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Correlates of amphetamine-type stimulants use and associations with HIV-related risks among young women engaged in sex work in Phnom Penh, Cambodia

Marie-Claude Couture¹, Jennifer L. Evans, Neth San Sothy², Ellen S. Stein¹, Keo Sichan³, Lisa Maher⁴, and Kimberly Page^{1,*} on the behalf of the Young Women's Health Study (Serey Phal Kien, Vonthanak Sapphon, Mean Chhi Vun, John Kaldor, Joel M. Palefsky, Tooru Nemoto, Kimberly Page)

¹University of California San Francisco, Global Health Sciences, 50 Beale street, Suite 1200, San Francisco CA 94105, USA

²National Center for HIV/AIDS, Dermatology and STD. #245H, Sreet 6A, Phum Kean Khlang, Sangkat Prekleap Russey Keo, Phnom Penh, Cambodia

³Cambodian Women's development Agency, #19, Street 242, Sangkat Boeng Prolit, Khan 7 Makara, Phnom Penh, Cambodia

⁴University of New South Wales, National Centre in HIV Epidemiology and Clinical Research, CFI Building, Corner Boundary and West Streets, Darlinghurst NSW 2010, Australia

Abstract

Background—Amphetamine-type stimulant (ATS) use has increased in Cambodia and emerged as a significant problem among female sex workers (FSWs), potentially contributing to increased risk of HIV. We examined the prevalence of ATS use and its effect on sexual risk behaviors, and sexually transmitted infections (STI) among FSWS in Phnom Penh, Cambodia.

Methods—A one-year prospective study among young women engaged in sex work in brothels, entertainment establishments and on a freelance basis. Socio-demographics, sexual risks, and recent ATS use were assessed by self-report. Blood and urine samples were collected to detect HIV, *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (GC). Bivariate and multivariate longitudinal analyses were conducted to assess the effects of ATS use on number of sex partners, inconsistent condom use with paying partners and incident STI.

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*Corresponding author: K. Page, University of California San Francisco, Global Health Sciences, 50 Beale street, Suite 1200, San Francisco CA 94105, USA., Kpage@psg.ucsf.edu, Phone: 415-597-4954., Fax: 415-597-8299.

Contributors

K. Page, ES. Stein, N. Sansothy, K. Sichan, M-C Couture and L. Maher designed the YWHS prospective study and contributed to data acquisition. M-C Couture managed the literature search and summaries of previous related studies, conceived the design of the analysis and with JL Evans undertook the statistical analysis. K. Page, JL Evans, L. Maher and M-C Couture contributed to data interpretation. M-C Couture wrote the first draft of the manuscript and made modifications after comments from the co-authors. All authors contributed with comments and suggestions and have approved the final manuscript.

Conflict of interests

All authors declare that they have no conflicts of interest.

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Results—ATS use was higher among women working freelance (35.6%) and in brothels (34.8%) compared to women working in entertainment establishments (17.7%) or in multiple venues (14.8%). ATS users reported more sex partners and days drunk in the previous month. In multivariate longitudinal analysis, ATS use was associated with having a higher number of sex partners (Adjusted Risk Ratio 1.49; 95% CI: 1.00–2.21) and incident STI (Adjusted Odds Ratio 5.41; 95% CI: 1.15–25.48), but not inconsistent condom use with paying partner.

Conclusion—ATS users had more sex partners, high level of alcohol use, and were at increased risk of STI. Our findings underscore ATS use as an important emerging risk exposure that should be integrated into HIV prevention interventions targeting this population.

Keywords

mphetamine-type stimulant; HIV/STI; Female sex workers; Cambodia; Risk behaviors

1. Introduction

Amphetamine-type stimulants (ATS) use has increased dramatically worldwide and is used by more people than cocaine and opioids (UNODC, 2010). ATS includes mainly amphetamine, methamphetamine and their derivatives, but also 3,4-Methylenedioxymethamphetamine (MDMA) or ecstasy. ATS are easy to produce, inexpensive to purchase and hard to control, infiltrating almost every region of the world, including Southeast Asia (Chouvy and Meissonnier, 2004; McKetin et al., 2008). In Cambodia, 80.9% of illicit drug users report ATS use and consumption is particularly high among vulnerable populations, including female sex workers (FSWs), men who have sex with men (MSM) (NCHADS, 2007), and street children (McKetin et al., 2008; NACD, 2008). A pill form of methamphetamine called “yama” in Cambodia (known as “yaba” in neighboring Thailand) is widely produced, trafficked and used in Southeast Asia (McKetin et al., 2008; UNODC, 2007). These tablets generally contain about 15% methamphetamine (NACD, 2008). “Crystal” (also known as “ice”) refers to a crystalline form of higher purity methamphetamine (generally about 82–84%) which is more potent and addictive. Although “yama” pills are swallowed, crystalline forms are usually melted and the vapors inhaled (Barr et al., 2006; McKetin et al., 2008). ATS has emerged as a potential problem among FSWs in Cambodia potentially contributing to increased risk for HIV. BSS surveys showed that among FSWs working in brothels, use of “yama” increased from 7.0% in 2003 to 18.6% in 2007 (NCHADS, 2007). Among women working in entertainment and drinking establishments such as beer gardens, nightclubs, karaoke bars and restaurants) smaller proportions reported ATS use (2.9% in 2003 and 2.3% in 2007). We have previously reported from cross-sectional data that a high proportion (26%) of FSWs report ever using ATS (Couture et al., 2010). And, in qualitative research conducted by our group, FSWs describe using “yama” and “crystal” both to increase stamina for working long hours and to see more clients (Maher et al., 2011). In addition to this “functionality,” the drug may also be used as a coping strategy; women reported that they use ATS to produce feelings of happiness as well as to alleviate suffering and misery (Maher et al., 2011).

ATS are synthetic central nervous system stimulants that release high level of dopamine, noradrenalin, adrenaline and serotonin, resulting in feelings of euphoria, increased energy, invulnerability, and appetite suppression (Barr et al., 2006; Scott et al., 2007). However, long term use can lead to anxiety, paranoia, depression, violent behaviors and persecutory delusions (Barr et al., 2006; Hanson et al., 2004; Scott et al., 2007). Studies have shown that ATS use causes increased libido, lowers inhibitions, enhances sexual pleasure, delays orgasm and results in prolonged sexual intercourse (Green and Halkitis, 2006; Halkitis et al., 2005; Halkitis and Jerome, 2008; Semple et al., 2004; Volkow et al., 2007). In studies

conducted in Southeast Asia, ATS has been associated with risky sexual behaviors and incident sexually transmitted infections (STI), including HIV (Beyrer et al., 2004; Buavirat et al., 2003; Melbye et al., 2002; Sattah et al., 2002). ATS users have more sexual partners, higher risk of unprotected anal and vaginal sex, have sex with anonymous partners or injection drug users (IDU) and are more likely to report sex in exchange of money or drugs than non ATS users (Baker et al., 2004; Bogart et al., 2005; Cheng et al., 2009; Halkitis et al., 2009; Hernandez et al., 2009; Molitor et al., 1998; Prestage et al., 2007; Rawstorne et al., 2007; Rusch et al., 2009; Semple et al., 2004). However, to date most of this epidemiological research has been conducted among MSM and IDU populations, with relatively few studies in FSWs.

Research with young adult methamphetamine users in Thailand where recreational use is high, found that women users had distinct behavioral typologies (Sherman et al., 2008; Sutcliffe et al., 2009). Using latent class analysis, Sherman et al., (Sutcliffe et al., 2009) grouped subjects into either “work” related or “high risk behavior” classes. Women in the latter group compared to the “work” group were significantly more likely to be older, and use more alcohol and methamphetamine, however sexual risks were prevalent in both classes. In a qualitative study exploring the relationship between methamphetamine use and sexual behavior, the same researchers reported that compared to men, women more frequently reported no or negative effects of methamphetamine on sexual desire, but like their male counterparts had limited awareness of how methamphetamine could increase risk for HIV (Sherman et al., 2008). The few studies conducted among sex workers showed that ATS use was associated with STI and inconsistent condom use with sex partners (Liao et al., 2010; Loza et al.; Munoz et al.; Patterson et al., 2006; Patterson et al., 2008). Only one study was prospective, but did not find any significant association between methamphetamine use and sexual risk patterns (Shannon et al., 2010). No studies among FSWs have been conducted in Southeast Asia where commercial sex is widespread and socially accepted and where the sex work environments differed enormously compared to western countries.

Cambodia has one of Asia’s most severe HIV epidemics, with heterosexual sex the main transmission route (NCHADS, 2006; Saphonn et al., 2005; Sopheab et al., 2009). Poverty, high levels of STI, widespread patronage of FSWs, and a highly mobile workforce are all important factors contributing to the epidemic (Charles, 2006; NCHADS, 2007; Plummer, 2009; UNIAP, 2009). Crucial progress has been made to reduce HIV risk, and recent estimates of HIV prevalence declined from 2.0% in 2001 to 1.6% in 2005 in adults aged 15 and over (NCHADS, 2006; Saphonn et al., 2004; UNAIDS, 2007). However, the prevalence of HIV among FSWs remains unacceptably high: surveillance surveys conducted in 2006 found 14% of FSWs working in direct sex establishments (brothels) were infected with HIV (NCHADS, 2006). There are concerns that escalating ATS use among FSWs in Cambodia may lead to a reversal of the downward trends in HIV/STI infection.

Many studies have shown that ATS use is associated with increased risk behaviors and HIV/STI infection. We hypothesized that ATS use among FSWs in Phnom Penh, Cambodia is prevalent and leads to increased risk behaviors and HIV/STI infection. This study examines the prevalence of ATS use and its effects, prospectively on selected HIV-related risk outcomes including increased number of sex partners, inconsistent condom use with paying partners and incident STI in this population.

2. Methods

2.1 Study setting

The Young Women’s Health Study (YWHS) was a prospective study of young (15 to 29 years) women engaged in sex work in a variety of settings in Phnom Penh, Cambodia;

methods have been described in detail elsewhere (Couture et al., 2010). In brief, participants working in brothels, entertainment establishments and on a freelance basis were invited to participate in a one-year study, with quarterly follow-up visits to assess HIV infection and associated risk, especially ATS use. All procedures were conducted at the YWHS clinic in Toul Svay Prey, a neighborhood near downtown Phnom Penh and led by a multi-disciplinary collaborative prevention research group of academic, governmental and community HIV prevention specialists from the U.S., Australia, and Cambodia.

2.2 Study population and recruitment

Inclusion criteria were: aged 15–29 years, understanding of spoken Khmer, ethnic Cambodian, reported ≥ 2 different sexual partners in the last month *or* who engaged in transactional sex (sex in exchange for money, goods, services, or drugs) within the last three months, plans to stay in Phnom Penh area for 12 months, biologically female, and able to provide voluntary informed consent. The eligibility criteria were carefully worded to be as sensitive as possible to avoid stigmatization and protect the women engaged in sex work, which is criminalized in Cambodia. All (100%) of the women participating in the study confirmed receiving money, gifts or goods from at least one partner in the last three months in a subsequent question of our survey, indicating transactional sex.

A convenient sample of women engaged in sex work was recruited by trained staff from: (1) YWHS information meetings held by CWDA; (2) neighborhood-based outreach visits; and (3) referrals by previous participants or other community groups, and screened for eligibility using a brief screening interview. Eligible women who expressed interest in the study were invited to a community location used by various sex-worker organizations (Cambodia Prostitutes Union, or CPU), where they were provided comprehensive study information. A group informed consent process including oral review of the written informed consent, with explanations and opportunities for questions and answers was conducted. Participants who expressed interest in participating were asked to provide signed informed consent, and provided appointment cards to present to the YWHS clinic site. Free transportation was offered to facilitate attendance at scheduled study visits. Only women who presented at the YWHS clinic site were considered enrolled in the study.

2.3 Data collection

Data were collected during quarterly visits from June 2007 to June 2008. A structured questionnaire covering socio-demographic characteristics, health care, occupational and sexual risk history, and alcohol and ATS use was administered in Khmer at baseline and quarterly visits. HIV testing with client-centered risk reduction counseling occurred at each visit, and participants were screened for STI (*Chlamydia trachomatis* (CT) and *Neisseria gonorrhoea* (GC)) at the 3- and 12-month visits, with treatment provided at no cost. Contact information was collected to facilitate participant tracking and maximize follow up.

2.4 STI and HIV testing

CT and GC were assessed from urine samples using BDProbeTec™ strand displacement amplification assay (Becton Dickinson, Sparks, MD) at the NCHADS STD laboratory. Specimens were processed and tested at the Cambodian National Institute of Public Health (NIPH) laboratory. HIV serology was performed using two rapid tests, Uni-Gold Recombigen (™) HIV rapid HIV test (Trinity Biotech USA, Jamestown, NY) and the Clairview HIV 1/2 STAT-PAK (Inverness Medical Diagnostics, Waltham, MA). HIV positive and discordant samples were confirmed by HIV-1 immunoblot.

2.5 Ethical review

The study protocol was reviewed and approved by the Institutional Review Board of the Committee on Human Research at UCSF, the Cambodian National Ethical Committee and the University of New South Wales Human Research Ethics Committee.

2.6 Measures

Lifetime and recent (last 3 months) drug use were assessed with questions using local Khmer vernacular and “yama” and “crystal” for ATS. Outcome variables were number of sex partners in the last 30 days (continuous variable), condom use with last paying (clients) and non-paying (boyfriends, husbands) partner (consistent or inconsistent), and STI (CT and GC combined) incidence. Condom use was classified as “inconsistent” if the participant did not report always using a condom with last sex partners (paying or non-paying). Other confounders/covariates included socio-demographic variables such as age, marital status, education, income and type of sex work venue. Women were surveyed regarding current (last 30 days) base of work (sex venue), and whether they currently had an employer (manager, boss or supervisor). At the time this study was conducted (2007–2008) sex venues in Cambodia were categorized as brothel-based (direct FSWs) and non-brothel-based (indirect FSWs). Non-brothel-based FSWs included women working in entertainment establishments: beer promotion girls, waitresses, hostesses, karaoke girls, dancers, and masseuses, and those working ‘freelance’, outside of entertainment establishments, in private apartments, streets and parks. We categorized women as brothel-based, entertainment-based, freelance, and multiple (women reported working in more than one sex work venue). Alcohol abuse was assessed using one item: In the past 30 days, on how many days did you feel some effect from the alcohol that you drank? (“buzzed”, “tipsy”, “high”, “drunk”).

2.7 Analyses

We first examined factors associated with recent ATS use; chi-square analyses were used to assess associations with socio-demographic, occupational, sexual behaviors, alcohol use and prevalent HIV and STI at baseline visit. Prospective data were examined using different multivariate models to investigate associations between recent ATS use and selected HIV-related risk outcomes over time: number of sex partners, inconsistent condom use with paying partner, and incident STI. Negative binomial regression analyses were used to determine the association between recent ATS use and number of sex partners (continuous variable) using data from all visits. Generalized estimating equations (GEE) were performed to examine the effect of ATS use on condom use with paying partners (consistent vs. inconsistent), also using data from all visits. The variability of ATS use over time was taken into account by using data from all visits. Finally, associations between recent ATS use and STI incidence were determined using logistic regression. STI incidence was calculated based on the number of newly-detected positive GC and CT infections at 12-month visit after a negative test at the 3-month visit. Data from a mid-point between the 3- and the 12-month visit (here 6-month visit) was used for our exposure variable, recent ATS use, and other covariates. Variables significant in the bivariate analyses ($P < 0.10$), known confounders (age, education), other risk factors (e.g., alcohol abuse), and variable hypothesized *a priori* to be associated with each outcome (e.g., type of sex work venue) were included in the multivariate models. We used a backward stepwise approach in which all variables nonsignificant at $P < 0.05$ were removed manually at each step, keeping potential confounders and other explanatory variables in the final models. Multivariate analyses were not conducted to assess predictors of HIV incidence due to small sample size and number of HIV seroconversions ($n=3$). Analyses were performed using STATA 11.0 (STATA, College Station, TX).

3. Results

Of 200 women consented to participate in the study, 160 (80%) presented to the clinic for the baseline study visit and enrolled into the prospective study. Follow-up rates for quarterly visits were: 81% at the 3-month visit, 75% at 6 months, 70% at 9 months, and 63% at 12-months. The prevalence of lifetime ATS use was high: 40.6% and 23.1% of participants reported ever using “yama” or “crystal” respectively (Table 1). Of the 68 (42.5%) women who reported ever using ATS, the majority (70.6%) reported using ATS before having sex. Overall, 26.3% of the women reported recent use (last 3 months) of any ATS at baseline (25% “yama” and 13.6% “crystal”) (Table 1). We observed a slight but statistically insignificant decrease of reported ATS use over the 12-month follow-up (data not shown). The use of all other drugs, including injected drugs, was low in this population (Table 1).

Table 2 shows socio-demographic, occupational, behavioral factors, prevalent HIV and STI and their associations with recent ATS use. Participants’ median age was 25 years (interquartile range (IQR) 21, 27), almost half (40%) had no education, and half (49.4%) were widowed, divorced or separated. Women reported working as FSWs for a median of 4.3 years (IQR 2.5, 6.3) and most (71.2%) were working freelance or in the entertainment service sector at enrollment. Median monthly income reported was 400,000 Riel (\$US 100.00) and 46.4% reported working under supervision of a boss, manager, employer, or supervisor. Alcohol use was prevalent; median numbers of days of drinking and being drunk in the last month were 15 (IQR 2, 30) and 3 (IQR 1, 20) days, respectively. Women reported many sex partners in the last month (median=30; IQR 10, 90). Consistent condom use was high with paying partners (77.5%), but low with non-paying partners (22.2%), mainly boyfriends and husbands. The prevalence of HIV was 23% (95% CI: 20.0–26.7: at baseline visit) and of STI (CT and GC) 15.4% (95% CI: 6.0–17.1% at 3-month visit). A significantly higher proportion of women who worked in brothels or as freelance FSWs reported ATS use (34.8% and 35.6%, respectively) compared to women working in entertainment establishments (17.7%) or in more than one venue (14.8%) (Table 2). Women who reported more sex partners and days affected by alcohol or drunk, also declared more ATS use (Table 2).

Table 3 shows bivariate and multivariate longitudinal analyses examining recent ATS use and HIV-related risk outcomes. ATS use was independently associated with a higher number of sex partners (Adjusted Relative Risk (ARR) 1.49; 95% CI: 1.00–2.21), controlling for age, education and type of sex work venue. Having a higher number of sex partners was also significantly associated with working in brothels (ARR 4.42; 95% CI: 2.74–7.12) or as freelance FSWs (ARR 2.84; 95% CI: 1.86–4.32). Predictors of inconsistent condom use with paying partners included only the type of sex work venue, but not recent ATS use. Women working in brothels (AOR 0.17; 95% CI: 0.05–0.58), or working as freelance FSWs (in bivariate analysis only: OR 0.53; 95% CI: 0.32–0.89) or women who reported working in multiple sex work venues (AOR 0.43; 95% CI: 0.22–0.82), were less likely to report inconsistent condom use with the last paying sex partner compared to entertainment-based FSWs. Incidence of STI was 21.2 per 100 PYO (95% CI: 12.6–35.8%) overall, but higher among freelance FSWs (OR 13.71; 95% CI: 1.68–112.3) than among women working in other venues. ATS use was independently associated with incident STI (AOR 5.41; 95% CI: 1.15–25.48), controlling for age, education, sex work venue, alcohol use, number of sex partner and inconsistent condom use with paying partners.

4. Discussion

This is the first longitudinal study to show that ATS use is associated with HIV-related risk behaviors among women engaged in sex work in Cambodia. In addition to the negative

health outcomes associated with ATS use, this research suggests that ATS use may also compound HIV and STI risk. Indeed, women in our study reporting recent ATS use had more sex partners in the last month and an increased risk of incident STI than non users, supporting other studies which have found similar association in other risk groups (Boddiger, 2005; Colfax et al., 2005; Molitor et al., 1999; Moon et al., 2001; Wohl et al., 2002), including FSWs (Liao et al., 2010; Loza et al., 2010; Munoz et al.; Patterson et al., 2006; Patterson et al., 2008), including in Southeast Asia (Celentano et al., 2008; German et al., 2008; Melbye et al., 2002; Sutcliffe et al., 2009). Research suggests ATS is often used recreationally to increase sociability, lower inhibitions, enhance libido and sexual pleasure (Diaz et al., 2005; Halkitis et al., 2005; Halkitis and Jerome, 2008; Maher et al., 2011; Semple et al., 2004), but also for occupational reasons in order to increase energy and productivity (Brecht et al., 2004; Malta et al., 2006; Semple et al., 2004; Sherman et al., 2009). In our qualitative study, many FSWs reported using ATS as a coping strategy to deal with their work conditions (Maher et al., 2011), which is consistent with another study among FSWs in Vietnam (Tran et al., 2004). Women described ATS as a “power drug” suggesting that its use was mainly viewed as functional, facilitating longer working hours, and enabling women to see more clients and potentially increase their income (Maher et al., 2011). To our knowledge, this study is the first to quantify a significant association between ATS and higher numbers of sex partners, including paying partners, in FSW in Cambodia compared to non users. If women using ATS have a larger sexual network than non-users, the potential exists for more rapid and widespread dissemination of HIV and STI (Adimora et al., 2010; German et al., 2008; Latkin et al., 1994; Latkin et al., 2003; Miller and Neaigus, 2001; Rothenberg et al., 1998).

The literature has shown that ATS use is associated with decision-making impairment and inconsistent condom use among many groups, including FSWs (Halkitis et al., 2009; Molitor et al., 1998; Munoz et al., 2008; Prestage et al., 2007). Moreover, drug using FSWs may be more inclined to accept unprotected sex because money is needed to satisfy drug cravings (Needle et al., 2008). Clients seeking unprotected sex are also more likely to seek out FSWs who use drugs, or to offer drugs to have unprotected sex (Johnston et al., 2010). In qualitative interviews, FSWs also reported more requests for unprotected sex from clients intoxicated with ATS (Maher et al., 2011). However, in the present study, ATS use was not associated with inconsistent condom use at last sexual encounter. Still, even using condoms more consistently in general, ATS users may have more risky sex partners, and potentially increased risk of HIV or STI infection. More research is needed to better understand the circumstance of condom use with the different partner types in the context of ATS use. Our qualitative data suggests that ATS use by clients was common and clients often provided women with drugs and/or encouraged drug use (Maher et al., 2011). Research among female drug users has shown an overlap between sexual and drug use networks with women often reporting initiation by and consumption with sex partners (Brecht et al., 2004; Cheng et al., 2009; Evans et al., 2003; Latkin et al., 2003; Molitor et al., 1998; Shannon et al., 2008; Shannon et al., 2010). Drug-using behaviors among male partners (paying and non-paying) in relation to condom use should be investigated to gain more insights into these dyadic effects.

ATS consumption has steadily increased in Southeast Asia since 2003, especially in Cambodia (McKetin et al., 2008). FSWs in Phnom Penh reported ATS was cheap, easy to obtain and commonly used in this particular work environment (Maher et al., 2011). In our study, while overall one in four women used ATS in recent months, use was particularly high among brothel-based FSWs and freelancers working in streets, parks and private apartments. Consistent with others who have shown that sex work environments affect sex and drug use behaviors (Choi and Holroyd, 2007; Dandona et al., 2005; Hsieh and Hsun Chen, 2004; Minh et al., 2004; Nemoto et al., 2008; Rusch et al., 2009), we have shown that

freelance FSWs working in the streets, parks and private apartments of Phnom Penh were more susceptible to HIV infection (Couture et al., 2010). Drug accessibility is likely to differ according to sex work venues; FSWs working in brothels or on the streets may have greater access to ATS than women working in entertainment establishments. Another consideration is that FSWs who use drugs may move from more “prestigious” and “less risky” work environments (i.e., entertainment establishments) to more hazardous venues such as brothels, streets or parks. A qualitative study conducted among Vietnamese FSWs suggested that once a woman is dependent on drugs, she may lose status to clients and venue owners, resulting in social and economic decline (Tran et al., 2004). Little is known about sex work “career” trajectories of FSWs in Cambodia and the typology of sex work has undergone significant changes following the promulgation of anti-sex-trafficking and sexual exploitation laws enacted in 2008. These laws resulted in closure of brothels and migration of FSWs to entertainment establishments, or outdoor settings. More information on changing socio-political and cultural context of sex work in Cambodia as well as women’s actual work environments is needed in order to understand the risks associated with different sex venues in this setting.

Our study has several limitations that should be considered when interpreting the results. Although retention at 12 months was high and there were no significant differences between women retained in the study and those lost to follow-up, the small sample size limited the power of the multivariate analyses and the precision of our estimates. The observational nature of this longitudinal study does not permit us to conclude causality between ATS use and outcomes studied here with certainty, as experimental design would. However, the prospective nature of the study and behavioral and biological data, strengthens the validity of our study findings. STI incidence may also have been underestimated, as women acquiring infections during follow-up may have sought interim treatment. Self-reported data on sexual behaviors and drug use may introduce response bias associated with socially acceptable or desired answers, but this would result in conservative estimates of risk, biasing our results toward the null. The variable number of sex partners included both non-paying and paying partners and the type was not specified. Given that our sample consists only of women engaged in sex work, most of the partners reported by the participants are assumed to be paying partners. Finally, participants in this study were not sampled systematically or probabilistically. As a consequence our results may not be generalizable to all young women involved in sex work in Phnom Penh or Cambodia. Nevertheless, our sample included women from a wide range of sex work venues, ranging from direct and indirect sex establishments to parks, streets and private apartments, capturing the diversity of this occupational group in Phnom Penh.

Our results underscore the risk associated with ATS use and the vulnerability of FSWs in Cambodia. The results highlight the burden of ATS use in the sex/entertainment industry in Phnom Penh and demonstrate the importance of understanding its influence on STI and HIV transmission in this population. While, resources for HIV prevention and care, including access to highly active antiretroviral therapy, have increased in Cambodia in the past 10 years, few options exist for drug treatment or intervention for drug users in that country. Compulsory detention centers characterized by an absence of evidence-based medical treatment or management are widespread in Southeast Asia. Detainees of these boot camp-like centers are often subject to physical and sexual abuse, and most return to drug use upon release (HRW, 2010). Even if no community-based options or effective substitution therapy for methamphetamine use currently exists, there is an urgent need for both prevention and harm reduction programs. While Cambodia recently initiated methadone maintenance therapy, few women use opiates; only one woman in our study (0.6%) reported recent use (last three months) of opium and one the recent use of heroin (0.6%). Significantly more work is necessary to minimize the harm associated ATS and its escalating use among

Cambodian FSWs. Our findings offer important insights into intersection of risky sexual behaviors, ATS use and HIV/STI infection for prevention interventions targeting FSWs in Cambodia and elsewhere.

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Table 1

Lifetime and recent use of ATS and other drugs among young women engaged in sex work participating in the Young Women's Health Study in Phnom Penh, Cambodia (n=160).

	Lifetime use		Recent use (last 3 months)	
	%		%	
ATS in pills ("yama")	40.6		25.0	
Crystal ATS	23.1		13.6	
Ecstasy	0		0	
Marijuana (<i>Ganja</i>)	8.1		5.2	
Glue	2.5		0.6	
Opium	0.6		0.6	
Heroin	1.9		0.6	
Injected any drug	1.2		0	

Table 2

Selected socio-demographic and risk characteristics and associations with recent ATS use at baseline visit among young women engaged in sex work participating in the Young Women's Health Study in Phnom Penh, Cambodia (n=160).

Characteristic	Prevalence characteristic		Recent ATS use (last 3 months)				p-value
	N	%	Yes		No		
Overall			N	%	N	%	
Age			42	26.3	118	73.7	0.728
16-18	13	8.1	3	23.1	10	76.9	
19-24	64	40	15	23.4	49	76.6	
25-29	83	51.8	24	28.9	59	71.1	
Marital status							
Never married	57	35.6	16	28.1	41	71.9	0.792
Married-living together	24	15	5	20.8	19	79.1	
Widowed/Divorced/Separated	79	49.4	21	26.6	58	73.4	
Education							
None	64	40.0	21	32.8	43	67.2	0.239
Primary (1-6 years)	82	51.25	19	23.2	63	76.8	
Secondary (7+ years)	14	8.75	2	14.3	12	85.7	
Type of sex work venue (last 30 days)							0.063
Entertainment	51	31.9	9	17.7	42	82.3	
Brothel-based	23	9.2	8	34.8	15	65.2	
Freelance	59	39.3	21	35.6	38	64.4	
Multiple/Other	27	16.9	4	14.8	23	85.2	
Income (last month)							0.179
0-75 \$US	50	31.3	13	26.0	37	74.0	
76-120 \$US	40	25.0	10	25.0	30	75.0	
121-170 \$US	37	23.1	6	16.2	31	83.8	
>171 \$US	33	20.6	13	39.4	20	60.6	
Have an employer, manager, boss or supervisor							0.103

Characteristic	Prevalence characteristic		Recent ATS use (last 3 months)		p-value
	No	Yes	Yes	No	
No	82	53.6	27	32.9	67.1
Yes	71	46.4	15	21.1	78.9
Number of days drunk (last month) Median 3					0.051
>3	74	46.3	14	18.9	81.1
≥3	86	53.7	28	32.6	67.4
Number of sex partners (last month)					0.034
≤10	45	28.1	7	15.6	38
11-50	53	33.1	12	22.6	41
≥51	62	38.8	23	37.1	39
Condom use with last non-paying partners					0.797
Consistent (always)	14	22.2	3	21.4	11
Inconsistent	49	77.8	9	18.4	40
Condom use with last paying partners					0.813
Consistent (always)	124	77.5	32	25.81	92
Inconsistent	36	22.5	10	27.78	26
HIV test					0.330
Negative	123	76.9	30	24.4	93
Positive	37	23.1	12	32.4	25
STI test					0.934
Negative	110	84.6	32	29.1	78
Positive	20	15.4	6	30.0	14

Table 3

Bivariate and multivariate longitudinal analyses for correlates of number of sexual partner in the last month, inconsistent condom use paying partners and STI incident infection among young women engaged in sex work participating in the Young Women's Health Study in Phnom Penh, Cambodia.

	Number of sex partners		Inconsistent condom use with non-paying partners		Incident STI	
	RR (95% CI)	ARR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
Recent ATS use (last 3 months)						
<i>No</i>	1.0	1.0	1.0	1.0	1.0	1.0
<i>Yes</i>	1.46(1.10-2.0)**	1.49 (1.00-2.21) *	0.71 (0.41-1.25)	0.82 (0.46-1.45)	4.25(1.25-14.45)*	5.41 (1.15-25.48)*
Age (year)	1.05 (1.0-1.09)	1.02 (0.97-1.07)	0.92 (0.85-0.99)	0.93 (0.87-1.01)	1.17 (0.97-1.42)	1.04(0.78-1.37)
Education (year)	0.95 (0.9-1.0)	0.96 (0.89-1.02)	1.04 (0.94-1.14)	1.00 (0.90-1.11)	0.86 (0.66-1.11)	0.98 (0.68-1.40)
Marital status						
<i>Never married</i>	1.0	ns	1.0	ns	1.0	ns
<i>Married-living together</i>	0.79 (0.4-1.4)		0.57 (0.29-1.12)		2.60 (0.55-12.4)	
<i>Widowed, divorced or separated</i>	1.15 (0.8-1.6)		0.76 (0.46-1.27)		1.28 (0.29-5.59)	
Type of sex work venue						
<i>Entertainment</i>	1.0	1.0	1.0	1.0	1.0	1.0
<i>Brothel</i>	4.73 (3.1-7.3)**	4.42 (2.74-7.12)**	0.15 (0.04-0.54)**	0.17 (0.05-0.58)*	--	1.0
<i>Freelances</i>	3.26 (2.2-4.9)**	2.84 (1.86-4.32)**	0.53(0.32-0.89)*	0.62(0.35-1.09)	13.71(1.68-112.3)*	3.84 (0.29-51.8)
<i>Multiple</i>	1.52 (0.96-2.4)	1.53 (0.99-2.38)	0.39 (0.21-0.74)**	0.43 (0.22-0.82)*	2.0 (0.12-34.9)	1.0
Income	0.67 (0.50-0.90)**	0.83 (0.59-1.26)	0.93 (0.58-1.51)	ns	0.22 (0.03-1.75)	ns
Number of days drunk (last month):Median 3						
<3	1.0	ns	1.0	ns	1.0	1.0
≥ 3	1.02 (0.76-1.36)		1.06 (0.70-1.62)		0.43 (0.11-1.67)	0.35(0.05-2.43)
Number of sex partners (last month)	--	--	1.00 (1.00-1.01)	ns	1.02 (1.00-1.03)	1.01 (0.99-1.03)
Condom use with last paying partners						
<i>Consistent (always)</i>	--	--	--	--	1.0	1.0
<i>Inconsistent</i>	--	--	--	--	1.38(0.38-4.99)	1.71 (0.32-9.21)

** p<0.01;

* p<0.05