%	N	%	N	%	
Number of male sex partners (past 3 months)							
Median	7	4-17	6	4-14	8	4-18	0.06
3	279	23.3	71	22.7	208	23.5	0.11
4-15	607	50.7	173	55.3	434	49.0	
16	312	26.0	69	22.0	243	27.5	
Number of new male sex partners (past 3 months)							
Median	4	1-9	3	1-7	4	2-10	<0.01
0	181	15.1	56	17.9	125	14.1	<0.01
1-5	582	48.6	166	53.0	416	47.0	
6	435	36.3	91	29.1	344	38.9	
Prostate Specific Antigen result positive	338	28.2	105	33.7	233	26.5	0.02
HIV antibody result positive	75	6.3	30	9.6	45	5.1	<0.01
Consistent condom use with paying partners; <sup>a</sup> (past 3 months)	862	76.6	235	81.9	627	74.8	0.02
Consistent condom use with non-paying partners; <sup>a</sup> (past 3 months)	113	18.5	35	18.6	78	18.5	0.97
ATS use with any sex partner in past 3 months (yes)	257	21.8	77	24.6	180	20.5	0.13
ATS use disorder (SUD)							0.09
Low (<4)	790	65.9	200	63.9	590	66.7	
Moderate (4-26)	322	26.9	82	26.2	240	27.1	
High ( 27)	86	7.2	31	9.9	55	6.2	
Alcohol use disorder (AUD)							
Low (<11)	292	24.4	60	19.2	232	26.2	<0.01
Moderate (11-26)	611	51.0	154	49.2	457	51.6	
High ( 27)	295	24.6	99	31.6	196	22.2	
Psychological distress							
No or low risk	708	59.7	174	56.5	534	60.8	0.42
Mild risk	260	21.9	74	24.0	186	21.2	

Characteristic	Total (n = 1198)		STI reported at any study visit (n = 313)		No STI report at any study visit (n = 885)		p-Value
	N	%	N	%	N	%	
Moderate risk	112	9.4	34	11.0	78	8.9	
Severe risk	107	9.0	26	8.4	81	9.2	
Food insecurity (past 3 months)							<0.01
Never	837	69.9	196	62.6	641	72.4	
Rarely	228	19.0	67	21.4	161	18.2	
Sometimes	66	5.5	20	6.4	46	5.2	
Often/always	67	5.6	30	9.6	37	4.2	
Housing instability (past 3 months)							0.03
Never	546	45.6	121	38.7	425	48.1	
Rarely	201	16.8	55	17.6	146	16.5	
Sometimes	144	12.0	44	14.1	100	11.3	
Often/always	306	25.6	93	29.7	213	24.1	
Experience of sexual or physical violence in the past 3 months (yes)	564	47.1	154	49.2	410	46.3	0.38

<sup>a</sup>Condom use with paying partners was calculated for all participants who reported a paying partner (N = 1125); Condom use with non-paying partners was calculated for all participants who reported a non-paying partner (N = 610).

**Table 3.** Crude, adjusted, and weighted estimates for joint effects of alcohol and ATS substance use disorder on STI acquisition among 1198 FESW in 10 provinces in Cambodia, 2013–2016.

Alcohol use disorder	ATS use disorder	Crude		Adjusted <sup>a</sup>		Weighted	
		OR	95% CI	AOR	95% CI	AOR	95% CI
0–26	0–26 <sup>b</sup>	1.0		1.0		1.0	
	27+	2.1	1.1–4.0	1.8	0.9–3.7	3.5	1.1–11.3
27+	0–26	2.3	1.3–4.0	2.1	1.3–3.4	2.8	1.5–5.1
	27+	3.5	2.1–5.6	2.5	1.6–4.0	5.7	2.2–15.2
p-value for interaction term		0.42		0.55		0.61	

<sup>a</sup> Accounted for baseline condom use with paying partners, psychological distress, age, sex work venue, income, food insecurity, housing instability, number of sex partners, drug use with sex partners, work place drinking, prostate specific antigen results, recent sexual or physical violence victimization, intervention participation, and months followed in study.

<sup>b</sup> Referent group.