



Research Paper

Prevalence and correlates of amphetamine-type stimulant use among transgender women in Cambodia

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ARTICLE INFO

Keywords:

Amphetamines
Key population
Illicit drugs
HIV
Substance abuse
Cambodia

ABSTRACT

Background: The use of amphetamine-type stimulants (ATS) is associated with increases in HIV infections and other negative health outcomes. Globally, transgender women are among the most vulnerable to HIV. In this paper, we report the prevalence and correlates of ATS use among transgender women in Cambodia.

Methods: In 2016, 1375 transgender women were recruited for the National Integrated Biological and Behavioural Survey using respondent-driven sampling method. Participants were recruited from the capital city of Phnom Penh and 12 other provinces. A structured questionnaire was used to collect information on demographic characteristics, sexual behaviours, ATS and other substance use, depressive symptoms, gender-based violence, adverse childhood experiences, stigmatization, and social support. Weighted multivariable logistic regression analyses were conducted to identify risk factors associated with ATS use in the past three months.

Results: Overall, the most commonly reported illicit drug used by the survey participants was ATS (10.4%). ATS use was more likely to occur among participants who: (1) were urban dwellers, (2) were 25 to 34 years old, (3) had low levels of education, (4) engaged in transactional sex, (5) inconsistently used condoms with commercial partners, (6) reported binge drinking, (7) had depressive symptoms, (8) had a feeling that co-workers/classmates were not supportive regarding their transgender identity, and (9) had experienced emotional abuse during childhood.

Conclusion: ATS were the most commonly reported illicit drugs among transgender women in this study. To mitigate potential negative outcomes, developing and implementing additional harm reduction strategies tailored to ATS use among transgender women is needed. Integration of HIV and mental health interventions into harm reduction programs is required.

Introduction

Over the course of the last decade, interest in the use of amphetamine-type stimulants (ATS) has grown significantly (Rasmussen, 2015). The thrust of this interest has been the observation of the rising worldwide use of ATS and its epidemiologic links to the global epidemic of human immunodeficiency virus (HIV). According to the United Nations Office on Drugs and Crime (UNODC), ATS refer to a group of drugs whose principal members include amphetamine and methamphetamine (UNODC, 2016). This group also includes a range of other substances, such as methcathinone, fenetylline, ephedrine, pseudoephedrine,

methylphenidate, and 3,4-methylenedioxyamphetamine or ‘ecstasy’ (UNODC, 2016). ATS can be used via a variety of ways including oral ingestion, injection, inhalation, smoking, or insertion into the anus, which increases their appeal to enhance sexual experience (McKetin et al., 2008). Globally, ATS are among the most commonly used type of illicit drugs (UNODC, 2016).

Globally, studies related to ATS use tend to focus on men who have sex with men (MSM) in high-income countries, with relatively limited exploration of ATS use in middle- and low-income countries (Colfax et al., 2010). While the consumption of ATS is stagnating in the Americas and Europe, it is rapidly increasing in East Asia and Oceania,

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with large-scale manufacturing occurring in parts of the sub-Mekong region (McKetin et al., 2008). The rising consumption of ATS in Southeast and East Asia has implications for the HIV epidemic and broader harm reduction programs in those regions, and therefore requires attention.

In Cambodia, one of the Asian countries most severely affected by HIV, the HIV epidemic was initially confined to entertainment/sex workers, their clients, and families (Vun et al., 2014). In recent years, however, the incidence of HIV has increasingly shifted to other key populations besides female entertainment workers, particularly MSM, people who use/inject drugs, and transgender women (Vun et al., 2014). In this context, methamphetamine is commonly consumed in the form of pills known as ‘yama’ (McKetin et al., 2008), which contains about 15% methamphetamine (National Authority for Combatting Drugs, 2008). To date, studies on the use of ATS in Cambodia have largely been confined to female entertainment workers and mainly conducted by the Young Women’s Health Study Collaborative (Couture et al., 2011; Maher et al., 2011; Page et al., 2013). These studies found that a quarter of sampled female entertainment workers were using ATS, an observation that is facilitating the identification of ATS as an emerging driver of HIV and other sexually transmitted infections (STIs) in the country.

Consumption of ATS is known to increase sexual desire, energy, disinhibition, and euphoria (Barr et al., 2006; Green & Halkitis, 2006; Volkow et al., 2007). Recent systematic reviews and epidemiologic studies have demonstrated that the use of ATS is commonly associated with group sex, unprotected sex, and multiple sexual partners, all of which increase the risk of HIV and other STIs (Molitor, Truax, Ruiz, & Sun, 1998; Plankey et al., 2007; Prestage, Grierson, Bradley, Hurley, & Hudson, 2009; Semple, Patterson, & Grant, 2002).

The prevalence of HIV in transgender women is among the highest in all key populations in Cambodia (Chhim et al., 2017). However, limited exploration of ATS use in relation to HIV risks among this population has been undertaken to date. As in other countries (Poteat, Scheim, Xavier, Reischer, & Baral, 2016), the response to HIV in Cambodia has been impeded by a lack of adequate strategic information related to transgender population. It is only recently that transgender women have been separated from MSM, under whom they had previously been subsumed for the purposes of national surveillance and program planning (National Center for HIV/AIDS, Dermatology and STD, 2013). The present study was therefore conducted to identify the prevalence and factors associated with ATS use among transgender women in Cambodia. By focusing on transgender women, this paper is a first step towards developing a better understanding of ATS use among this HIV key population, as it provides critical data required for subsequent evidence-based development of strategies that address the harms of ATS use.

Methods

Study sites and participants

Data used for this study were collected as part of the 2016 National Biological and Behavioural Survey among Transgender Women in Cambodia. The details of the larger study have been reported elsewhere (Chhim et al., 2017; Yi et al., 2017, 2018). In brief, participants were recruited from 20 specific locations, six locations in the capital city of Phnom Penh and 14 locations in 12 other provinces using the respondent driven sampling (RDS) method. The locations were determined based on the proportion of the required sample size and the estimated population size of transgender women in each site. To be included in the study, an individual must: (1) be aged at least 18 years, (2) be biologically male at birth and self-identified as female, (3) report having anal intercourse with at least one man in the past 12 months, (5) be able to communicate in Khmer, and (6) be able to provide a written informed consent to participate in the study.

Four potential seeds (two seeds aged 18–24 and the other two seeds aged 25 or older) were identified in each study site (80 seeds in total). The eligibility to participate as a seed was determined by the data collection team leader using a screening tool. Each seed received three coupons and US\$2 for a successful referral. In each location, each seed was expected to extend between three to six recruitment waves. Additional seeds would be selected if the initial seeds failed to recruit participants, or if the enrolment was halted because all recruitment chains had dried up.

Training and data collection

Two data collection teams with eight members each were formed and received three days of training. The contents of the training included the overview of the study protocol and tools, interview techniques, ethical issues, and questionnaire pretesting. Review sessions with interviewers were conducted regularly during data collection by the team leaders and field supervisors.

The team members included one field supervisor, five interviewers, one lab technician, and one counsellor. Each team was supported by a field facilitator who was a peer outreach worker from a community-based organization working with transgender women community in the area. The field supervisor was responsible for eligibility screening and providing a unique personal identification number that was used to link all data collected from each participant. The counsellor was responsible for obtaining informed consent from each participant and performing HIV pre- and post-test counselling. An Android tablet was used for the interviews conducted in a private room and took approximately 30 min to complete. Each participant received US\$4 of token cash and a pack of three condoms for their time and transport compensation.

Variables and measurements

The questionnaire was initially developed in English and translated into Khmer, which was then back-translated into English. Consultative meetings were held with key stakeholders working on HIV as well as representatives of transgender women communities. The questionnaire was pretested prior to the data collection with 20 transgender women in Phnom Penh who were later excluded from the main study.

Questions were adapted from the most recent Cambodia Demographic and Health Survey (2014) and other recent surveys among HIV key populations in Cambodia (Yi et al., 2015, 2016) to measure socio-demographic characteristics, sexual behaviours, and substance use. For socio-demographic characteristics, we collected information on type of community (urban, rural), age, self-reported gender identity, marital status, main occupation, average income, and level of formal education attained. HIV risks included sexual behaviours and condom use with different types of partners, as well as substance use (ATS, heroin, marijuana, alcohol, among others) in the past three months.

We adapted a questionnaire from previous studies (Clements-Nolle, Marx, Guzman, & Katz, 2001) to measure experiences of gender-based discrimination and violence. The questionnaire collected self-reported information on different forms of gender-based discrimination and violence that the participants had experienced in the past 12 months. The participants were asked whether they felt that their co-workers or classmates were supportive regarding their transgender identity, and whether they had experienced problems such as difficulties in getting a job, losing a job, having been denied or thrown out of housing, or having had difficulties in accessing HIV or other health services. They were also asked whether they had experienced different forms of gender-based violence due to their transgender identity, including physical or sexual abuse, being forced to drop out of school, or being arrested by police/authorities (Cronbach’s alpha = 0.74).

Five questions were adapted from a brief screening version of the Childhood Trauma Questionnaire (Bernstein et al., 2003) to measure

adverse childhood experiences. The yes/no questions collected information on physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect they experienced during the time when they were growing up.

Depressive symptoms were measured using the Center for Epidemiologic Studies Depression scale (CES-D) (Radloff, 1977). The 20-item scale evaluated six symptoms of depression experienced during the preceding week including depressed mood, guilt or worthlessness, helplessness or hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. Each question was scored on a scale of 0 to 3 according to the frequency of the symptoms, and the total CES-D score ranges from 0 to 60. To calculate the total score, four items (I felt I was just as good as other people, I felt hopeful about the future, I was happy, I enjoyed life) were reverse coded. The criterion validity of the CES-D has been well established in Asian (Shima, Shikano, Kitamura, & Asai, 1985) and Western populations (Radloff, 1977). Participants were defined as having depressive symptoms if they had a CES-D score of ≥ 16 . Severe depressive state was defined using a cut-off value of ≥ 23 recommended for Asians (Wada et al., 2007). Cronbach's alpha among participants in this study was 0.88.

Data analyses

All statistical analyses were RDS-adjusted using Stata's "rds_network," "rds," and "bootstrap.b: rds," which was adapted from www.respondentdrivensampling.org. All continuous variables were converted into categorical variables because RDS technique does not support continuous variables. For continuous variables with no standard cut-off value in the contemporary literature, we used the mean value (or median for skewed data) to convert continuous outcomes into categorical outcomes. Individual weight based on the outcome variables were created using RDS' Stata command and used in both bivariate and multivariate analyses. Chi-square test (or Fisher's exact test when a cell count was smaller than five) was used to compare socio-demographic characteristics, experiences of gender-based violence, sexual behaviours, use of other substances, depressive symptoms, and adverse childhood experiences among ATS users (respondents who reported using any form of ATS at least once in the past three months) and non-users. We then constructed a weighted multivariable logistic regression model to explore factors associated with ATS use in the past three months. Variables associated with ATS use in bivariate analyses at a level of p -value < 0.05 were included simultaneously in the model. No multicollinearity was detected. Adjusted odds ratio (AOR) were obtained and presented with a confidence interval (CI) and p -value. We used Stata (StataCorp LP, version 14.1) for data analyses.

Ethical considerations

The National Ethics Committee for Health Research (NECHR) of the Ministry of Health, Cambodia approved the study (Ref No. 420 NECHR). We obtained written informed consent from each participant and strictly protected the privacy and confidentiality of the participants.

Results

Sociodemographic characteristics and illicit drug use

This study included 1375 transgender women with a mean age of age of 25.8 years (SD = 7.1). Of the total, 165 participants (12.0%) reported having used at least one form of illicit drugs in the past three months, with ATS being the most commonly reported (10.4%). Very few participants reported using other forms of illicit drugs such as heroin (0.6%), marijuana (0.3%), and other non-defined types (0.4%). As shown in Table 1, a significantly higher proportion of ATS users were from urban communities, in the age group of 25 to 34, not married

Table 1

Comparison of sociodemographic characteristics and gender-related experiences among ATS users and non-users.

Characteristics	Total (n = 1375)	ATS use in the past 3 months		P-value*
		No (n = 1232)	Yes (n = 143)	
Types of community				0.04
Urban	1146 (83.3)	1018 (82.6)	128 (89.5)	
Rural	229 (16.7)	214 (17.4)	15 (10.5)	
Age group (in years)				0.005
18–24	729 (53.0)	668 (54.2)	61 (42.7)	
25–34	503 (36.6)	433 (35.1)	70 (49.0)	
≥ 35	143 (10.4)	131 (10.6)	12 (8.4)	
Marital status				0.001
Married	23 (1.7)	19 (1.5)	4 (2.8)	
Widowed/divorced	18 (1.3)	15 (1.2)	3 (2.1)	
Not married, not living with partner	1074 (78.1)	982 (79.7)	92 (64.3)	
Not married, but living with partner	260 (18.9)	216 (17.5)	44 (30.8)	
Average monthly income in past 6 months				0.73
\leq US\$ 200	876 (63.7)	783 (63.6)	93 (65.0)	
$>$ US\$ 200	499 (36.3)	449 (36.4)	50 (35.0)	
Level of formal education attained				0.001
Primary (0–6 years)	307 (22.3)	264 (21.4)	43 (30.1)	
Lower secondary (7–9 years)	440 (32.0)	384 (31.2)	56 (39.2)	
Higher secondary (10–12 years)	503 (36.6)	465 (37.7)	38 (26.6)	
Higher education ($>$ 12 years)	125 (9.1)	119 (9.7)	6 (4.2)	
Current job (main source of income)				< 0.001
Entertainment worker	203 (14.8)	165 (13.4)	38 (26.6)	
Hair dresser/beautician	482 (35.1)	448 (36.4)	34 (23.8)	
Office worker	84 (6.1)	76 (6.2)	8 (5.6)	
Farmer/labourer	241 (17.5)	206 (16.7)	35 (24.5)	
Self-employed	149 (10.8)	139 (11.3)	10 (7.0)	
Unemployed	64 (4.7)	57 (4.6)	7 (4.9)	
Student	108 (7.9)	103 (8.4)	5 (3.5)	
Other	44 (3.2)	38 (3.1)	6 (4.2)	
Self-reported gender identity				0.06
Female	581 (42.3)	531 (43.1)	50 (35.0)	
Third gender†	794 (57.7)	701 (56.9)	93 (65.0)	
Frequency of expressing as a woman				0.23
All the time	661 (48.1)	599 (48.6)	62 (43.4)	
Not all the time	714 (51.9)	633 (51.4)	81 (56.6)	

Abbreviation: ATS, amphetamine-type stimulants.

Values are numbers of subjects (%).

* Chi-square test, or Fisher's exact test when a cell count was smaller than 5, was used.

† Participants considered themselves as neither male nor female.

but living with a partner, having lower level of formal education, and in entertainment or farmer/labourer employment category.

Sexual behaviours and HIV risk perception

Table 2 shows that a vast majority of the participants were sexually active and most reported a receptive role in anal intercourse with men in the past three months. The median number of sexual partners in the past three months was 3.0 (ranging from 0 to 90), with 61.7% having three or more partners in the past three months. About 38.0% reported having transactional sex in the past three months. The rates of consistent condom use in non-commercial and commercial relationships were similar (58.4% and 60.0%, respectively). Compared to non-users, a significantly higher proportion of ATS users reported engaging in either insertive or both insertive and receptive anal sexual intercourse, using condoms consistently when having anal intercourse with non-

Table 2
Comparisons of HIV risk and sexual behaviours among ATS users and non-users.

Sexual behaviours in the past 3 months	Total (n = 1375)	ATS use in the past 3 months		P-value*
		No (n = 1232)	Yes (n = 143)	
Had anal intercourse with a man				0.14
No	66 (4.8)	64 (5.2)	2 (1.4)	
Yes	1309 (95.2)	1168 (94.8)	141 (98.6)	
Usual role in anal intercourse with men				<0.001
Insertive only	29 (2.1)	24 (1.9)	5 (3.5)	
Receptive only	1145 (83.3)	1039 (84.3)	106 (74.1)	
Both	135 (9.8)	105 (8.5)	30 (21.0)	
No response	66 (4.8)	64 (5.2)	2 (1.4)	
Number of male sexual partners				0.08
< 3	526 (38.3)	481 (39.0)	45 (31.5)	
≥ 3	849 (61.7)	751 (61.0)	98 (68.5)	
Had anal intercourse with men not in exchange for money or gifts				0.23
No	253 (18.4)	232 (18.8)	21 (14.7)	
Yes	1122 (81.6)	1000 (81.2)	122 (85.3)	
Condom use in anal intercourse with a man not in exchange for money or gifts				<0.001
Not always	500 (41.6)	476 (44.3)	24 (18.8)	
Always	703 (58.4)	599 (55.7)	104 (81.3)	
Had anal intercourse with a man in exchange for money or gifts				<0.001
No	814 (62.2)	761 (65.2)	53 (37.6)	
Yes	495 (37.8)	407 (34.8)	88 (62.4)	
Number male sexual partners in exchange for money/gifts				<0.001
< 2	1041 (75.7)	962 (78.1)	79 (55.2)	
≥ 2	334 (24.3)	270 (21.9)	64 (44.8)	
Condom use with male sexual partners in exchange for money or gifts				0.001
Not always	164 (40.0)	123 (36.4)	41 (56.9)	
Always	246 (60.0)	215 (63.6)	31 (43.1)	
Perceived likelihood of HIV infection				0.07
Very likely	153 (11.1)	135 (11.0)	18 (12.6)	
Likely	758 (55.1)	669 (54.3)	89 (62.2)	
Unlikely	345 (25.1)	322 (26.1)	23 (16.1)	
Very unlikely	119 (8.7)	106 (8.6)	13 (9.1)	

Abbreviations: ATS, amphetamine-type stimulants; HIV, human immunodeficiency virus.

Values are numbers of subjects (%).

* Chi-square test or Fisher's exact test when a cell count was smaller than 5, was used.

commercial male partners, having transactional sex with men, and having two or more commercial partners in the past three months compared to that of non-users. A significantly lower proportion of ATS users reported using condoms consistently when having anal intercourse with commercial male partners in the past three months.

Alcohol use and depressive symptoms

The majority of the participants reported drinking alcohol in the past three months with almost one-third drinking at least two times per week and about one in 10 drinking more than five drinks in one day (binge drinking) on at least four days per week. The prevalence of depressive symptoms and severe depressive symptoms on CES-D was 45.0% and 21.8%, respectively. As shown in Table 3, the prevalence of alcohol use, binge drinking, depressive symptoms, and major depressive symptoms was significantly higher among ATS users compared to that among non-users.

Gender-based discrimination and violence

Table 4 shows that experiences of gender-based discrimination and violence were common among transgender women in this study. For example, 42.0% reported experiencing problems getting a job, while 24.3% reported having lost a job and thought it was because of their transgender identity. Participants also reported having experienced different forms of gender-based violence such as physical abuse

Table 3
Comparisons of alcohol use and depressive symptoms among ATS users and non-users.

Illicit drug use in the past 3 months	Total (n = 1375)	ATS use in the past 3 months		P-value*
		No (n = 1232)	Yes (n = 143)	
Drank at least one can of beer or glass of wine in the past 3 months				<0.001
Never	331 (24.1)	322 (26.1)	9 (6.3)	
≤ Once a month	339 (24.7)	316 (25.6)	23 (16.1)	
2–4 times/month	304 (22.1)	267 (21.7)	37 (25.9)	
2–3 times/week	196 (14.3)	171 (13.9)	25 (17.5)	
≥ 4 times/week	205 (14.9)	156 (12.7)	49 (34.3)	
Frequency of having more than 5 drinks in one day in the past 3 months				<0.001
Never more than five drinks	285 (27.4)	265 (29.3)	20 (14.9)	
≤ Once a month	304 (29.3)	279 (30.8)	25 (18.7)	
2–4 times/month	182 (17.5)	151 (16.7)	31 (23.1)	
2–3 times/week	157 (15.1)	129 (14.3)	28 (20.9)	
≥ 4 times/week	111 (10.7)	81 (9.0)	30 (22.4)	
Had depressive symptoms [†]	619 (45.0)	535 (43.4)	84 (58.7)	<0.001
Had severe depressive symptoms [‡]	300 (21.8)	250 (20.3)	50 (35.0)	<0.001

Abbreviations: ATS, amphetamine-type stimulant.

Values are numbers of subjects (%).

* Chi-square test was used.

[†] Defined by a Center for Epidemiology Studies Depression Scale (CES-D) score of ≥ 16.

[‡] Defined by a Center for Epidemiology Studies Depression Scale (CES-D) score of ≥ 23.

Table 4
Comparison of gender-related discrimination and violence experiences among ATS users and non-users.

Discrimination experience in the past 12 months	Total (n = 1375)	ATS use in the past 3 months		P-value*
		No (n = 1232)	Yes (n = 143)	
Feeling co-workers/classmates are supportive regarding transgender identity				0.001
No	140 (10.2)	115 (9.3)	25 (17.5)	
Yes	1235 (89.8)	1117 (90.7)	118 (82.5)	
Experienced problems getting a job and thought it was because of transgender identity				0.08
No	797 (58.0)	724 (58.8)	73 (51.0)	
Yes	578 (42.0)	508 (41.2)	70 (49.0)	
Lost a job and thought it was because of your transgender identity				<0.001
No	1041 (75.7)	950 (77.1)	91 (63.6)	
Yes	334 (24.3)	282 (22.9)	52 (36.4)	
Denied/thrown out of a housing and thought it was because of your transgender identity				0.001
No	1126 (81.9)	1024 (83.1)	102 (71.3)	
Yes	249 (18.1)	208 (16.9)	41 (28.7)	
Had problems getting health services because of your transgender identity				0.96
No	1258 (91.5)	1127 (91.5)	131 (91.6)	
Yes	117 (8.5)	105 (8.5)	12 (8.4)	
Physically abused or beaten because of your transgender identity				<0.001
No	1050 (76.4)	960 (77.9)	90 (62.9)	
Yes	325 (23.6)	325 (23.6)	272 (37.1)	
Sexually abused or assaulted because of your transgender identity				<0.001
No	837 (60.9)	667 (62.3)	70 (60.9)	
Yes	538 (39.1)	465 (37.7)	73 (51.0)	
Arrested and thought it was because of your transgender identity				0.001
No	1231 (89.5)	1114 (90.4)	117 (81.8)	
Yes	144 (10.5)	144 (10.5)	26 (18.2)	
Dropped out of school because of your transgender identity				<0.001
No	1042 (75.8)	951 (77.2)	91 (63.6)	
Yes	333 (24.2)	281 (22.8)	52 (36.4)	

Abbreviations: ATS, amphetamine-type stimulant.

Values are numbers of subjects (%).

* Chi-square test was used.

Table 5
Comparisons of adverse childhood experiences among ATS users and non-users.

Adverse childhood experiences	Total (n = 1375)	ATS use in the past 3 months		P-value*
		No (n = 1232)	Yes (n = 143)	
Had been hit, slapped, or kicked by a parent or guardian				0.007
No	568 (41.3)	524 (42.5)	44 (30.8)	
Yes	807 (58.7)	708 (57.5)	99 (69.2)	
People in my family had said hurtful or insulting things to me				<0.001
No	489 (35.6)	463 (37.6)	26 (18.2)	
Yes	886 (64.4)	769 (62.4)	117 (81.8)	
Someone had tried to touch me or make me touch them in a sexual way				0.003
No	928 (67.5)	847 (68.8)	81 (56.6)	
Yes	447 (32.5)	385 (31.2)	62 (43.4)	
There had been someone to take care of me when I got sick				0.81
No	43 (3.1)	39 (3.2)	4 (2.8)	
Yes	1332 (96.9)	1193 (96.8)	139 (97.2)	
There had been someone who helped me feel that I was loved and important				0.16
No	104 (7.6)	89 (7.2)	15 (10.5)	
Yes	1271 (92.4)	1143 (92.8)	128 (89.5)	

Abbreviations: ATS, amphetamine-type stimulant.

Values are numbers of subjects (%).

* Chi-square test or Fisher's exact test when a cell count was smaller than 5, was used.

(23.6%), sexual abuse or assault (39.1%), and arrests by police or authorities (10.5%) because of their transgender identity. The proportion of participants who had a feeling that co-workers/classmates were supportive regarding their transgender identity was significantly lower among ATS users compared to that among non-users. The proportion of participants who reported having lost a job, been denied or thrown out of housing, been physically abused, been sexually abused or assaulted, been arrested by police or authorities, and dropped out of school because of their transgender identity was significantly higher among ATS users compared to that among non-users.

Adverse childhood experiences

As shown in Table 5, a noticeably high proportion of participants in this study reported adverse childhood experiences such as physical abuse (58.7%), emotional abuse (64.4%), and sexual abuse (32.5%). Compared to that among non-users, the proportion of participants who reported physical abuse, emotional abuse, and sexual abuse was significantly higher among ATS users.

Independent factors associated with ATS use

Table 6 shows that, after controlling for other covariates in a multivariable logistic regression model, ATS use in the past three months remained negatively associated with living in rural areas (AOR = 0.36, 95% CI = 0.19–0.69) and having more than 12 years of formal education (AOR = 0.33, 95% CI = 0.12–0.93) and positively associated with being in the age group of 25 to 34 years (AOR = 1.69, 95% CI = 1.08–2.62). In regards to HIV risks, ATS use remained positively associated with involvement in transactional sex (AOR = 2.26, 95% CI = 1.11–4.64) and negatively associated with consistent condom use with commercial partners (AOR = 0.50, 95% CI = 0.28–0.92) in the past three months. ATS use also remained positively associated with higher frequency of binge drinking: (AOR = 3.86, 95% CI = 1.53–8.99 among those reporting binge drinking 2–4 times per month; AOR = 4.80, 95% CI = 1.23–5.85 among those reporting binge drinking 2 to 3 times per week; and AOR = 6.41, 95% CI = 2.67–9.05 among those reporting binge drinking \geq 4 times per week). Regarding mental health problems, ATS use remained negatively associated with a feeling that co-workers/classmates were supportive regarding their transgender identity (AOR

Table 6
Multivariable associations of ATS use among transgender women in the study.

Variables in the final model	ATS use in the past 3 months	
	AOR (95% CI)	P-value*
Types of community		
Urban	Reference	
Rural	0.36 (0.19–0.69)	0.002
Age group (in years)		
18–24	Reference	
25–34	1.69 (1.08–2.62)	0.02
\geq 35	0.85 (0.38–1.89)	0.68
Level of formal education		
Primary (0–6 years)	Reference	
Lower secondary (7–9 years)	1.18 (0.71–1.96)	0.54
Higher secondary (10–12 years)	0.63 (0.36–1.09)	0.09
Higher education (> 12 years)	0.33 (0.12–0.93)	0.03
Had anal intercourse with a man in exchange for money or gifts		
No	Reference	
Yes	2.26 (1.11–4.64)	0.03
Always use condoms with men in exchange for money or gifts in the past three months		
No	Reference	
Yes	0.50 (0.28–0.92)	0.03
Frequency of having more than 5 drinks in one day in the past 3 months		
Never more than five drinks	Reference	
\leq Once a month	2.23 (0.96–7.63)	0.06
2–4 times/month	3.86 (1.53–8.99)	<0.001
2–3 times/week	4.80 (1.23–5.85)	<0.001
\geq 4 times/week	6.41 (2.67–9.05)	<0.001
Had depressive symptoms in the past week		
No	Reference	
Yes	1.68 (1.06–2.36)	0.04
Feeling co-workers/classmates are supportive regarding transgender identity		
No	Reference	
Yes	0.49 (0.30–0.78)	0.006
Verbal abuse by family members during childhood		
No	Reference	
Yes	2.24 (1.18–3.42)	0.004

Abbreviations: AOR, adjusted odds ratio; ATS, amphetamine-type stimulant; CI, confidence interval.

* The following covariates were included simultaneously in the multivariable logistic regression model: age, marital status, education, occupation, usual role in anal intercourse with men, sex with men in exchange for money or gifts in the past three months, condom use when having sex with men in exchange for money or gifts in the past three months, binge alcohol drinking in the past three months, depressive symptoms, support from co-workers/classmates regarding transgender identity, physical and sexual abuse because of transgender identity, drop-out of schooling because of transgender identity, and physical/verbal/sexual abuse by family members during childhood.

= 0.49, 95% CI = 0.30–0.78) and positively associated with having depressive symptoms (AOR = 1.68, 95% CI = 1.06–2.36), and experiences of emotional abuse during childhood (AOR = 2.24, 95% CI = 1.18–3.42).

Discussion

This paper reports factors associated with recent ATS use among transgender women in Cambodia. The results show that after controlling for other covariates in a multivariable logistic regression model, the odds of ATS use were significantly higher among transgender women who: (1) were urban dwellers, (2) were 25 to 34 years old, (3) had attained less than a high school education, (4) participated in transactional sex, (5) used condoms inconsistently with commercial partners, (6) reported binge drinking, (7) had depressive symptoms, (8) had a feeling that co-workers/classmates were supportive regarding their transgender identity, and (9) had experiences of emotional abuse during childhood.

Our study suggests that urban-dwelling and poorly educated

transgender women were likely to use ATS, which might be related to a combination of wider availability of ATS in urban areas and socio-economic factors. Studies from other countries also suggest that low education and economic privilege increases the risk of ATS consumption even among other populations (Massaro et al., 2017). In addition, the association of higher ATS use with low education is consistent with the general trend observed in Cambodia where both substance use and HIV infection are associated with lower levels of education (Chhim et al., 2017; Weissman et al., 2016). These findings have important implications for HIV and harm reduction programs to ensure that less educated and urban-dwelling transgender women are reached with information and health education related to the harms of substance use, including risk of dependence and HIV infection. While we are unable to hypothesize based solely on our study, other authors suggest that (1) more active models of engagement with ATS users, (2) education based on the specific patterns of sexual behaviours, and (3) ensuring that education is taken to places of users' work, are essential among general users of meth/amphetamines (Degenhardt et al., 2010; Roche, Pidd, Bywood, & Freeman, 2008; Sherman et al., 2008). In Cambodia, future studies should explore which education and information and communication approaches would be most effective specifically for transgender women.

In our study, the highest prevalence of ATS was found among transgender women who were involved in transactional sex. This is similar to other studies showing an association between sex work and the use of ATS (Schein, Bauer, & Shokoohi, 2017). At the same time, it is clear in the literature that the confluence of sex work and the use of ATS contributes to the high rates of HIV among transgender women (Hoffman, 2014), partly because the use of ATS has an impact on sexual desire, number of sexual partners, and sexual risk taking among transgender populations (Marshall et al., 2011; Santos et al., 2014). In Cambodia, consumption of ATS has been associated with a high number of sexual partners and STIs among female sex workers (Couture et al., 2012).

The use of ATS was significantly associated with inconsistent condom use with commercial partners in our transgender sample, a finding that contrasted the observations in the study by Couture et al. (2012) among Cambodian female entertainment workers. While the inconsistency in findings requires further studies to understand, our finding is particularly important, and is indeed consistent with existing evidence that the consumption of ATS reduces condom use (Marshall et al., 2011; Santos et al., 2014), which may increase the risk of HIV and other STIs. In separate analyses using the same data, we found that the prevalence of HIV among participants in this national survey was 5.9% ($n = 81$), of whom 52% ($n = 42$) were not aware of their HIV status prior to the study (Chhim et al., 2017; Yi et al., 2017).

The observation that ATS users were also more likely to binge on alcohol emphasizes the potential for HIV exposure among transgender women who use ATS, which is of primary concern in the Cambodian context. Alcohol intoxication impairs judgment, making transgender women more likely to engage in risky sexual practices (Delgado et al., 2017; Operario, Nemoto, Iwamoto, & Moore, 2011), although the association with the risk of HIV and other STIs is not always consistent (Herrera et al., 2016). Alcohol use by transgender women may itself be mediated by other factors such as depression, stigma, and victimization (Chakrapani, Newman, Shunmugam, Logie, & Samuel, 2017), and our study suggest a convergence of such multiple vulnerabilities. As such, our findings support the need for novel approaches to mitigate multiple risk factors related to ATS use, transactional sex work, and alcohol use. While current approaches stratify risk based on condom use and sexual partners, our findings suggest that ATS may influence HIV risk behaviours and should be considered as part of risk assessment targeting transgender women with HIV testing and prevention services.

Our data show that ATS users were more likely to have experienced emotional abuse during childhood and had less social support regarding their transgender identity from friends or colleagues in adulthood. A

lack of social support has been linked to higher substance use among transgender women in previous studies (Ryan, Huebner, Diaz, & Sanchez, 2009). Several researchers have also reported that exposure to childhood physical violence is predictive of adult substance use (Debeck et al., 2013; Hadland et al., 2012). Not surprisingly, ATS users were also more likely to perceive stigmatizing attitudes from their classmates or co-workers, which is consistent with the suggestion that substance use is a commonly used coping strategy for emotional distress and psychological problems (Arnou, 2004; Wegman & Stetler, 2009). In our recent publication from the same study sample, we reported that stigmatization by classmates or co-workers doubled the odds of experiencing depressive symptoms among transgender women (Yi et al., 2018). Similarly, a recent study in Vietnam found a co-occurrence of ATS use, stigma, and depression among MSM (Vu et al., 2017).

Assessed as a whole, therefore, a particularly important pattern emerging from our findings is related to mental health. In sum, ATS use was associated with excessive use of alcohol, stigma, and discrimination related to transgender identity, adverse childhood experiences, adulthood gender-based violence, and depressive symptoms. While it is difficult to identify causality in our study, these findings suggest that addressing mental health will be essential in limiting effects or antecedent causes of ATS use. An important first step would constitute the sensitization of HIV and harm reduction programs that reach transgender women regarding the presence and need for screening transgender women for ATS use and depressive symptoms, followed by integration of ATS counselling within harm reduction programs. At the present, a significant focus of the national harm reduction strategy is on injection drug use. Integration and implementation of individual cognitive-behavioural therapy (CBT), CBT skills groups, and regular screening of ATS use has been shown to reduce ATS use in the United States (Rawson et al., 2004). A pilot of this approach in Cambodia has recently been shown to have some successes among female entertainment workers (Carrico et al., 2016). Much more widely, these findings suggest that system strengthening to address mental health would be needed, given the limited infrastructure and resources to respond to mental health problems that currently exists in the country (Aberdein & Zimmerman, 2015; Ministry of Health, 2010; Schunert et al., 2012). Similarly, strengthening harm-reduction policies with more focus on prevention of mental health problems and substance use would be needed to complement infrastructural and service initiatives aimed at curbing the impact of ATS.

Our study has several noteworthy strengths, including a large sample of transgender women recruited by using the RDS method. However, our results should be interpreted in light of the fact that the study covered only the capital city and 12 provinces, where most transgender women were to be found. Since smaller towns and provinces with fewer transgender women were left out, these results may not be generalized to transgender women in those areas, where intervention programs are more scarcely available. Second, participants were identified through initial seeds who were in contact with outreach workers from community-based organizations. As such, the results might apply less to transgender women who are not in contact with HIV and harm reduction programmes. In this regard, potential for social desirability bias may exist given that the study utilized self-reporting measures and was linked to community-based organizations whose aim was to mitigate ATS and other substance use among participants. Given that this study is cross-sectional in nature, measures were necessarily brief, and causal relationship may not be deduced from the findings.

Conclusions

Globally, most studies on ATS have focused predominantly on MSM residing in industrialized countries. This is the first study to explore this phenomenon among transgender women in Cambodia. We found that 10.4% of transgender women in this study had used ATS in the last three months. Higher odds of having used ATS was observed among

transgender women who were residing in urban areas, in the age group of 25 to 34 years, with low education levels, involved in transactional sex and inconsistent condom use, frequent binge drinkers, with less social support regarding their transgender identity, with a history of adverse childhood experiences, and with depressive symptoms. To mitigate new HIV infections and long-term harms of ATS use among transgender women, tailored interventions need to focus on these subpopulations and attendant risk factors. Integration of HIV and mental health interventions into harm reduction programs would be important for their success.

Declaration of Competing Interest

None declared.

Acknowledgements

This study was financially supported by the United States Agency for International Development (USAID) through the HIV/AIDS Flagship Project. We thank all provincial health departments, data collection teams, community-based organisations, community support volunteers, outreach workers, and all participants for their excellent contribution to this study. Disclaimer: Content of this paper is the responsibility of the authors and does not reflect the view of USAID or our respective institutions.

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