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Proportion and predictors of loss to follow-up in a longitudinal cohort study of female entertainment and sex workers in Cambodia

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Abstract

We examined the proportion and correlates of loss to follow-up (LTFU) among female entertainment and sex workers (FESWs) in a longitudinal HIV prevention intervention trial in Cambodia. The Cambodia Integrated HIV and Drug Prevention Intervention trial tested a comprehensive package of interventions aimed at reducing amphetamine-type stimulant use and HIV risk among FESWs in ten provinces. The present study estimated the proportion of women LTFU and assessed factors associated with LTFU. Logistic regression analyses were used. Of a total 596 women enrolled, the cumulative proportion of LTFU was 29.5% (n = 176) between zero- and 12-month follow-up. In multivariate analyses, women with no living children (adjusted odds ratio [AOR] 1.6; 95% confidence interval [CI]: 1.1, 2.3) and those who experienced recent food insecurity (AOR 1.7; 95%CI: 1.1, 2.7) were more likely to be LTFU. Women who were members

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Authors' contributions

KP, ESS, LM, AC, and JLE designed the CIPI study, developed the research protocol and tools. SM, ESS, JLE, AC, LM, SC were responsible for training and data collection. SC analysed the data, interpreted the results, and drafted the manuscript with guidance from KP, LM, and BMM. SC, CC, SH, BMM, JK, JLE, ESS, AC, SM, NS, and LM reviewed and contributed to editing the manuscript. All authors have read and approved the final manuscript.

Disclaimer

Data used for analysis cannot be made available in the manuscript, the supplemental files, or a public repository. However, data can be accessed upon request from the Principal Investigator Kimberly Page at pagek@salud.unm.edu.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

of the SMARTgirl HIV prevention programme for > 6 months compared to non-members were less likely to be LTFU (AOR 0.3; 95%CI: 0.2, 0.6). LTFU was moderately high in this study and similar to other studies, indicating a need for strategies to retain this population in HIV prevention programmes and research. Interventions aimed at stabilizing women's lives, including reducing food insecurity and creating communities of engagement for FESWs, should be considered.

Keywords

Female entertainment worker; sex workers; HIV prevention; loss to follow-up; intervention; Cambodia

Introduction

Women engaged in transactional sex remain one of the most at-risk groups for HIV globally.

¹ A systematic review and meta-analysis of studies from 50 low- and middle-income countries showed that pooled HIV prevalence in this population was as high as 11.8%, 13.5 times greater than in the general population of women of childbearing age.¹ In Cambodia, women engaged in transactional sex are a heterogeneous group who work in a variety of settings, including entertainment establishments (karaoke bars, massage parlours, beer gardens, cafes, and barber shops), guest houses, streets, and parks. We use the term female entertainment and sex workers (FESWs) to describe this group.² In 2016, national surveillance data estimated an HIV prevalence of 3.2% among Cambodian FESWs,³ five-fold higher than in the general population.⁴ Research by our group has also shown that FESWs who use amphetamine-type stimulants (ATSs) have more sexual partners, are more likely to engage in condomless sex, are at higher risk of acquiring sexually transmitted infections (STIs),^{5,6} and to be less engaged in preventive care.⁷

Prospective longitudinal studies, including intervention trials, aim to minimize loss to follow-up (LTFU) to reduce bias and maximize study validity.⁸⁻¹⁰ While LTFU may be defined differently from one study to another, non-random loss occurs when losses are related to the study exposure or outcome and have potential to be damaging to study validity.⁸⁻¹¹ Often, LTFU cannot be managed by statistical control.⁸⁻¹¹

Assessing factors associated with retention and loss can help to inform study procedures and reduce the potential for compromising study validity. Further, identifying and understanding the predictors of LTFU within longitudinal cohorts can inform programme planning when implementing interventions that are suited to a population of interest. Three prospective studies conducted among Cambodian FESWs reported high rates of LTFU. One study assessing HIV and STI incidence in a prospective cohort closed 12 months after initiation, citing concerns about insufficient sample size resulting from 51% LTFU.¹² Two consecutive cohort studies, each conducted for one year, among FESWs in Phnom Penh between 2007 and 2010 by our group reported LTFU of 37 and 23% at 12 months, respectively.^{2,5,6} To date, studies conducted among Cambodian FESWs have not explored specific factors associated with LTFU in this population.

The Cambodia Integrated HIV and Drug Prevention Intervention (CIPI) trial was designed to assess the impact of a comprehensive package of interventions designed to prevent HIV by reducing sexual risk and ATS use among high-risk FESWs.^{13,14} Data collected as part of the trial present an opportunity to examine predictors of LTFU among Cambodian FESWs participating in longitudinal research.

Methods

CIPI enrolled and followed women between June 2013 and December 2016. Full descriptions of the protocol and intervention methods have been previously published but are described briefly below.^{13,14} This study was reviewed and approved by Institutional Review Board (IRB) at the University of California San Francisco (UCSF) (No. 12-08589) on 29 March 2012, the Cambodia's National Ethics Committee for Human Research (No. 0038 NECHR) on 1 March 2013, and FHI360's Protection Human Subject Committee (No. 404710) on date 11 March 2013. The University of New Mexico and the University of New South Wales had reliance agreements recognizing the UCSF IRB determination. All women provided oral informed consent (signed consent was waived) prior to participation.

Study setting and intervention

The CIPI study was implemented in ten provinces, which were randomized to receive the study intervention sequentially in a step wedge randomized cluster study design. This study design is often used in implementation science research to study treatments that can be delivered only in a group setting (e.g. education), or to avoid contamination in the delivery of each regimen (e.g. a behavioural intervention that could be delivered individually, but where randomization may not impede close contact between study subjects). Clusters, in this case, provinces are identified and randomized prospectively to receive the experimental condition in a step-wise fashion.¹⁵ The CIPI programme had four components: (1) Expanded outreach to engage high-risk FESWs in existing HIV prevention services, the number of outreach workers and activities, including hours and recruitment locations, was expanded; (2) ATSs and alcohol screening using the World Health Organization Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST)^{16,17} as well as urine toxicology screening for recent ATS use, with brief counselling for those who screened positive for problematic ATS and/or alcohol use; (3) FESWs with problematic ATS use at baseline (based on ASSIST results and urine toxicology screening) were offered a 12-week conditional cash transfer (CCT) intervention targeting ATS use followed by four-week, cognitive-behavioural aftercare (AC) group; (4) a microenterprise (ME) opportunity for women who tested ATS toxicology negative at six months or who had completed the CCT and AC groups, and which included a three-day financial literacy training with the option to apply for a microloan. CIPI leveraged SMARTgirl, an established and widely disseminated HIV prevention platform targeting FESWs in Cambodia initiated in 2008.^{18,19} SMARTgirl provides peer education; social support; and referrals to HIV, STIs, and reproductive health services.^{18,19} Participants were aged 18 years or older, who understood spoken Khmer, were biologically female, reported two or more transactional sexual partners in the past month, and could provide voluntary informed consent. In each province, targeted participant recruitment and follow-up outreach for CIPI study participants was conducted by trained

outreach workers who were part of ongoing community programmes locally. All women who were not already members were invited to join the SMARTgirl programme.^{18,19}

At enrolment (baseline) women were surveyed regarding socio-demographic factors (e.g. age, marital status, number of children, and time living in the specific province). That visit and all subsequent study visits included further assessments for occupational factors (e.g. the type of venue they worked at, whether they had a boss or manager), assessments for ATSS and alcohol disorder using the ASSIST²⁰; urine toxicology testing for recent ATS use; assessment of sexual risk by self-report and prostate-specific antigen testing (a biomarker of unprotected sex).²¹ Measures of wellbeing included income, food insecurity, and housing instability. Food insecurity was defined as reporting 'sometimes', 'always', or 'usually' 'having no food to eat of any kind in the household because of lack of money or resources to get food in the last three months'.²² Housing instability was measured by asking 'In the past three months, how often did you worry about having a place to stay for you or your family because of lack of resources or money for housing?'.²³

Follow-up procedures

The CIPI study design included a target of enrolling and assessing 1200 women for an initial visit. Three subsequent six-month follow-up visits then followed. A total of 600 enrolled FESWs were purposively targeted for follow-up assessments at each of the three six-monthly follow-up assessments to measure the effectiveness of the CIPI multi-level intervention. For the 12-month follow-up, we primarily targeted women who participated in the six-month visit for follow-up and similarly, women in the 18-month follow-up visits were, to the extent possible, targeted from those who participated in the 12-month visit. To assess LTFU in this study, we anchored data at the six-month outcome evaluation visit and assessed losses at the subsequent 12- and 18-month outcome evaluation visits relative to the six-month visit. The baseline preintervention sample of women (N = 1198) could not be used to evaluate LTFU since the design was purposefully targeting outcome evaluation follow-up visits to half the number of women (N = 600). Thus, losses between baseline and six-month were not 'natural' losses.

At each visit, participants were given appointment cards and asked to return to the CIPI study site for follow-up in six months. Contact information was elicited including a phone number, home address, and workplace address to facilitate follow-up reminders and tracking. Approximately two weeks prior to scheduled appointments, outreach workers attempted to locate participants to remind them about upcoming visits in person and, or by telephone if available. Women received a remuneration of US\$4 for completing the six- and 12-month follow-up visits and US\$8 for completing the 18-month visit. All participants were also offered US\$2 for transportation or free transportation, as well as refreshments and condoms at all visits.

Analyses

The primary outcome of interest was the proportion of LTFU measured at the 12- and 18-month follow-up visits relative to the women who participated in the six-month visit. Participants were coded as LTFU if (1) they missed the 18-month visit, or (2) missed both

12- and 18-month visits. We assessed the association between LTFU and the following variables collected at baseline: socio-demographic characteristics; sexual and drug use exposures (by self-report and biomarker); measures of income, housing instability, and food insecurity; and participation in SMARTgirl. The proportion of LTFU was calculated by dividing total LTFU individuals by total participants enrolled at six-month follow-up visit. To identify factors associated with LTFU, we first conducted unadjusted logistic regression analysis. We included variables with $p < 0.25$ in the multivariate regression model. In addition to p -values, variables perceived a priori (e.g. SMARTgirl membership) and known potential confounders (like age) were included. We then eliminated variables with the highest p -value from the model. To ensure we did not eliminate potential interacting variables, we tested for interaction prior to finalizing the model. We repeated this until we had all variables with $p < 0.05$ in the final model. Analyses were conducted using STATA (Version 14.1 for Windows, Stata Corp, TX, US).

Results

Of the 596 FESWs who were seen at the anchor outcome evaluation (at six-month) visit (t0), 80.7% (n = 481) returned six months later at the 12-month visit (t1) and 70.5% (n = 420) were seen at the 18-month follow-up visit (t2) in the present study (Figure 1). A total of 115 women (19.3%) missed between (t0) and t(1), and a total of 61 (12.6%) missed the t(1) and t(2). The cumulative proportion of women who lost to follow-up between the (t0) and (t2) was 29.5%.

Table 1 summarizes socio-demographic, behavioural, and other characteristics of participants, LTFU proportion, and factors associated with attrition in bivariate analyses. The median age of women was 27 years (interquartile range 23, 31), two-thirds (68.1%) had six or fewer years of education, over half the women (58.7%) had one or more living children, and 37.4% reported cohabiting with a partner(s). The majority (80.0%) of women worked in entertainment venues such as karaoke bars, massage parlours, beer gardens, or nightclubs. One-fifth of participants (20.6%) reported food insecurity and almost half (44.4%) reported housing instability in the previous three months. Most women (84.1%) had been registered with the SMARTgirl programme for more than six months.

Based on unadjusted logistic regression analyses, the following variables were included in the multivariable model: marital status, parity, not providing a phone number, work venue, food insecurity, housing insecurity, SMARTgirl programme registration, having more than five sexual, and having a condomless sex (Table 1). Factors found to be independently associated with LTFU included parity, food insecurity, and SMARTgirl membership (Table 2).

Discussion

Our results provide important insights into the factors associated with LTFU among Cambodian FESWs participating in a longitudinal study. The proportion of women LTFU in this study, 29.5%, is comparable to that reported by other studies in similar populations which have reported 23–27% of women lost.^{2,5,6}

However, it was substantially lower than the 51% found in cohort of FESWs in Phnom Penh that was initiated in the early 2000s but subsequently stopped as a result.¹² Since our design had only two time points at which to assess follow-up over a 12-month period we were unable to calculate an estimated rate of LTFU per person-years of observation (PYO), limiting comparability to other studies which report rates in PYO. Nevertheless, the observed proportion of LTFU in our study was comparable to results of a study of female sex workers in Kenya ([23/100 PYO; 95%CI: 21.9, 24.9] and a study in China [29.7/100 PYO; 95% CI: 27.9, 31.6]).^{24,25}

Variables independently associated with LTFU in this study provide important insights into factors impacting retention in this population. FESWs who reported food insecurity were more likely to be LTFU compared to those who did not. Food insecurity has also been found to be associated with poor adherence to HIV treatment in studies in sub-Saharan Africa,^{26–35} the US,^{36–39} Canada,⁴⁰ and Honduras.⁴¹ FESWs who face food insecurity may have more instability in their daily lives and have significant competing priorities that impact participation in research. Our findings are in line with these studies and suggest that additional research is needed on how to minimize food insecurity to help overcome the destabilizing effects of this hardship on engagement and retention. A systematic review by Tirivayi and Groot⁴² suggested that providing food assistance could improve the adherence to HIV treatment. This kind of intervention in a research setting might only be a short-term approach, implemented in a small scale, given resource limitations. For a bigger scale or longer term structural solution, addressing food insecurity must involve all level policymakers to increase the job opportunities, decrease the food prices, increase farming, or promote small-scale enterprises, etc. going beyond what public health research can do.

Membership in the SMARTgirl programme emerged as significant and independent positive predictor of retention in our study. This finding is important because SMARTgirl has high programme coverage and high ‘brand-name’ recognition among FESWs in Cambodia. We are unable to measure how and by what mechanism SMARTgirl optimized retention. However, we hypothesize that group engagement, and factors like the safe space that SMARTgirl offers may contribute positively to retention and reduce the desire or need to relocate. Women may have also developed relationships with SMARTgirl programme’s outreach workers or staff that support positive engagement and retention. We have previously shown that SMARTgirl membership was a significant predictor of retention in HIV treatment among HIV-positive FESWs.⁴³

Women without living children compared to those with living children were also more likely to be LTFU in this study. Additional sub-analysis (data not shown) revealed that these women were significantly younger than those with children, less likely to cohabit with a partner, and had a shorter period of residence in the city in which they were enrolled, suggesting that they were more mobile. A similar finding was found in a study of LTFU among female sex workers in China.²⁵ There is a need for studies of the natural history of sex work in different settings which explore the relationships between age, childlessness, and mobility in this population. For women who are young and more mobile, informing women in advance that they can ‘transfer’ their programme membership to other locations could help to minimize attrition.

We noted that LTFU was not different between those who provided the research team with a contact phone number at baseline and those who did not. It is common for FESWs in Cambodia to change their phone numbers, especially when they relocate, and outreach workers used various methods to locate women including by direct contact at their living place or workplace. No associations were found between LTFU and risk behaviours, including between ATS use and sexual risk behaviour, the principal exposures, and outcomes in the CIPI trial.

Our study has several limitations. First, we only calculated the proportion of LTFU among women already enrolled in the study – using the six-month visit as the anchor point. These women may have been relatively stable compared to baseline, and it is possible that women who were more likely to be LTFU may have already lost prior to our six-month entry point, underestimating the proportion of LTFU rate in our study. In addition, women who did not complete the six-month visit could participate in the 12- and 18-month visits. If outreach workers met the target number, they might not have been diligent in trying to get the same women back, which would have the effect of inflating our estimate of LTFU. The CIPI study targeted high-risk FESWs, and as such, our sample may not represent the population of FESWs in Cambodia who are a highly heterogeneous group. For example, this study focused on women who were venue based (both entertainment and freelance), and it is unknown if women recruit male partners from the internet or other sources. Nevertheless, the large sample size and the wide geographic area from where participants were recruited means that our findings are highly relevant to FESWs at risk of HIV.

Conclusion

LTFU among FESWs in this study was moderately high but similar to that observed in other studies of female sex workers. There is a need for strategies designed to increase engagement in order to retain this population in HIV prevention programmes and related research. Results suggest that interventions aimed at stabilizing women's lives, including reducing food insecurity and creating communities of engagement for FESWs as using technologies, such as mobile phone apps that might increase geographic access for mobile FESWs should be considered.

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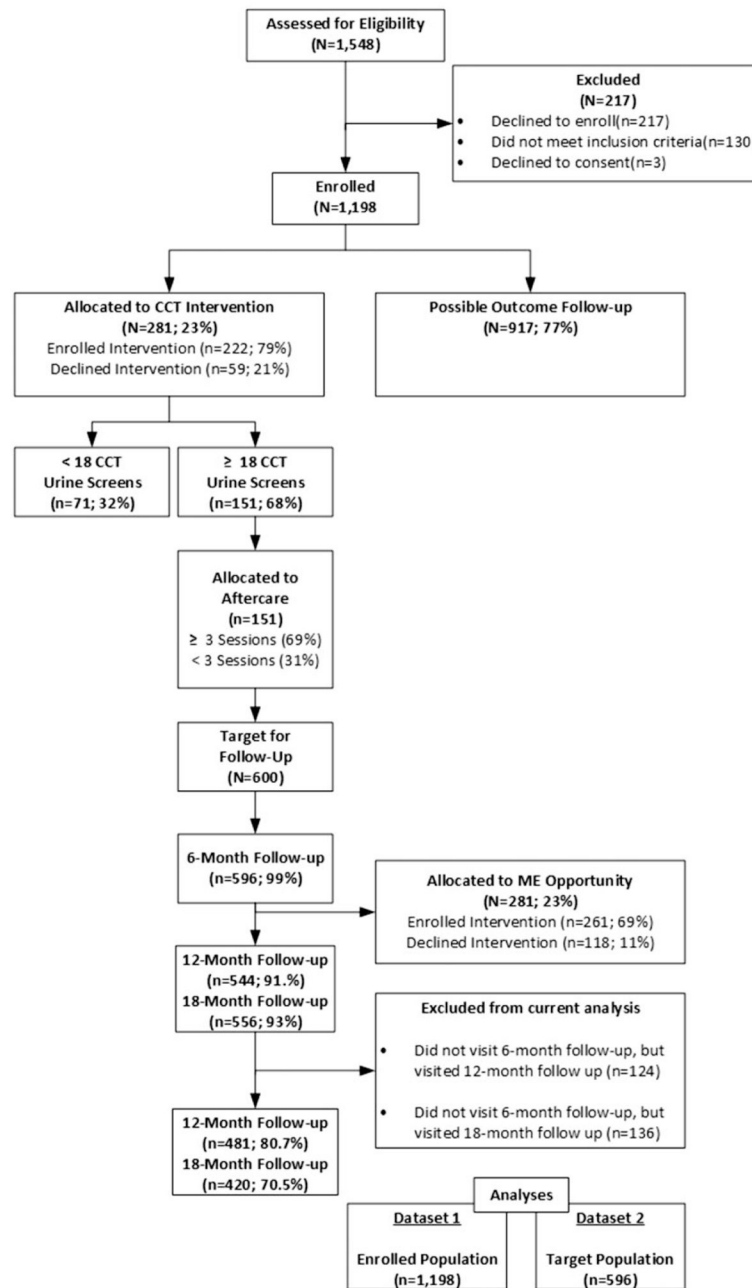


Figure 1. CONSORT diagram. CCT: conditional cash transfer; ME: micro-enterprise.

Table 1. Baseline characteristics and unadjusted factors associated with loss to follow-up in bivariate logistic regression model (N = 596).

		Total (N=596)		
Characteristics at baseline	n (column %)	LTFU proportion (95% CI)	OR (95% CI)	p-value
Age (years, median [IQR])	27 (23-31)			
18-24	217 (36.4)	30.4 (24.6, 36.9)	Ref.	0.546
25-29	184 (30.9)	31.5 (25.2, 38.6)	1.1 (0.7, 1.6)	
30	195 (32.7)	26.7 (20.9, 33.3)	0.8 (0.5, 1.3)	
Schooling (in years, median [IQR])	5 (2-7)			
0-6 years	406 (68.1)	30.9 (25.7, 37.1)	Ref.	0.271
7-12 years	190 (31.9)	36.7 (28.6, 47.1)	1.2 (0.9, 1.6)	
Marital status				
No cohabiting partner	373 (62.6)	26.8 (22.5, 31.6)	Ref.	0.061
Having cohabiting partner	223 (37.4)	34.1 (28.1, 40.6)	1.4 (1.0, 2.0)	
Has living children				
Yes	350 (58.7)	26.6 (22.2, 31.5)	Ref.	0.060
No	246 (41.3)	33.7 (28.1, 39.9)	1.4 (1.0, 2.0)	
Period of living in current city/province (in years, median [IQR])	7 (2-15)			
<2 years	170 (28.5)	27.6 (21.4, 34.9)	Ref.	0.523
2 years	426 (71.5)	30.3 (26.1, 34.8)	1.1 (0.8, 1.7)	
Provided telephone number at baseline for follow-up contact				
No	191 (32.1)	30.9 (24.7, 37.8)	Ref.	0.178
Yes	321 (53.9)	26.8 (22.2, 31.9)	0.8 (0.6, 1.2)	
Missing	84 (14.1)	36.9 (27.2, 47.8)	1.3 (0.8, 2.2)	
Current job				
Working in entertainment venues (i.e. karaoke, restaurant)	477 (80.0)	27.3 (23.4, 31.4)	Ref.	0.017
Working in sex work venues	119 (20.0)	38.7 (30.3, 47.7)	1.7 (1.1, 2.6)	
Income (USD\$, median [IQR])	225 (125-375)			
<100	67 (11.2)	31.3 (21.3, 43.5)	1.0 (0.6, 1.8)	0.507
100-200	214 (35.9)	26.6 (21.1, 33.0)	0.8 (0.5, 1.2)	

Characteristics at baseline	Total (N=596)			
	n (column %)	LTFU proportion (95% CI)	OR (95% CI)	p-value
>200	315 (52.9)	31.1 (26.2, 36.5)	Ref.	
Type of household				
Own house	54 (9.1)	33.3 (22.0, 47.0)	Ref.	0.618
Rental house/room	362 (60.7)	29.6 (25.1, 34.5)	0.8 (0.5, 1.5)	
Living at workplace	174 (29.2)	27.6 (21.4, 34.7)	0.8 (0.4, 1.5)	
Homeless	6 (1.0)	50.0 (14.7, 85.3)	2.0 (0.4, 10.9)	
Food insecurity in the past three months				
No	471 (79.4)	26.1 (22.3, 30.3)	Ref.	<0.001
Yes	122 (20.6)	41.8 (33.3, 50.8)	2.0 (1.3, 3.1)	
Housing instability in the past three months				
No	330 (55.7)	27.6 (23.0, 32.7)	Ref.	0.291
Yes	263 (44.4)	31.6 (26.2, 37.4)	1.2 (0.8, 1.7)	
Alcohol disorder (ASSIST score)				
Minimal risk	221 (37.1)	29.0 (23.3, 35.3)	Ref.	0.466
Medium risk	265 (44.5)	31.7 (26.4, 37.6)	1.1 (0.8, 1.7)	
High risk	110 (18.5)	25.5 (18.1, 34.5)	0.8 (0.5, 1.4)	
Binge drinking (more than five drinks on one day or night in the past three months)				
Never	165 (27.7)	32.7 (26.0, 40.3)	Ref.	0.446
Monthly or less	76 (12.8)	25.0 (16.5, 36.0)	0.7 (0.4, 1.3)	
Weekly/daily	355 (59.6)	29.0 (24.5, 34.0)	0.8 (0.6, 1.3)	
Positive ATS urine screen (indicating recent use, last 48 hours)				
Negative	485 (81.4)	29.7 (25.8, 33.9)	Ref.	0.692
Positive	111 (18.6)	28.8 (21.1, 38.0)	1.0 (0.6, 1.5)	
ATS disorder (ASSIST score)				
Minimal risk	423 (71.0)	29.6 (25.4, 34.1)	Ref.	0.804
Medium risk	138 (23.2)	30.4 (23.3, 38.7)	1.0 (0.7, 1.6)	
High risk	35 (5.9)	25.7 (13.8, 42.8)	0.8 (0.4, 1.8)	
SMARTgirl membership				
No, I am not a member	59 (9.9)	54.2 (41.4, 66.5)	Ref.	<0.001

Characteristics at baseline	Total (N=596)			
	n (column %)	LTFU proportion (95% CI)	OR (95% CI)	p-value
Yes, during past six months	36 (6.0)	47.2 (31.5, 63.5)	0.8 (0.3, 1.7)	
Yes, more than six months	501 (84.1)	25.3 (21.7, 29.4)	0.3 (0.2, 0.5)	
Sexual risk No. of sexual partners past three months				
2-4	308 (51.9)	26.6 (22.0, 31.9)	Ref.	0.122
5	286 (48.2)	32.4 (27.2, 38.1)	1.3 (0.9, 1.9)	
Condomless sex in the past 72 hours (prostate-specific antigen (PSA) test)				
Positive	153 (25.8)	33.3 (26.3, 41.2)	1.3 (0.9, 1.9)	0.252
Negative	440 (74.2)	28.2 (24.2, 32.6)	Ref.	
Self-reported condomless sex with any of last three partners in the past three months				
Always use	328 (55.0)	31.4 (26.6, 36.6)	Ref.	0.699
Not always	268 (45.0)	27.2 (22.2, 32.9)	0.9 (0.6, 1.4)	
Mental health (measuring by Kessler Psychological Distress Scale [K10])				
Well	430 (72.3)	30.0 (25.8, 34.5)	Ref.	0.567
Mild mental disorder	89 (15.0)	23.6 (15.9, 33.6)	0.7 (0.4, 1.2)	
Moderate mental disorder	43 (7.2)	32.6 (20.2, 48.0)	1.1 (0.6, 2.2)	
Severe mental disorder	33 (5.6)	33.3 (19.3, 51.1)	1.2 (0.5, 2.5)	

ATS: amphetamine-type stimulant; CI: confidence interval; IQR: interquartile range; LTFU: loss to follow-up; n: number of sub-total; N: number of the total; OR: odds ratio; ref: reference group; USD: US Dollars.

Table 2.

Adjusted factors associated with loss to follow-up in multivariate logistic regression model

Characteristics at baseline	Adjusted odds ratio (AOR)	95% CI	p-value
Having living children			
Yes	Ref.		
No	1.6	1.1, 2.3	0.020
Food insecurity in the past three months			
No	Ref.		
Yes	1.7	1.1, 2.7	0.013
SMARTgirl membership			
Never	Ref.		
Six or less months	0.8	0.4, 2.0	0.685
More than six months	0.3	0.2, 0.6	<0.001

AOR: adjusted odds ratio; CI: confidence interval; Ref: reference group.