Prevalence and social determinants of psychological distress among people who use drugs in Cambodia

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Research

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Abstract

Background: People who use drugs are at a disproportionately higher risk of mental disorders due to prolonged exposure to psychosocial challenges. However, studies on mental health among people who use drugs in resource-constrained countries are scarce. This study sheds light on the prevalence and correlates of psychological distress among people who use drugs in Cambodia.

Methods: We conducted this cross-sectional study in 12 provinces in 2017. The Respondent Driven Sampling method was adapted to recruit 1677 people who used drugs for face-to-face interviews using a structured questionnaire. Psychological distress was measured using the General Health Questionnaire (GHQ-12). A total score of GHQ-12>2 indicated high psychological distress. We performed a multiple logistic regression analysis to examine factors associated with psychological distress.

Results: The mean age of the participants was 28.6 years (SD= 7.8). Of the total, 41.9% had high psychological distress – 49.7% in women and 37.3% in men. We included 1598 participants in the multiple logistic regression analysis. The adjusted 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 when they were growing up (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 the first drug use (AOR 0.56, 95% CI 0.34-0.91), and had someone taking care of when getting sick (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. Intervention programs that attempt to address mental health problems among people who use drugs in resource-limited settings should be gender- and age-sensitive and target more marginalized subpopulations. Mental health services can be integrated into HIV and harm-reduction programs for people who use drugs.

Background

In 2017, the global estimate of the number of people who use drugs, including people who inject drugs, aged 15-64 were 271 million [1], equivalent to about 5% of the world population of the same age. Of them, about 35 million (12.9%) suffered from drug-use disorders, which resulted in approximately 166613 deaths and a loss of 27 million Disability-Adjusted Life Years (DALYs) [1,2]. Therefore, drug use is 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 remain limited globally. Only one in seven people who use drugs receive the treatment each year [1].

Existing studies show that comorbidity between drug-use disorders and mental health problems is common among people who use drugs. Moreover, people who use drugs without drug-use disorders are also at increased risk of mental health problems [3–10]. Substance use disorders have been found to occur in tandem with anxiety disorders including generalized anxiety disorder, panic disorder, and post-traumatic stress disorder [11–14]; mental disorders including depression and bipolar disorder [8,11–13]; attention deficit hyperactivity disorder [12,14]; and antisocial personality disorder [15].

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, such as severe depressive symptoms, are more likely to adopt unsafe injection practices like sharing needles and syringes [16–18]. Previous studies have also reported that people who use drugs with mental health problems were more likely to have more sexual partners and engage in frequent condomless sexual intercourse than those without mental health problems [19,20]. These risky behaviors are associated with a higher risk of acquiring human immunodeficiency virus (HIV) [21].

The mental health problems of people who use drugs is a significant public health concern as it co-occurs with drug use disorders and mediates other viral infections such as human immunodeficiency virus (HIV) and hepatitis C virus (HCV) [22–24]. Therefore, addressing risk factors associated with mental health problems among people who use drugs would reduce the disease burden of drug use disorders and HIV and HCV infections among people who use drugs. Previous studies have documented drug use behaviors and experiences such as duration, frequency, overdose, and drug rehabilitation as associated risk factors of psychological distress [21,25–28]. Exposure to violence, such as stigma and discrimination and sexual assault, and lack of social support, such as family intimacy and adaptability, has also been shown to be predictors of psychological distress among people who use drugs [28–34].

In Cambodia, the latest estimated number of people who use drugs aged 18 years and above in 2017 was notably large at around 22374 people [16]. Previous studies show that psychological distress is common among Cambodian people who use drugs [17,21,27]. Also, access to psychological support, such services provided in drop-in centers by community-based organizations, is limited [16]. In the same year, of the 90672 people who received consultation and treatment for all types of mental illnesses in the public health facilities, approximately 4.5% reported that their mental health problems had stemmed from drug use [35]. Our previous study showed that adverse childhood experiences (ACEs) were common and associated with psychological distress among people who use drugs in Phnom Penh [21]. Despite the common mental health problems and limited access to care among people who use drugs, studies on these issues remain scarce, preventing it from gaining policy and strategic attention.

To our knowledge, two studies on the mental health of people who use drugs have been conducted in Cambodia [21,27]. Yi et al. included only people who inject 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 the relationship between mental health outcomes and history of drug rehabilitation. In this study, we used

data from the most recent national integrated biological and behavioral survey to examine the prevalence and correlates of psychological distress among people who use drugs in Cambodia.

Methods

Study design and setting

We conducted this cross-sectional study in 2017 in the capital city and 11 provinces. A feasibility assessment was conducted before selecting 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 were defined as people who have used any illicit drugs, as stated in the Cambodian Law on Control of Drugs in the past 12 months [36].

Eligibility criteria

To be eligible for the survey, an individual 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 calculation

In this survey, we calculated the sample size 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 and a population size of 13000 people who use non-injecting drugs and 1300 people who inject drugs [40]. Based on the most recent national survey, the prevalence of HIV was 4% among people use non-injecting drugs, and 25% among people who inject drugs [40]. We used a 1.5% margin of error, a 95% confidence interval [CI], a 90% response rate, and a 1.5% design effect. We used 12 selected sites as strata and sampled 15% of people who use non-injecting drugs and 22% of people who inject drugs from their respective estimated population in each site acquired from the National Authority for Combatting Drugs. Figure 1 shows the flow chart of the sample selection. The survey included 1677 participants. We finally included 1598 participants in the multiple logistic regression analysis after dropping 79 observations with missing data on variables included in the model.

Sampling procedure

We adapted the Respondent-Driven Sampling (RDS) method to recruit the study participants due to the hard-to-reach nature of people who use drugs. The sampling procedure included five steps. Initially, we

sought support from local NGOs in the selected 21 data collection locations to obtain four seeds with a good connection with people who use drugs in each location. A personal identification number was then assigned to each seed after receiving written informed consent from the participant. Next, we provided three coupons to each seed for referring three other people who use drugs to the study. Seeds received US$2 for a successful referral and were expected to refer three to six peers. New seeds would be selected when the recruitment tree had dried up. Finally, participants recruited for the study were invited to become seeds allowing them to recruit other people who use drugs from their networks.

Data collection training

The interviews were conducted by formally trained counselors from HIV voluntary counseling and testing centers in the respective province. All members of the data collection teams attended a three-day training on data collection covering topics such as informed consent process, study protocol, HIV and HCV testing, data collection tools, interview techniques, administration of the questionnaire, participants' privacy and confidentiality protection, as well as data quality checks, including spot-checking and reviewing the filled questionnaires.

Variables and measurements

A structured questionnaire was developed based on standardized and validated tools adapted from previous studies on mental health among HIV key populations, including people who use drugs [21,40,42,43]. We also conducted a questionnaire validation workshop participated by representatives from communities, NGOs, development partners, and national programs working on HIV and harm reduction programs in Cambodia. The questionnaire was piloted with 20 people who use drugs residing in Phnom Penh. The questionnaire collected information on socio-demographic characteristics, drug use behaviors, sexual behaviors, HIV and other sexually transmitted infections (STIs), other substance use, adverse childhood experiences, and psychological distress.

Sociodemographic information included age (18-24, 24-35, 35+ years), gender (male, female), type of community (urban, rural), years of formal schooling attained (0-6, 7-9, 10+ years), average monthly income earned in the past six months (<100, 100-199, 200+ USD), primary occupation (entertainment workers, office workers, laborer/farmer, unemployed, other), and living arrangement (living with family/relatives, living with friends, living in own dwelling, living on the streets, other).

The information on drug use included types of illicit drugs most commonly used and frequency of use in the past three months. We also collected information regarding other substance use (i.e., alcohol drinking and binge drinking, cigarette smoking) and exposure to community-based HIV, harm reduction, and other related services in the past six months.

To measure HIV risks, we asked participants about their sexual behaviors in the past three months. The information included the number of sexual partners and condom use with commercial (defined as partners with whom the participant had sex in exchange for money or gifts) and non-commercial partners. We also collected information on HIV testing history, STI symptoms, and care-seeking behaviors for the symptoms in the past three months.

We adapted five questions on ACEs from the brief screening version of the Childhood Traumatic Questionnaire [44]. The questions collected information on the experiences of physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect. All the 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 psychological distress [45]. A four-point Likert-type scale, which varied from “0= less than usual” to “3= much more than usual,” was applied to each question [45]. 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 using a “0-0-1-1” method to eliminate bias [46]. The median of the sum of the newly derived score for the sample was used as a cut-off to identify participants with high (GHQ-12> 2) and low (GHQ-12≤ 2) psychological distress [45]. Cronbach's alpha of the scale in this study was 0.88, confirming good reliability [47]. Besides, we added questions on participants’ suicidal thoughts and overall quality of life to the questionnaire.

Statistical analyses

Stata (StataCorp LP, version 14.2) was used for data analyses in this study. We compared sociodemographic characteristics, substance use, sexual behaviors, and ACEs of participants with low psychological distress (GHQ-12≤2) to those of participants with high psychological distress (GHQ-12>2). We used Chi-square test (or Fisher's exact test when the expected cell count was smaller than 5) for categorical variables and Student's *t*-test (or Mann-Whitney test when a variable was not normally distributed) for continuous variables. A multiple logistic regression model was constructed to identify factors associated with psychological distress. We included age and gender regardless their statistical significance level and other variables with a *p*-value <0.05 in the bivariate analyses in the model. The variables included marital status, education level, living arrangement, duration of drug use, experience at drug rehabilitation, mode of first-time drug use, HIV status, and ACEs. We obtained crude and adjusted odds ratios (AOR) of the associations and presented with 95% CIs and *p*-values.

Ethical considerations

This study received ethical approval from the National Ethics Committee for Health Research (NECHR) of the Ministry of Health in Cambodia (No. 420 NECHR). Participation in the study was voluntary, and all

participants provided written informed consent. We protected participants' privacy and confidentiality by collecting data in a private room and removing personal identifiers from research documents.

Results

This study included 1677 people who use drugs who had an average age of 28.6 (SD=7.8) years, average years of formal 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 18.5% of the study sample. Around one-third of the participants resided in Phnom Penh, while 16% lived 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 and 37.3% in men.

Sociodemographic characteristics

Table S1 in the supplementary materials shows that 62.8% of the participants were male, and 88.5% lived in an urban setting. More than half (53.6%) had primary or no formal education, and 65.6% were 25 years of age or older. The majority (94.5%) were in Khmer ethnic group, and 46.2% were never married. While 46.7% of the participants lived with their family or relatives, 10.3% lived on the streets. Approximately one-third (35.6%) had their primary occupation as laborers or farmers, while 18.3% worked as entertainment workers. The majority (82.6%) reported having an average monthly earning of less than US$200.

Substance use

As shown in Table S2 in the supplementary materials, 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 (78.7%) reported having daily alcohol drinking habits, while 50.1% had smoked at least 100 cigarettes in their lifetime. The proportions of participants who reported using any drugs in the past three months (85.2% vs. 75.6%, $p<0.001$), using methamphetamine in the past three months (77.8% vs. 69.3%, $p<0.001$), using multiple drugs in the past three months (11.5% vs. 7.5%, $p= 0.005$), and having been to a drug rehabilitation center in the past 12 months (22.3% vs. 11.2%, $p<0.001$) were significantly higher among participants who had high psychological distress than among participants who had low psychological distress.

Sexual behaviors

As shown in Table S3 in the supplementary materials, 92.8% reported having had sexual intercourse; of them, 24.9% reported always using condoms with any partner. Of the 1557 sexually active participants, 39.7% reported having sexual intercourse when a partner was intoxicated. One in five (20.5%) reported always using condoms with non-commercial partners. More than one-third (35.8%) reported having sexual intercourse with commercial partners, and 39.2% reported always using condoms with commercial partners. Of the total, 4.8% knew that they had HIV. The proportions of participants who reported having had sexual intercourse when 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%, $p=0.003$), having sexual intercourse in an exchange for money or gifts (41.5% vs. 31.2%, $p<0.001$), and knowing that they had HIV (6.9% vs. 3.2%, $p= 0.001$) were significantly higher among participants who had high psychological distress than among participants who had low psychological distress.

Adverse childhood experiences (ACEs)

Table S4 in the supplementary materials shows the participants' experiences of physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect when they were growing up. More than half (54.5%) reported having been slapped, kicked, or received physical punishment from a family member or a guardian when they were growing up. About half (51.2%) reported having been insulted by family members or guardians, and 21.9% reported having been sexually harassed or abused. The majority of participants (89.3%) reported being taken care of by someone in the family and receiving emotional support and care from a family member (85.4%). Participants who had high psychological distress were significantly more likely to report experiences of physical punishment from a family member or a guardian (62.7% vs. 48.6%, $p<0.001$), getting insulted by a family member or a guardian (63.5% vs. 42.4%, $p<0.001$), and being sexually harassed/abused by someone (30.1% vs. 16.0%, $p<0.001$).

Factors associated with psychological distress

Results of bivariate and multiple logistic regression analyses are presented in Table 1. 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 1 Factors associated with the level of psychological distress among people who use drugs in bivariate and multivariable logistic regression analyses (*n*= 1598)

Variables in the model	GHQ-12 ≤ 2 (*n*= 927)	GHQ-12>2 (*n*= 671)	Psychological distress	Psychological distress
	n (%)	*n* (%)	OR (95% CI)	AOR (95% CI)
Gender				
Female	298 (32.1)	298 (44.4)	Reference	Reference
Male	629 (67.9)	373 (55.6)	0.59 (0.48-0.73)***	0.54 (0.41-0.69)***
Type of living arrangements				
<25	351 (37.8)	200 (29.8)	Reference	Reference
25-34	380 (41.0)	300 (44.7)	1.38 (1.10-1.74)**	1.31 (1.00-1.72)*
≥35	196 (21.2)	171 (25.5)	1.53 (1.17-2.00)**	1.65 (1.18-2.32)**
Current marital status				
Married	349 (37.6)	251 (37.4)	Reference	Reference
Never married	448 (48.3)	287 (42.8)	1.42 (1.06-1.90)*	1.01 (0.76-1.33)
Divorced/separated	130 (14.1)	133 (19.8)	0.89 (0.71-1.11)	1.08 (0.78-1.49)
Level of formal education completed				
Primary education or none (0–6)	472 (50.9)	382 (56.9)	Reference	Reference
Lower secondary education (7–9)	265 (28.6)	182 (27.1)	0.84 (0.67-1.07)	1.06 (0.82-1.37)
Upper secondary or higher (≥10)	190 (20.5)	107 (15.9)	0.69 (0.53-0.91)**	0.90 (0.66-1.23)
Type of living arrangements				
With family/relatives	438 (47.2)	314 (46.8)	Reference	Reference
On the streets	87 (9.4)	72 (10.7)	1.15 (0.82-1.63)	0.70 (0.46-1.06)
In own dwelling	230 (24.8)	131 (19.5)	0.79 (0.61-1.03)	0.56 (0.41-0.76)***
With friends	94 (10.2)	72 (10.8)	1.07 (0.76-1.50)	0.88 (0.61-1.27)

Others	78 (8.4)	82 (12.2)	1.47 (1.04-2.06)***	1.11 (0.76-1.63)
Duration of drug use				
≤ 2 years	584 (63.0)	380 (56.6)	Reference	Reference
3-5 years	187 (20.2)	147 (21.9)	1.21 (0.94-1.55)	1.19 (0.90-1.57)
6-9 years	54 (5.8)	44 (6.6)	1.25 (0.82-1.90)	1.07 (0.67-1.71)
≥ 10 years	102 (11.0)	100 (14.9)	1.51 (1.11-2.04)***	1.11 (0.75-1.63)
Had been sent to a drug rehabilitation center				
No	821 (88.6)	521 (77.6)	Reference	Reference
Yes	106 (11.4)	150 (22.4)	2.23 (1.70-2.93)***	2.05 (1.47-2.85)***
Injection as mode of first drug use				
No	838 (90.4)	609 (90.8)	Reference	Reference
Yes	89 (9.6)	62 (9.2)	0.95 (0.68-1.35)	0.57 (0.35-0.92)*
Had been sent to prison in the past 12 months				
No	834 (90.0)	583 (86.9)	Reference	Reference
Yes	93 (10.0)	88 (13.1)	1.35 (0.99-1.84)	0.99 (0.69-1.43)
Had been slapped, kicked by parents/guardians				
No	477 (51.5)	250 (37.3)	Reference	Reference
Yes	450 (48.5)	421 (62.7)	1.78 (1.45-2.18)***	1.13 (0.88-1.46)
Had been insulted by family members				
No	535 (57.7)	245 (36.5)	Reference	Reference
Yes	392 (42.3)	426 (63.5)	2.37 (1.93-2.91)***	2.10 (1.63-2.71)***
Had been sexually harassed/abused by someone				
No	780 (84.1)	468 (69.7)	Reference	Reference
Yes	147 (15.8)	203 (30.3)	2.3 (1.81-	1.80 (1.38-

			2.93)***	2.35)***
Had someone taking care when getting sick				
No	86 (9.3)	83 (12.4)	Reference	Reference
Yes	841 (90.7)	588 (87.6)	0.72 (0.53-0.99)*	0.69 (0.48-1.01)*
Had emotional support from family member				
No	124 (13.4)	111 (16.5)	Reference	Reference
Yes	803 (86.6)	560 (83.5)	0.78 (0.59-1.03)	1.19 (0.86-1.65)
Injected drugs in the past 12 months				
No	769 (83.0)	531 (79.1)	Reference	Reference
Yes	158 (17.0)	140 (20.9)	1.28 (0.99-1.65)	1.40 (0.95-2.06)
Current HIV status				
Negative	588 (63.4)	430 (64.1)	Reference	Reference
Positive	31 (3.3)	47 (7.0)	2.07 (1.29-3.32)**	1.63 (0.98-2.71)
Don't know	308 (33.3	194 (28.9)	0.86 (0.69-1.07)	1.10 (0.87-1.40)

AOR, adjusted odds ratio; CI, confidence interval; GHQ, General Health Questionnaire; OR, odds ratio.

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.

$^{*}p<0.05$; $^{**}p<0.01$, $^{***}p<0.001$.

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. We found 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 [21].

Sociodemographic factors

Our findings suggested that male people who use drugs were less likely to have high psychological distress than their female counterparts. This finding is consistent with the results shown in previous studies [21,27,48]. In Taiwan, female people who use drugs were more likely to have suicidal thoughts than their male counterparts, resulting in more psychiatric illnesses than men [48]. In our additional analyses, female participants who were sex workers, sellers, and farmers experienced significantly higher psychological distress than their male counterparts. This finding suggested that being sex workers might have mediated psychological distress among female relative to male participants. Gender differences in reporting psychological distress and help-seeking behavior are universal, with few exceptions. The differences can be explained by the traditional masculine ideology and the active denial of their actual psychological status [49]. Qualitative studies are needed to explore gender differences.

People who use drugs aged 25 and above were significantly more likely to have high psychological distress than their younger counterparts aged 18-24. This finding corroborates with findings in a previous study in Cambodia [27]. In this study, older people (aged 25+) who use drugs were more likely to have suicidal thoughts and to drink alcohol four times or more per week in the past three months 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 thoughts and mental health [3,21] has also been documented in previous studies.

We found that people who use drugs living in their own dwelling were less distressed than those living with family. In our additional analyses, participants with more ACEs living in their own dwelling were less psychologically distressed than those living with family or relatives. Therefore, ACEs could have been a driver of the choice of living arrangement. It should be noted that marriage and cohabitation might have mediated the association as close to two-thirds of the participants living in their own dwelling were married and cohabited. Breaking free from the past ACEs with family and forming their independent cohabitation with a spouse, people who use drugs living in their own dwelling were less psychologically distressed than those living with family.

People who use drugs who had been to a drug rehabilitation center had more psychological distress than those who had never been to the center. This finding confirmed findings in previous studies in Cambodia [21,27], suggesting that the role of the drug rehabilitation centers remained counterproductive five years later. The poor overall quality of life and health of people who use drugs with a history of rehabilitation could be the underlying drivers of psychological distress. However, adverse experience in rehabilitation centers remained a valid explanation, as indicated in another study in 2012 [27]. Similar accounts had also been documented in China [50], Taiwan [48], and Vietnam [51]. It is important to note that living with HIV while in the rehabilitation centers might have compounded the effect on the participants' psychological distress. A previous study in China reported a lack of ART access in rehabilitation centers among people who inject drugs living with HIV [50]. Moreover, the existing evidence showed that HIV-positive status is directly linked with mental disorders via neuro-biological mechanisms [52]. HIV-positive status is also indirectly related to mental disorders through stigma [53], particularly among people living with HIV without access to ART and insufficient or late ART receipt [54].

Adverse Childhood Experiences (ACEs)

The participants who had been insulted by family members or guardians or sexually harassed or abused when growing up exhibited a higher level of psychological distress than those who had not. On the other hand, the participants who experienced care provided by someone when getting sick as children were less psychologically distressed than those who did not. These findings are consistent with those in the United States [55] and Cambodia [21]. 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 [56]. The association's pathway 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 a higher ACE score, were about two to four times more likely to initiate drug use than people with a lower ACE score [57]. Another possible pathway could have been from ACEs to low self-esteem or self-regards, drug use, and finally, psychological distress. A study in Japan showed that female juvenile offenders who reported ACEs tended to have low self-esteem [58]. Another study in Iran showed that participants who had low self-esteem had a tendency towards drug addiction drug addiction [59].

Limitations of the study

Despite several strengths, the 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. Thus, the results should be interpreted as the association between the dependent and independent variables 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, the study findings' generalizability may be limited because the study targeted provinces with a heavy burden of HIV and drug use to obtain a large sample. Furthermore, the 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 psychological distress than men, while people aged 25 and older also exhibited higher psychological distress than people aged 18 to 24. Our results on the

counterproductive role of drug rehabilitation and the negative effect of ACEs on the psychological distress of people who use drugs also corroborated with findings in earlier studies. Therefore, intervention programs that attempt to address mental health among people who use drugs should be gender- and age-sensitive. The programs should be tailored to more vulnerable and marginalized subpopulations and individuals with a history of ACEs and drug rehabilitation. Importantly, integrating mental health services into HIV and harm-reduction programs for people who use drugs across all health care system levels is a promising alternative to tackle mental health problems among this vulnerable population. A community-based rehabilitation or treatment could be an alternative to rehabilitation centers, given the centers' counterproductive roles.

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 training 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.

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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. They 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.

Ethical approval and consent to participate

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

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