

Psychological Distress and Its Associated Risks Among People Who Use Drugs in Cambodia

Chan Hang Saing

National University of Singapore

Kiesha Prem

National University of Singapore

Ponha Uk

National University of Singapore

Navy Chann

National Center for HIV/AIDS, Dermatology and STD

Pheak Chhoun

KHANA Center for Population Health Research

Phalkun Mun

National Center for HIV/AIDS, Dermatology and STD

Sovannary Tuot

KHANA Center for Population Health Research

Siyan Yi (✉ siyan@doctor.com)

KHANA Center for Population Health Research <https://orcid.org/0000-0002-3045-5386>

Research

Keywords: Substance use, Mental health, Adverse childhood experiences, Resource-limited setting, Asia

Posted Date: June 1st, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-31493/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published on November 4th, 2020. See the published version at <https://doi.org/10.1186/s13033-020-00411-5>.

Abstract

Background: People who use drugs are at a disproportionately higher risk of mental disorders as a consequence of prolonged exposures to social and psychological issues. However, studies on mental health among people who use drugs in resource-constrained countries are scarce. This study sheds lights on the prevalence and correlates of psychological distress among people who use drugs in Cambodia.

Methods: This national survey was conducted in 12 provinces in 2017 using the Respondent Driven Sampling method. A structured questionnaire was used for face-to-face interviews. Psychological distress was measured using the General Health Questionnaire (GHQ-12). A total score of GHQ-12 > 2 indicated high psychological distress. A multiple logistic regression analysis was performed to examine factors associated with psychological distress.

Results: This study included 1677 people who use drugs who had an average age of 28.6 years (SD = 7.8). Of the total sample, 41.9% had high psychological distress – 49.7% in women and 37.3% in men. In the regression model, the odds of having high psychological distress was significantly higher among participants who were 25–34 years old (AOR 1.30, 95% CI 1.01–1.70) and 35 years and above (AOR 1.68, 95% CI 1.19–2.35), had been to a drug rehabilitation center (AOR 2.06, 95% CI 1.48–2.86), had been insulted by family members (AOR 2.09, 95% CI 1.62–2.70), and had been sexually harassed/abused by someone (AOR 1.80, 95% CI 1.38–2.36). The odds of having high psychological distress was significantly lower among participants who were male (AOR 0.53, 95% CI 0.41–0.69), lived in own dwelling (AOR 0.56, 95% CI 0.41–0.77), reported injecting as the mode of first drug use (AOR 0.56, 95% CI 0.34–0.91), and had someone taking care of when getting sick when they were growing up (AOR 0.68, 95% CI 0.47–0.99).

Conclusions: This study documents a high prevalence of psychological distress among people who use drugs in Cambodia. Older people who use drugs and those in more vulnerable subpopulations were more likely to exhibit a higher level of psychological distress. Interventions that attempt to address mental health issues among people who use drugs should be gender- and age-sensitive and target more marginalized subpopulations.

Background

In 2017, the global estimate of number of people who use drugs, including people who inject drugs, aged 15–64 were 271 million, equivalent to about 5% of the world population of the same age. Of them, 35 million (12.9%) suffered from drug-use disorders which translated to approximately 166,613 deaths and loss of healthy life years of 27 million DALYs (Disability-Adjusted Life Years) [1, 2]. Drug use is therefore recognized as one of the major global public health concerns. However, the availability of and access to treatment services among people with drug use disorders remains limited globally, and only one in seven people who use drugs receives the treatment each year [2].

Southeast Asia, East Asia and Oceania exhibited the highest loss of healthy life years of 7.0 million DALYs owing to drug use disorders in 2017, followed by North Africa and the Middle East (4.4 million),

South Asia (3.4 million), Sub-Saharan Africa (1.8 million), and Latin America and the Caribbean (1.5 million) [1]. At the country level, China and the United States topped the list in 2017 by having the highest loss of DALYs of 5.6 and 5.5 million due to these disorders, respectively, followed by India (2.5 million), Iran (0.8 million), and Russia (0.7 million) [1]. In Southeast Asia, Indonesia and Vietnam experienced the highest DALYs loss at 0.37 and 0.22 million, respectively in the same year followed by the Philippines (0.17 million) and Thailand (0.16 million) [1].

Existing studies show that while comorbidity between drug use disorders and mental health problems is quite common among people who use drugs, and people who use drugs without drug use disorders are also at increasing risk of mental health problems [3–10]. Substance use disorders have been found to occur in tandem with anxiety disorders, i.e. generalized anxiety disorder, panic disorder, and post-traumatic stress disorder [11–14], mental disorders including depression and bipolar disorder [12, 15–17], attention deficit hyperactivity disorder [18, 19], and antisocial personality disorder [20].

The relationship between mental health and risky drug use, particularly intravenous drug use and unsafe sexual practices has been well documented in previous studies. People who use drugs with poor mental health, for example severe depressive symptoms, are more likely to adopt unsafe injection practices like sharing needles and syringes [3, 6, 21]. Besides, they also have more sexual partners and engage in frequent unprotected sex [22, 23]. These risky behaviors are associated with a higher risk of acquiring human immunodeficiency virus (HIV) [24].

Mental health problems of people who use drugs is also a major public health concern as it not only co-occurs with drug use disorders but also mediates other viral infections such as HIV and hepatitis C virus (HCV). Therefore, studies on risk factors associated with mental health among people who use drugs is critical to inform policies of the indirect benefits from addressing viral infections and drug use disorders through tackling mental health problems among people who use drugs. Previous studies have documented a number of socio-demographics such as gender, age, and education as correlates of psychological distress [24–26], while drug use behaviors and experiences such as duration, frequency, overdose, and drug rehabilitation are also associated risk factors [24, 25, 27–29]. Exposure to violence, e.g. stigma and discrimination and sexual assault in the past six months, and social support such as family intimacy and adaptability have also been shown to be predictors of psychological distress among people who use drugs [29–35].

To our knowledge, two studies on mental health of people who use drugs have been conducted in Cambodia [24, 25]. Yi et al. included only people who use injecting drugs living in the capital city of Phnom Penh, while Heng et al. used data from the national survey conducted in 2012 and focused primarily on comparing mental health outcome of people who use drugs who had been to a drug rehabilitation center with that of people who use drugs who had no history of rehabilitation. In this study, we used data from the most recent national integrated biological and behavioral survey and expanded the focus to examine the association between several factors in different domains and psychological distress among people who use drugs in Cambodia.

Methods

Study design, sites, and participants

This national survey was conducted in 2017 in the capital city and 11 provinces. A feasibility assessment was conducted before selection of the 12 sites, which consisted of 21 operational districts with a high burden of HIV and a large population of people who use drugs. People who use drugs are people who have used any types of illicit drugs in the past 12 months as defined by the Cambodian Law on Control of Drugs [36]. To be eligible for the survey, participants must: (1) be at least 18 years old; (2) have a predetermined study coupon; (3) never participate in this survey earlier; (4) meet the definition of people who use drugs; and (5) be able and willing to provide written informed consent to participate in the survey. Details of the main survey have been published elsewhere [37–39].

Sample size and sampling procedures

In this survey, sample size calculation was done separately for people who use non-injecting drugs and people who inject drugs. Assumptions were made including a 20% drop in the prevalence of HIV between 2012 and 2017, population size of 13000 people who use non-injecting drugs and 1300 people who inject drugs [40], the prevalence of HIV of 4% among people use non-injecting drugs and 25% people who inject drugs [40] with a margin of error of 1.5% and a confidence interval [CI] of 95%, 90% response rate, and 1.5% design effect. The 12 selected sites were used as strata, while 15% of people who use non-injecting drugs and 22% of people who inject drugs were sampled from their respective estimated population in each site acquired from the National Authority for Combatting Drugs and non-governmental organizations (NGOs) working with people who use drugs across the country. The estimated population of people who use non-injecting drugs were predominantly in Phnom Penh, Banteay Meanchey and Battambang, while that of people who inject drugs was concentrated mainly in Phnom Penh, the capital city.

The Respondent Driven Sampling (RDS) method was adopted in this study because of the hard-to-reach nature of the people who use drugs population. The Strengthening the Reporting of Observational Studies in Epidemiology for RDS studies (STROBE-RDS) statement was followed [41]. There were five steps in the sampling method. Initially, support from local NGOs in 21 data collection locations within the 12 selected sites was sought to obtain four seeds who had good connection with people who use drugs in each data collection site. Then, a personal identification number was assigned to each seed after receiving written informed consent from the participant. Next, each seed was provided with three coupons which they could use to refer three other people who use drugs. A seed having successfully referred a person who use drugs received US\$2 and was expected to extend to additional three to six people who use drugs in each site. However, new seeds would be selected had the enrolment not continued because of the dried-up of the recruitment tree or had initial seed not recruited participants. Finally, participants recruited for the study were invited to become seeds allowing them to recruit other people who use drugs whom they had known.

Data collection training

All members of the data collection teams attended a three-day training on data collection covering topics such as informed consent process, interview techniques, administration of questionnaire, privacy and confidentiality as well as quality check of the data including spot checking and reviewing the filled questionnaires. The training was primarily aimed to ensure that information was properly collected with minimal errors. All data collection team members were also required to sit in the training on data collection tools and study protocol, while training on HIV and HCV tests were also provided to members assigned to collect the information. Daily consultation between team members and team leaders on data collection issues and monitoring of progress of data collection were also performed by team leaders.

Questionnaire development and measures

A structured questionnaire was developed based on standardized tools utilized in previous studies among HIV key populations [24, 40, 42, 43]. The questionnaire also went through a validation workshop participated by representatives from communities, NGOs, development partners, and national programs working on HIV and harm reduction in Cambodia. The questionnaire was piloted with 20 people who use drugs residing in the capital city of Phnom Penh.

The questionnaire collected information related to socio-demographic characteristics, drug use behaviors, sexual behaviors, HIV and other sexually transmitted infections (STIs), HCV, other substance use, adverse childhood experiences, and psychological distress. Demographic information included age, gender, type of community (urban, rural), years of formal schooling attained, average monthly income earned during past six months, employment status, and living arrangement. Information on drug use covered the sorts of illicit drug used in the past three months, duration of drug use, expenditure on drugs, and the experiences of having been to a rehabilitation center, a detaining center or a prison in the past 12 months.

Five questions on adverse childhood experiences (ACEs) were adapted from the brief screening version of the Childhood Traumatic Questionnaire [47]. The questions asked the studied participants about their experiences of emotional abuse, sexual abuse, physical abuse, and physical and emotional neglect at the time when they were growing up. All five questions were close-ended, where respondents chose between zero (No) and one (Yes) to describe their ACEs.

The General Health Questionnaire (GHQ-12) was used to assess level of psychological distress among people who use drugs [44]. A four-point Likert-type scale, which varied from “0 = less than usual” to “3 = much more than usual,” was applied to each of the 12 questions [44]. A dichotomous variable of “1 = high psychological distress” and “0 = low psychological distress” was developed based on the GHQ-12 guide. Therein, the four-point Likert-like scale was re-coded by using a “0-0-1-1” method to eliminate bias [45]. The median of the sum of the newly derived scores for the whole sample was used as a cut-off to identify participants with high ($\text{GHQ-12} > 2$) and low ($\text{GHQ-12} \leq 2$) psychological distress [44]. Cronbach’s alpha was also estimated to assess the reliability of the scale, and it was 0.88 confirming good reliability of the scale, as it was higher than the minimum acceptable level of 0.50 [46].

Data analyses

Stata (StataCorp LP, version 14.2) was used for data analyses in this study. In bivariate analyses, Chi-square test was used to compare socio-demographic characteristics, substance use, sexual behaviors, and ACEs of participants who had low psychological distress ($\text{GHQ-12} \leq 2$) with those of participants who had high psychological distress ($\text{GHQ-12} > 2$). We applied Fisher's exact test when the expected cell value was less than 5, and Mann-Whitney test, rather than Student's *t*-test, was used when a continuous variable does not follow normal distribution. We conducted a multiple logistic regression analysis to examine factors associated with psychological distress controlling for potential confounders. We included age and gender regardless their level statistical significance and other variables that had a *p*-value < 0.05 in the bivariate analyses in the model. Adjusted odds ratio (AOR) were obtained and shown with CI and *p*-values.

Ethical considerations

All individuals participated in the study on a voluntary basis and provided written informed consent. Our teams ensured that participants were well informed of risks that may have occurred and benefits that they may have received during the study. We removed personal identifiers and kept collected information in a private room to maintain privacy and confidentiality of participants. This study received ethic approval from the National Ethics Committee for Health Research (NECHR) of the Ministry of Health in Cambodia (No. 420 NECHR).

Results

This study included 1677 people who use drugs who had an average age of 28.6 (SD = 7.8) years, average years of schooling completed of 6.0 years (SD = 3.9), and a median monthly income in the past six months of US\$100.0 (interquartile range [IQR] = 90). People who inject drugs constituted to around 18.5% of the study sample. Around one-third of the participants were residing in Phnom Penh, while the other 16% were living in Banteay Meanchey and 11% in Battambang province, which border Thailand. Of the total sample, 41.9% had high psychological distress – 49.7% in women compared to 37.3% in men.

Socio-demographic characteristics

Socio-demographic characteristics are presented in Table 1. Almost two-thirds (62.8%) of the study participants were male. The majority of the participants (88.5%) were living in an urban setting. About two-thirds (65.6%) were in the age group of 25 and above, and 53.6% reported having primary or no formal education. Almost all participants (94.5%) were in Khmer ethnic group, and 46.2% were never married. While 46.7% of the participants were living with their family or relatives, 10.3% were living on the streets. Approximately one-third (35.6%) of the participants had their main career as a laborer or a farmer, while 18.3% worked as an entertainment worker. The majority (82.6%) reported having an average monthly earning of less than US\$200.

Table 1
Socio-demographics of people who use drugs who had high and low psychological distress

Socio-demographics	Total (n = 1677)	Level of psychological distress		P-value*
		GHQ-12 > 2 (n = 703)	GHQ-12 ≤ 2 (n = 974)	
	n (%)	n (%)	n (%)	
Living in an urban area	1485 (88.5)	621 (88.3)	864 (88.7)	0.81
Male gender	1053 (62.8)	393 (55.9)	660 (67.7)	< 0.001
Age groups				0.001
18–24	575 (34.4)	207 (29.5)	368 (37.8)	
25–34	716 (42.7)	316 (45.0)	400 (41.1)	
≥ 35	383 (22.9)	179 (25.5)	204 (21.1)	
Khmer ethnic group	1578 (94.5)	671 (95.8)	907 (93.6)	0.04
Current marital status				0.002
Never married	769 (46.2)	302 (43.2)	467 (48.4)	
Married	624 (37.5)	258 (36.9)	366 (37.9)	
Widowed/divorced/separated	271 (16.3)	139 (19.9)	132 (13.7)	
Level of formal schooling completed				0.01
Primary education (0–6 years)	899 (53.6)	404 (57.5)	495 (50.8)	
Lower secondary (7–9 years)	462 (27.6)	186 (26.4)	276 (28.4)	
High school or higher (≥ 10 years)	316 (18.8)	113 (16.1)	203 (20.8)	
Living arrangement				0.02
With family or relatives	781 (46.7)	324 (46.1)	457 (47.1)	
In the streets	171 (10.2)	78 (11.1)	93 (9.6)	
In own dwelling	382 (22.8)	140 (19.9)	242 (24.9)	
With friends	172 (10.3)	75 (10.7)	97 (10.0)	
Other	167 (10.0)	86 (12.2)	81 (8.4)	

Psychological distress was measured using the General Health Questionnaire (GHQ-12), and a total score of GHQ-12 > 2 was used to define high psychological distress.

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

Socio-demographics	Total (<i>n</i> = 1677)	Level of psychological distress		P-value*
		GHQ-12 > 2 (<i>n</i> = 703)	GHQ-12 ≤ 2 (<i>n</i> = 974)	
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Main occupation				0.02
Unemployed	197 (11.7)	74 (10.5)	123 (12.7)	
Entertainment worker	306 (18.3)	152 (21.6)	154 (15.8)	
Office worker	79 (4.7)	31 (4.4)	48 (4.9)	
Laborer/farmer	597 (35.6)	253 (36.0)	344 (35.3)	
Other	498 (29.7)	193 (27.5)	305 (31.3)	
Average monthly income in the past 6 months (US\$)				0.56
< 100	605 (36.1)	261 (37.1)	344 (35.3)	
100–199	780 (46.5)	327 (46.5)	453 (46.5)	
≥ 200	292 (17.4)	115 (16.4)	177 (18.2)	
<i>Psychological distress was measured using the General Health Questionnaire (GHQ-12), and a total score of GHQ-12 > 2 was used to define high psychological distress.</i>				
<i>*Chi-square (or Fisher's exact test when a cell count was smaller than 5) was used.</i>				

Substance use

As shown in Table 2, participants reported having used drugs for a median duration of 18 months (IQR = 42). Nearly one in 10 (9.3%) described injecting as the mode of their first drug use. The proportion of participants who had been to a prison and a drug rehabilitation center in the past 12 months was 11.2% and 15.8%, respectively. More than two-thirds reported having daily alcohol drinking habit, while half had smoked at least 100 cigarettes in their lifetime. The proportions of participants who reported having used any drugs in the past three months (85.2% vs. 75.6%, $p < 0.001$), used methamphetamine in the past three months (77.8% vs. 69.3%, $p < 0.001$), and been to a drug rehabilitation center (22.3% vs. 11.2%, $p < 0.001$) were significantly higher among participants who had high psychological distress compared to those among participants who had low psychological distress.

Table 2

Characteristics of substance use among people who use drugs who had high and low psychological distress

Characteristics of substance use	Total (n = 1677)	Level of psychological distress		P-value*
		GHQ-12 > 2 (n = 703)	GHQ-12 ≤ 2 (n = 974)	
	n (%)	n (%)	n (%)	
Median months using drugs (IQR)	18 (42)	24 (53)	14 (42)	0.003
Mode of first drug use – injecting	156 (9.3)	65 (9.2)	91 (9.3)	0.34
Used any drugs in the past 3 months	1324 (79.7)	595 (85.2)	729 (75.6)	< 0.001
Type of drugs most commonly used in the past 3 months				
Heroin	184 (10.9)	88 (12.5)	96 (9.8)	0.08
Yama/ice (methamphetamine)	1222 (72.8)	547 (77.8)	675 (69.3)	< 0.001
Ecstasy	70 (4.2)	40 (5.7)	30 (3.1)	0.008
Inhalants	53 (3.2)	34 (4.8)	19 (1.9)	0.001
Injected drugs in the past 3 months	122 (7.3)	60 (8.5)	62 (6.4)	0.09
Always used new syringes/needles	118 (7.0)	54 (7.7)	64 (6.6)	0.38
Used needles/syringes used by someone else in the past 3 months	43 (2.5)	26 (3.7)	17 (1.7)	0.01
Had been to a prison in the past 12 months	188 (11.2)	94 (13.4)	94 (9.6)	0.01
Had been sent to a drug rehabilitation center in the past 12 months	266 (15.8)	157 (22.3)	109 (11.2)	< 0.001
Daily alcohol drinking habit (n = 1320)				0.017

Psychological distress was measured using the General Health Questionnaire (GHQ-12), and a total score of GHQ-12 > 2 was used to define high psychological distress.

**Chi-square (or Fisher's exact test when a cell count was smaller than 5) was used for categorical variables and Mann-Whitney U test for continuous variables.*

Characteristics of substance use	Total (n = 1677)	Level of psychological distress		P-value*
		GHQ-12 > 2 (n = 703)	GHQ-12 ≤ 2 (n = 974)	
	n (%)	n (%)	n (%)	
1–2 cans per day	323 (24.5)	114 (20.5)	209 (27.3)	
3–4 cans per day	359 (27.2)	149 (26.9)	210 (27.5)	
5–6 cans per day	329 (24.9)	155 (27.9)	174 (22.7)	
At least 7 cans per day	309 (23.4)	137 (24.7)	172 (22.5)	
Smoked at least 100 cigarettes in lifetime	838 (50.1)	359 (51.2)	479 (49.2)	0.42
<i>Psychological distress was measured using the General Health Questionnaire (GHQ-12), and a total score of GHQ-12 > 2 was used to define high psychological distress.</i>				
<i>*Chi-square (or Fisher's exact test when a cell count was smaller than 5) was used for categorical variables and Mann-Whitney U test for continuous variables.</i>				

Sexual behaviors

Table 3 shows sexual behaviors among the study participants in the past three months. Of the total, 92.8% reported having had sexual intercourse; of them, 24.9% reported having always used condoms with any partner. Of the 1557 sexually active participants, 39.7% reported having sexual intercourse while a partner was intoxicated. One in five (20.5%) reported having always used condoms with partners without an exchange for money or gifts. More than one-third (35.8%) reported having sexual intercourse in an exchange for money or gifts, and 39.2% reported always using condoms with the commercial partners. The proportions of participants who reported having had sexual intercourse while a partner was intoxicated (49.5% vs. 31.9%, $p < 0.001$), having sex with partners without an exchange for money or gifts (58.6% vs. 49.9%, $p = 0.003$), and having sexual intercourse in an exchange for money or gifts (41.5% vs. 31.2%, $p < 0.001$) were significantly higher among participants who had high psychological distress compared to those among participants who had low psychological distress.

Table 3
Sexual behaviors among people who use who had high and low psychological distress

Sexual behaviors in the past 3 months	Total	Level of psychological distress		
	(n = 1677)	GHQ-12 > 2 (n = 703)	GHQ-12 ≤ 2 (n = 974)	
	n (%)	n (%)	n (%)	P-value*
Had sexual intercourse	1557 (92.8)	673 (95.7)	884 (90.8)	< 0.001
Median number of sex partners (IQR)	1 (2)	1 (2)	1 (2)	0.06
Always used condom with any partner	288 (24.9)	129 (25.2)	159 (24.7)	0.35
Had sex when a partner was intoxicated	456 (39.7)	252 (49.5)	204 (31.9)	< 0.001
Had sex with partners not in exchange for money or gifts	622 (53.7)	300 (58.6)	322 (49.9)	0.003
Always used condom with partners not in exchange for money or gifts	129 (20.5)	60 (19.8)	69 (21.2)	0.08
Had sex in exchange for money or gifts	415 (35.8)	213 (41.5)	202 (31.2)	< 0.001
Always used condom with partners in exchange for money or gift	162 (39.2)	74 (34.9)	88 (43.8)	0.001
<i>Psychological distress was measured using the General Health Questionnaire (GHQ-12), and a total score of GHQ-12 > 2 was used to define high psychological distress.</i>				
<i>*Chi-square (or Fisher's exact test when a cell count was smaller than 5) was used for categorical variables and Mann-Whitney U test for continuous variables.</i>				

Adverse childhood experiences (ACEs)

As shown in Table 4, 54.5% reported having been slapped, kicked or received physical punishment from a family member or a guardian when they were growing up. Of the total, 51.2% described having been insulted by a family member or a guardian, and 21.9% reported having been sexually harassed or abused. The majority of participants reported having been taken care of by someone in the family (89.3%) and having received emotional support and care from a family member (85.4%). Participants who had high psychological distress were significantly more likely to report that they had experience with physical punishment from a family member or a guardian (62.7% vs. 48.6%, $p < 0.001$), insulted by a family member or a guardian (63.5% vs. 42.4%, $p < 0.001$), and had been sexually harassed/abused by someone (30.1% vs. 16.0%, $p < 0.001$) when they were growing up.

Table 4

Adverse childhood experiences among people who use drugs who had high and low psychological distress

Adverse childhood experiences	Total (n = 1677)	Level of psychological distress		P-value*
		GHQ-12 > 2 (n = 703)	GHQ-12 ≤ 2 (n = 974)	
	n (%)	n (%)	n (%)	
Had been slapped, kicked or received physical punishment from a family member	909 (54.5)	439 (62.7)	470 (48.6)	< 0.001
Had been insulted by a family member	853 (51.2)	443 (63.5)	410 (42.4)	< 0.001
Had been sexually harassed by someone (e.g. touching, watching pornography or sexual abuse)	367 (21.9)	211 (30.1)	156 (16.0)	< 0.001
Had been taken care of by someone (e.g. providing guardian or accompanying to medical center)	1493 (89.3)	614 (87.7)	879 (90.5)	0.06
Had received emotional support and care from a family member	1411 (85.4)	579 (83.5)	832 (86.7)	0.07
<i>Psychological distress was measured using the General Health Questionnaire (GHQ-12), and a total score of GHQ-12 > 2 was used to define high psychological distress.</i>				
<i>*Chi-square (or Fisher's exact test when a cell count was smaller than 5) was used for categorical variables and Mann-Whitney U test for continuous variables.</i>				

Factors associated with psychological distress

Results of multiple logistic regression analysis are presented in Table 5. After adjustment for other covariates in the model, the odds of having high psychological distress was significantly higher among participants who were 25–34 years old (AOR 1.30, 95% CI 1.01–1.70) and 35 years and above (AOR 1.68, 95% CI 1.19–2.35), had been to a drug rehabilitation center (AOR 2.06, 95% CI 1.48–2.86), had been insulted by family members (AOR 2.09, 95% CI 1.62–2.70), and had been sexually harassed or abused by someone (AOR 1.80, 95% CI 1.38–2.36). The odds of having high psychological distress was significantly lower among participants who were male (AOR 0.53, 95% CI 0.41–0.69), lived in own dwelling (AOR 0.56, 95% CI 0.41–0.77), reported injecting as the mode of first drug use (AOR 0.56, 95% CI 0.34–0.91), and had someone taking care of when getting sick when they were growing up (AOR 0.68, 95% CI 0.47–0.99).

Table 5

Factors associated with level of psychological distress among people who use drugs in multiple logistic regression model ($n = 1598$)

Variables in the model	AOR (95% CI)	P-value
Gender		
Female	Reference	
Male	0.53 (0.41–0.69)	< 0.001
Age groups		
< 25	Reference	
25–34	1.30 (1.01–1.70)	0.04
≥ 35	1.68 (1.19–2.35)	0.003
Current marital status		
Married	Reference	
Never married	1.02 (0.77–1.34)	0.88
Divorced/separated	1.08 (0.79–1.49)	0.60
Level of formal education completed		
Primary education or none (0–6 years)	Reference	
Lower secondary education (7–9 years)	1.05 (0.81–1.36)	0.67
Upper secondary or higher (≥ 10 years)	0.89 (0.65–1.22)	0.48
Type of living arrangements		
With family/relatives	Reference	
In the streets	0.70 (0.46–1.06)	0.09
In own dwelling	0.56 (0.41–0.77)	< 0.001
With friends	0.88 (0.61–1.27)	0.51
Others	1.12 (0.76–1.65)	0.54
Duration of drug use		
≤ 2 years	Reference	
3–5 years	1.20 (0.91–1.58)	0.19
<i>AOR, adjusted odds ratio; CI, confidence interval.</i>		
<i>Psychological distress was measured using the General Health Questionnaire (GHQ-12), and a total score of GHQ-12 > 2 was used to define high psychological distress.</i>		

Variables in the model	AOR (95% CI)	P-value
6–9 years	1.08 (0.68–1.73)	0.73
≥ 10 years	1.09 (0.74–1.59)	0.65
Had been sent to drug rehabilitation center		
No	Reference	
Yes	2.06 (1.48–2.86)	< 0.001
Injection as mode of first drug use		
No	Reference	
Yes	0.56 (0.34–0.91)	0.02
Had been sent to prison in past 12 months		
No	Reference	
Yes	1.00 (0.69–1.44)	0.97
Had been slapped, kicked by parents/guardians		
No	Reference	
Yes	1.13 (0.88–1.45)	0.33
Had been insulted by family members		
No	Reference	
Yes	2.09 (1.62–2.70)	< 0.001
Had been sexually harassed/abused by someone		
No	Reference	
Yes	1.80 (1.38–2.36)	< 0.001
Had someone taking care when getting sick		
No	Reference	
Yes	0.68 (0.47–0.99)	0.04
Had emotional support from family member		
No	Reference	

AOR, adjusted odds ratio; CI, confidence interval.

Psychological distress was measured using the General Health Questionnaire (GHQ-12), and a total score of GHQ-12 > 2 was used to define high psychological distress.

Variables in the model	AOR (95% CI)	P-value
Yes	1.18 (0.85–1.64)	0.32
Being person who inject drugs (PWID)		
No	Reference	
Yes	1.43 (0.97–2.09)	0.07
<i>AOR, adjusted odds ratio; CI, confidence interval.</i>		
<i>Psychological distress was measured using the General Health Questionnaire (GHQ-12), and a total score of GHQ-12 > 2 was used to define high psychological distress.</i>		

Discussion

This study provides evidence of the prevalence and factors associated with psychological distress, measured by GHQ-12, among people who use drugs in a resource-constrained country. It showed that the prevalence of psychological distress among people who use drugs in this study was 41.9%, which was similar to the 42% found in our previous study conducted in 2014 using the same measure of psychological distress among people who inject drugs in the capital city of Phnom Penh [24].

Our findings suggested that male people who use drugs were less likely to have high psychological distress than their female counterparts, which is consistent with results shown in previous studies [24–26]. In Taiwan, female people who use drugs were more likely to have suicidal thoughts than their male counterparts, which resulted in suffering from more psychiatric illnesses than men [26]. In our additional analyses, we further examined this gender difference by separately including the interaction terms between gender and main occupational categories and age groups in a multiple logistic regression model. We found that female participants who were sex workers (AOR = 30.3, $p = 0.004$), sellers (AOR = 2.8, $p = 0.03$) and farmers (AOR = 4.0, $p = 0.001$) experienced significantly higher level of psychological distress than their male counterparts. Adjusted odds ratios of the interaction terms between gender and other relevant variables such as ACEs, suicide ideation and drug use duration were not statistically significant at any conventional level.

People who use drugs aged 25 and above were found to be significantly more likely to have high psychological distress than their younger counterparts aged 18–24, and this corroborates with findings in a previous study in Cambodia [25]. We observed that older people who use drugs (aged 25+) were more likely to have suicidal thoughts (22.5% vs 12.7%, $p < 0.001$) and drink alcohol four times or more per week in the past three months (29.3% vs 23.3%, $p < 0.001$) than their younger counterparts (aged 18–24). The co-occurrence of substance use and mental illness among people who use drugs [11–14] and the association between suicidal thought and mental health [3, 24] has also been documented in previous studies.

On the living arrangement, we found that people who use drugs living in their own dwelling were less distressed than those living with family. We probed this association further by including the interaction terms between living arrangements and ACEs quintiles generated using principal component analysis in a multiple logistic regression model. The results showed that people who use drugs living in own dwelling and having more ACEs (2nd quintile: AOR = 0.33, $p = 0.03$; 3rd quintile: AOR = 0.39, $p = 0.04$; 4th quintile: AOR = 0.49, $p = 0.04$; 5th quintile: AOR = 0.40, $p = 0.02$) were less psychological distressed than people who use drugs living with family. ACEs could have been a driver of the choice of living arrangement. And it should be noted that marriage and cohabitation might have mediated the association as 60.4% of the people who use drugs living in own dwelling were married and cohabited. Breaking free from past ACEs with family and forming their independent cohabitation with a spouse, people who use drugs living in own dwelling were less psychological distressed than those living with family.

People who use drugs who had been to a drug rehabilitation center were found to have more psychological distress than people who use drugs who had never been to the center, which confirmed findings in previous studies in Cambodia [24, 25], suggesting that the role of drug rehabilitation center remained counterintuitive five years later. Poor overall quality of life and health of people who use drugs with a history rehabilitation could be the underlying drivers of level of psychological distress. However, we found no statistically significant interactions with having been to a rehabilitation center and quality of life and health. Therefore, adverse experience in rehabilitation centers remained a valid explanation as indicated in another study in 2012 [25]. Similar accounts had also been documented in China [48], Taiwan [26], and Vietnam [49].

Last, on the ACEs, people who use drugs who had been insulted by family members or guardians or had been sexually harassed or abused while growing up exhibited a higher level psychological distress than those who had not. On the other hand, people who use drugs who experienced care provided by someone when getting sick as a child were less psychological distressed than those who did not. These findings are consistent with those in studies in the United States [50] and Cambodia [24]. In their systematic review, De Venter et al. showed that people who use drugs who had experienced ACEs exhibited symptoms or diagnoses of depressive and anxiety disorders [51]. The pathway of the association likely ran from ACEs to entry to drug use and later to psychological distress. Another study showed that people aged 14 and above in California with higher ACE score were about two to four times more likely to initiate drug use than people with lower ACE score [52].

Limitations of the study

Despite several strengths, limitations of this study should be noted. First, causal inference from our multiple logistic regression analysis could not be made as we did not address endogeneity (e.g. omitted variable bias or reverse causality) of each independent variable, and thus results should be interpreted as the association between the dependent variable and independent variables included in the model. Second, since our measure of psychological distress was constructed based on self-reported responses to the GHQ-12 questionnaire, but not performance-based psychological measure, our results of the

association could be biased due to social desirability and recall bias. Third, our results were also likely biased due to selection of people who use drugs into the study sample because the study targeted locations with heavy burden of HIV and drug use in order to obtain as large sample as possible, and participants likely self-selected into the study as they could have been motivated by the incentive (token) provided through the RDS method.

Conclusions

This study documents a high prevalence of and risk factors associated with psychological distress among people who use drugs in Cambodia. Risk factors found to be significantly associated with psychological distress among people who use drugs in this study included gender, age, history of drug rehabilitation, and ACEs. Women showed higher level of psychological distress than men, while people aged 25 and older also exhibited higher level of psychological distress than people aged 18 to 24. Our results on the counterintuitive role of drug rehabilitation and the negative effect of ACEs on psychological distress of people who use drugs also corroborated with findings in earlier studies. Therefore, interventions that attempt to address mental health among people who use drugs should be gender- and age-sensitive, while they should be tailored to more vulnerable and marginalized subpopulations and individuals with a history of ACEs and drug rehabilitation.

Declarations

Authors' contributions

SY, ST, and PM designed the study and developed the study protocol and tools. NC, PC, TS, and PM were responsible for trainings and data collection. CS, KP, PU, and SY analyzed data and wrote the manuscript. All authors contributed to the conceptualization of the research questions, interpretation of the results, and manuscript writing. All authors read and approved the final manuscript.

Acknowledgements

We thank the National Center for HIV/AIDS, Dermatology and STD, National Authority for Combatting Drugs, UNAIDS, and World Health Organization for their technical guidance. Special thanks are also extended to all data collection teams, community-based organizations, local authorities, and the participants for their excellent contribution to this study.

Competing interest

The authors declare that they have no competing interests.

Availability of data and material

The data used for this study are owned by the National Center for HIV/AIDS, Dermatology and STD and cannot be made available in the manuscript, the additional files, or a public repository. However, they can be accessed upon request from the Principal Investigators Dr. Phalkun Mun (phalkun@nchads.org) or Dr. Siyan Yi (siyan@doctor.com).

Consent for publication

Not applicable.

Ethic approval and consent to participate

The National Ethics Committee for Health Research (NECHR) of the Ministry of Health, Cambodia (No. 420 NECHR). A written informed consent was obtained from each participant.

Funding

The National Integrated Biological and Behavioral Survey among people who use and inject drugs 2017 was financially supported by the Global Fund to Fight AIDS, Tuberculosis and Malaria in Cambodia.

References

1. Institute for Health Metrics and Evaluation. Findings from the global burden of disease report 2017. Seattle, WA: Institute for Health Metrics and Evaluation; 2018.
2. United Nations Office on Drugs and Crime. World Drug Report 2019. Vienna: United Nations Office on Drugs and Crime; 2019.
3. Armstrong G, Jorm AF, Samson L, Joubert L, Nuken A, Singh S, et al. Association of depression, anxiety, and suicidal ideation with high-risk behaviors among men who inject drugs in Delhi, India. *J Acquir Immune Defic Syndr*. 2013;64:502–10.
4. Armstrong G, Nuken A, Samson L, Singh S, Jorm AF, Kermode M. Quality of life, depression, anxiety and suicidal ideation among men who inject drugs in Delhi, India. *BMC Psychiatry*. 2013;13:151.
5. Kelly TM, Daley DC. Integrated treatment of substance use and psychiatric disorders. *Soc Work Public Health*. 2013;28:388–406.
6. Mackesy-Amiti ME, Donenberg GR, Ouellet LJ. Psychiatric correlates of injection risk behavior among young people who inject drugs. *Psychol Addict Behav*. 2014;28:1089.
7. Montoya ID, Bell DC, Atkinson JS, Nagy CW, Whitsett DD. Mental health, drug use, and the transition from welfare to work. *J Behav Health Serv Res*. 2002;29:144–56.

8. National Institute on Drug Abuse. The Science of Drug Use and Addiction: The Basics. Bethesda, MD: National Institute on Drug Abuse; 2018.
9. Ross S, Peselow E. Co-occurring psychotic and addictive disorders: neurobiology and diagnosis. *Clin Neuropharmacol*. 2012;35:235–43.
10. Skogen JC, Sivertsen B, Lundervold AJ, Stormark KM, Jakobsen R, Hysing M. Alcohol and drug use among adolescents: and the co-occurrence of mental health problems. Ung@hordaland, a population-based study. *BMJ Open*. 2014;4:e005357.
11. Brady KT, Haynes LF, Hartwell KJ, Killeen TK. Substance use disorders and anxiety: a treatment challenge for social workers. *Soc Work Public Health*. 2013;28:407–23.
12. Conway KP, Compton W, Stinson FS, Grant BF. Lifetime comorbidity of DSM-IV mood and anxiety disorders and specific drug use disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *J Clin Psychiatry*. 2006;67:247–57.
13. Magidson JF, Liu S-M, Lejuez CW, Blanco C. Comparison of the course of substance use disorders among individuals with and without generalized anxiety disorder in a nationally representative sample. *J Psychiatr Res*. 2012;46:659–66.
14. Wolitzky-Taylor K, Operskalski JT, Ries R, Craske MG, Roy-Byrne P. Understanding and treating comorbid anxiety disorders in substance users: review and future directions. *J Addict Med*. 2011;5:233–47.
15. Compton WM, Thomas YF, Stinson FS, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: results from the national epidemiologic survey on alcohol and related conditions. *Arch Gen Psychiatry*. 2007;64:566–76.
16. Pettinati HM, O'Brien CP, Dundon WD. Current status of co-occurring mood and substance use disorders: a new therapeutic target. *Am J Psychiatry*. 2013;170:23–30.
17. Torrens M, Gilchrist G, Domingo-Salvany A, psyCoBarcelona Group. Psychiatric comorbidity in illicit drug users: substance-induced versus independent disorders. *Drug Alcohol Depend*. 2011;113:147–56.
18. De Alwis D, Lynskey MT, Reiersen AM, Agrawal A. Attention-deficit/hyperactivity disorder subtypes and substance use and use disorders in NESARC. *Addict Behav*. 2014;39:1278–85.
19. Harstad E, Levy S, Abuse C on S. Attention-Deficit/Hyperactivity Disorder and Substance Abuse. *Pediatrics*. *Pediatrics*. 2014;134:e293–301.
20. Flórez-Salamanca L, Secades-Villa R, Budney AJ, García-Rodríguez O, Wang S, Blanco C. Probability and predictors of cannabis use disorders relapse: results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Drug Alcohol Depend*. 2013;132:127–33.
21. Li L, Tuan NA, Liang L-J, Lin C, Farmer SC, Flore M. Mental health and family relations among people who inject drugs and their family members in Vietnam. *Int J Drug Policy*. 2013;24:545–9.
22. Pettes T, Kerr T, Voon P, Nguyen P, Wood E, Hayashi K. Depression and sexual risk behaviours among people who inject drugs: a gender-based analysis. *Sex Health*. 2015;12:224–30.

23. Pilowsky DJ, Wu L-T, Burchett B, Blazer DG, Ling W. Depressive symptoms, substance use, and HIV-related high-risk behaviors among opioid-dependent individuals: results from the Clinical Trials Network. *Subst Use Misuse*. 2011;46:1716–25.
24. Yi S, Tuot S, Chhoun P, Pal K, Choub SC, Mburu G. Prevalence and correlates of psychological distress among drug users in Phnom Penh, Cambodia. *Int J Drug Policy*. 2016;36:25–32.
25. Heng S, Suy S, Chhea C, Chhit S, Mun P, Bui TC. Psychological distress among Cambodian people who use drugs. *Drug Alcohol Rev*. 2020;39:66–70.
26. Lin S-K, Ball D, Hsiao C-C, Chiang Y-L, Ree S-C, Chen C-K. Psychiatric comorbidity and gender differences of persons incarcerated for methamphetamine abuse in Taiwan. *Psychiatry Clin Neurosci*. 2004;58:206–12.
27. Burns JM, Martyres RF, Clode D, Boldero JM. Overdose in young people using heroin: associations with mental health, prescription drug use and personal circumstances. *Med J Aust*. 2004;181:S25–S28.
28. Darke S, Ross J. Suicide among heroin users: rates, risk factors and methods. *Addict Abingdon Engl*. 2002;97:1383–94.
29. Scott N, Carrotte ER, Higgs P, Cogger S, Stoové MA, Aitken CK, et al. Longitudinal changes in psychological distress in a cohort of people who inject drugs in Melbourne, Australia. *Drug Alcohol Depend*. 2016;168:140–6.
30. Ahern J, Stuber J, Galea S. Stigma, discrimination and the health of illicit drug users. *Drug Alcohol Depend*. 2007;88:188–96.
31. Lemstra M, Rogers M, Thompson A, Moraros J, Buckingham R. Risk indicators of depressive symptomatology among injection drug users and increased HIV risk behaviour. *Can J Psychiatry Rev Can Psychiatr*. 2011;56:358–66.
32. Li J, Gu J, Lau JTF, Chen H, Mo PKH, Tang M. Prevalence of depressive symptoms and associated factors among people who inject drugs in China. *Drug Alcohol Depend*. 2015;151:228–35.
33. Lin W, Zhou W. Factors associated with the physical and mental health of drug users participating in community-based drug rehabilitation programmes in China. *Health Soc Care Community*. 2020;28:584–90.
34. McLaughlin DF, McKenna H, Leslie JC. The perceptions and aspirations illicit drug users hold toward health care staff and the care they receive. *J Psychiatr Ment Health Nurs*. 2000;7:435–41.
35. Shaw SA, El-Bassel N, Gilbert L, Terlikbayeva A, Hunt T, Primbetova S, et al. Depression Among People Who Inject Drugs and Their Intimate Partners in Kazakhstan. *Community Ment Health J*. 2016;52:1047–56.
36. United Nations High Commissioner for Human Rights. *Laws on Control of Drugs*. Geneva: United Nations High Commissioner for Human Rights; 1996
37. Mburu G, Chhoun P, Chann N, Tuot S, Mun P, Yi S. Prevalence and risk factors of HIV infection among people who inject drug in Cambodia: finding from a national survey. *Subst Abuse Treat Prev Policy*. 2019;14:42.

38. Tuot S, Mburu G, Mun P, Chhoun P, Chann N, Prem K, et al. Prevalence and correlates of HIV infection among people who use drugs in Cambodia: a cross-sectional survey using respondent driven sampling method. *BMC Infect Dis.* 2019;19:515.
39. Yi S, Mun P, Chhoun P, Chann N, Tuot S, Mburu G. Prevalence of and risk factors for hepatitis C virus antibody among people who inject drugs in Cambodia: a national biological and behavioral survey. *Harm Reduct J.* 2019;16:29.
40. Chhea C, Sopheab H, Sovannary T. National Population Size Estimation, HIV Related Risk Behaviors and HIV Prevalence. Phnom Penh: National Center for HIV/AIDS, Dermatology and STD; 2014.
41. White RG, Hakim AJ, Salganik MJ, Spiller MW, Johnston LG, Kerr L, et al. Strengthening the Reporting of Observational Studies in Epidemiology for respondent-driven sampling studies: “STROBE-RDS” statement. *J Clin Epidemiol.* 2015;68:1463–71.
42. Mun P, Chhim S, Chhoun P, Tuot S, Ly C, Dionisio J, et al. National Population Size Estimation, HIV Related Risk Behaviors, and HIV Prevalence among Men who have sex with Men in Cambodia in 2014. Phnom Penh: National Center for HIV/AIDS, Dermatology and STD; 2016.
43. Yi S, Chhoun P, Brant S, Kita K, Suong S, Thin K, et al. The sustainable action against HIV and AIDS in communities (SAHACOM): end-of-project evaluation. KHANA; 2014.
44. Goldberg DP. The detection of psychiatric illness by questionnaire: A technique for the identification and assessment of non-psychotic illness. Oxford University Press; 1972.
45. Goldberg DP, Oldehinkel T, Ormel J. Why GHQ threshold varies from one place to another. *Psychol Med.* 1998;28:915–21.
46. Mclver J, Carmines EG. Unidimensional scaling. Sage; 1981.
47. Bernstein DP, Stein JA, Newcomb MD, Walker E, Pogge D, Ahluvalia T, et al. Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse Negl.* 2003;27:169–90.
48. Cohen JE, Amon JJ. Health and human rights concerns of drug users in detention in Guangxi Province, China. *PLoS Med.* 2008;5:e234.
49. Human Rights Watch. Torture in the Name of Treatment: Human Rights Abuses in Vietnam, China, Cambodia, and Lao PDR. New York, NY: Human Rights Watch; 2012.
50. Kang SY, Deren S, Goldstein MF. Relationships between childhood abuse and neglect experience and HIV risk behaviors among methadone treatment drop-outs. *Child Abuse Negl.* 2002;26:1275–89.
51. De Venter M, Demyttenaere K, Bruffaerts R. The relationship between adverse childhood experiences and mental health in adulthood. A systematic literature review. *Tijdschr Voor Psychiatr.* 2013;55:259–68.
52. Dube SR, Felitti VJ, Dong M, Chapman DP, Giles WH, Anda RF. Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: the adverse childhood experiences study. *Pediatrics.* 2003;111:564–72.