


# Depression and Anxiety in Youth and Young Adults Living with HIV: Frequency and Associated Factors in Thai Setting

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## Abstract

Integrative mental health care in HIV patients is an important contributor to successful therapy. This is a cross-sectional study in youth and young adults who attend routine HIV clinic at a tertiary care centre in Bangkok. We recruited 100 youth and 130 young adults living with HIV to evaluate the frequency of depression and anxiety and associated sociodemographic including sexual orientation and health-related behaviours. Overall, about a fifth of the participants had significant depression or anxiety. Interestingly, we found different factors associated with depression in youth and young adults living with HIV. Loss of their father, loss of close relatives or friends, and being unemployed or school exclusion were the factors associate with depression in youth; while dangerous alcohol use, feeling discriminated against and having lipodystrophy were factors in young adults. The understanding of the frequency and different associated factors can inform more effective prevention and treatment strategies.

## Keywords

mental health, HIV-infected youth, psychosocial factors, HIV in asian setting

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## Background

Depression and anxiety disorder are common and profoundly affect the quality of life.<sup>1</sup> HIV infection may be a cause or consequence of mental health difficulties. Despite the availability of effective antiviral treatments (ART), mental health is an important factor that affects antiretroviral treatment compliance and patient outcomes.<sup>2,3</sup> Mental health care for individuals living with HIV is a key contributor to successful therapy, but it is often neglected.

Youth living with HIV are more vulnerable to depression and anxiety than HIV-uninfected youth due to the burden of taking ART, loss of parents, stigmatization, and discrimination.<sup>4</sup> Depression, anxiety, and attention deficit and hyperactivity disorder are frequently diagnosed in children and youth living with HIV and can negatively affect treatment compliance.<sup>4,5</sup> The parents or caregivers of these youth are often

HIV positive and may also suffer from depression and anxiety disorder, affecting the child's emotion and well-being.<sup>6</sup>

An early meta-analysis revealed that people living with HIV had a higher prevalence of depression than HIV-negative

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individuals,<sup>7,8</sup> and more than a third of adults with HIV in Asia had depression.<sup>9,10</sup> In contrast to the data in youth, there have been few studies addressing depression and anxiety in adolescents living with HIV in the Asian context, with only one recent study revealing the rate of significant anxiety or depressive symptoms at about 20%, comparable to the rate in HIV-uninfected youths.<sup>11,12</sup> Due to differences in stage of psychosocial development between youth and young adults, they have distinct developmental tasks resulting in unique psychological and emotional changes. We hypothesized that the factors associated with depression and anxiety in the two groups may be different. Therefore, we aimed to estimate the frequency of significant depression and anxiety, identify factors associated with these conditions and compare the associated factors in youth and young adults living with HIV in the same setting. An improved understanding of the frequency and associated factors can inform more effective prevention and treatment strategies.

## Methods

This is a cross-sectional, single-centre study in youth (15–24 years) and young adults (25–35 years) receiving long-term HIV treatment at a public tertiary-care university hospital in Bangkok. The hospital is a referral centre for HIV-related comprehensive treatment and care. Approximately 3000 individuals living with HIV have been regularly followed-up at the adult clinic, and 160–170 children and adolescents at the paediatric HIV clinic. The routine specialized care available includes mental health screening if there are signs or symptoms of mental health difficulties or nonadherence. The patients with positive screening for mental health difficulties were referred to the hospital's psychiatric department or other community mental health services for further evaluation and management.

The study was approved by the local ethical committee in 2019. The participants were invited to participate in the study during their regular scheduled clinic visits from June 2019 to January 2020. Each week, the study staff invited about 3–6 youth and 10–20 young adults who were in the clinic waiting area. After providing informed written consent, each participant completed 3 questionnaires: a socio-demographic and health-risk-behaviour self-report form, a patient health questionnaire with depression scale, and an anxiety disorder test. The participants were informed that there may be some questions asking about their personal experiences and they should feel free to answer the questions or not. They could stop completing the questionnaire anytime if they felt distress. The participants aged under 18 years gave their assent with the provision of written consent from their parents.

The demographics and clinical characteristics were extracted from medical records including mode of transmission as well as gender and sexual orientation. The latter had been routinely collected by the patients' self-identification during the HIV clinic registration process. The most recent values of CD4 T-lymphocyte (CD4) counts and HIV-1 RNA (viral load: VL) level were recorded. Adherence to ART was defined as good if the pill count of the current visit indicated 90% or more of the drug has been taken.

Socio-demographic data and health-related behaviours were collected using a self-report questionnaire developed for the study. Data included education or employment status, marital status, family circumstances, hobbies, the experience of loss and stressful life events, subjective sense of stigmatization and discrimination, sexual risks, and substance use behaviours. Participants also completed the Alcohol Use Identification Test (AUDIT), a self-report questionnaire that detects early signs of dangerous and harmful drinking and identify mild dependence.<sup>13,14</sup>

## Major Depression Test

The Thai version of the Patient Health Questionnaire for Adolescents (PHQ-A) and Patient Health Questionnaire (PHQ-9) in young adults were used to evaluate major depressive disorder. PHQ-A is an adolescent version of the PHQ-9 with minor changes made to suit the unique symptoms of depressive disorder in adolescents.<sup>15</sup> The Thai version was validated among adolescents aged 11–20 years with a sensitivity of 0.76 and the specificity of 0.81.<sup>16</sup> PHQ-9 is a 9-item questionnaire based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria for a major depressive episode. It refers to symptoms experienced by the patient during the preceding two weeks. The Thai version has acceptable psychometric properties for screening of major depressive disorder among adults over 18 years of age with a sensitivity of 0.84 and the specificity of 0.77.<sup>17</sup> Using validated cut-off scores, the PHQ-A and PHQ-9 differentiate between those with and without moderate to severe major depressive disorder. In this study, we used the PHQ-A score of  $\geq 10$  or PHQ-9 of  $\geq 9$  to identify the patients with depression, according to the references.

## Anxiety Disorder Test

We used the Screen for Child Anxiety Related Disorder (SCARED) in youth and the 7-item anxiety scale (GAD-7) in young adults. The SCARED consists of 41 items measuring the DSM-IV diagnostic criteria for 5 anxiety disorders. At a cut point of  $\geq 25$ , the SCARED instrument differentiates children and youth from 8–18 years of age with and without anxiety with the optimal sensitivity of 0.79 and specificity of 0.82.<sup>18</sup> The 7 items in GAD-7 reflects core symptom criteria for generalized anxiety disorder (GAD) based on the DSM-IV in adults over 18 years of age. At a cut point of  $\geq 10$ , the sensitivity and specificity are 0.89 and 0.82, respectively for screening of generalized anxiety disorder.<sup>19</sup> In this study, we used the SCARED score of  $\geq 25$  or GAD-7 of  $\geq 10$  to identify the patients with anxiety according to the references.

## Statistical Analysis

Descriptive statistics were used to present baseline characteristics, HIV-related data, and frequencies of depression and anxiety disorder. Inferential statistics were used to analyse the correlation between factors associated with depression in the groups of youth and young adults using Chi-square or Fisher's exact test.

**Table 1.** Demographics and Clinical Characteristics of Youth and Young Adults (N = 230).

	Youth (N = 100) <sup>a</sup>	Young Adult (N = 130) <sup>a</sup>	Total (N = 230) <sup>a</sup>
Age (years); Median (IQR)	19 (17–22)	30 (27–33)	26 (20–31)
Gender and sexual orientation by self-report; n (%)			
Male, heterosexual	35 (35.0)	29 (22.3)	64 (27.8)
Female, heterosexual	52 (52.0)	30 (23.1)	82 (35.7)
LGBT	13 (13.0)	71 (54.6)	84 (36.5)
MSM	10 (10.0)	60 (46.2)	70 (30.4)
Bisexual	-	5 (3.8)	5 (2.2)
TGW	3 (3.0)	6 (4.6)	9 (3.9)
Mode of HIV acquisition; n (%)			
Perinatal	77 (77.0)	4 (3.1)	81 (35.2)
Sexual	20 (20.0)	126 (96.9)	146 (63.5)
Transfusion	1 (1.0)	0 (0.0)	1 (0.4)
Unknown	2 (2.0)	0 (0.0)	2 (0.9)
Age at HIV diagnosed (years); median (IQR)	3.5 (0.5–11)	25 (23–28)	21 (4–26)
Current CD4 <sup>b</sup> cells/mm <sup>3</sup> ; median (IQR)	605 (443–830)	561 (365–737)	580 (384–768)
≤200; n (%)	4 (4.0)	11 (8.5)	15 (6.6)
201–500; n (%)	31 (31.0)	40 (31.0)	71 (31.0)
>500; n (%)	65 (65.0)	78 (60.5)	143 (62.4)
Worst CDC clinical staging; n (%)			
N	21 (21.0)	65 (50.0)	86 (37.4)
A	17 (17.0)	18 (13.8)	35 (15.2)
B	29 (29.0)	15 (11.5)	44 (19.1)
C	33 (33.0)	32 (24.6)	65 (28.3)
Current Viral Load <sup>b</sup> ; n (%)			
Not available	1 (1.0)	6 (4.6)	7 (3.0)
Undetectable (<40 copies/mL)	81 (81.0)	112 (86.2)	193 (83.9)
40–1000 copies/mL	4 (4.0)	4 (3.1)	8 (3.5)
>1000 copies	14 (14.0)	8 (6.2)	22 (9.6)
Duration of undetectable viral load (years); median (IQR)			
	n = 80	n = 111	n = 191
≤1 year; n (%)	8.5 (3.5–12.0)	3 (1–5)	4 (2–8)
>1–5 years; n (%)	9 (11.3)	13 (11.7)	22 (11.5)
>5 years; n (%)	17 (21.3)	68 (61.3)	85 (44.5)
>5 years; n (%)	54 (67.5)	30 (27.0)	84 (44.0)
Current antiretroviral drugs composed with NRTI backbone; n (%)			
EFV	29 (29.0)	83 (63.8)	112 (48.7)
RPV	22 (22.0)	33 (25.4)	55 (23.9)
DOR	3 (3.0)	-	3 (1.3)
LPV/r	2 (2.0)	6 (4.6)	8 (3.5)
ATV/r	27 (27.0)	2 (1.5)	29 (12.6)
ATV/COBI	4 (4.0)	-	4 (1.7)
DRV/r	-	3 (2.3)	3 (1.3)
EVG/COBI	5 (5.0)	1 (0.8)	6 (2.6)
RAL	-	1 (0.8)	1 (0.4)
DTG	1 (1.0)	-	1 (0.4)
BIC	1 (1.0)	-	1 (0.4)
No antiretroviral treatment in the past 6 months	2 (2.0)	-	2 (0.9)
Adherence by current visit pill counts; n (%)			
Good adherence (>90%); n (%)	85 (85.0)	126 (96.9)	211 (91.7)
Poor adherence (<90%); n (%)	15 (15.0)	4 (3.1)	19 (8.3)
Age at full self-disclosure (year); median (IQR)	12.5 (11–14)	25 (23–28)	21 (13–26)
Having ongoing HIV or ART-related comorbidities <sup>c</sup> ; n (%)	32 (32.0)	41 (31.5)	73 (31.7)

(continued)

**Table 1.** (continued)

	Youth (N = 100) <sup>a</sup>	Young Adult (N = 130) <sup>a</sup>	Total (N = 230) <sup>a</sup>
Having ongoing nonHIV-related comorbidities <sup>d</sup> ; n (%)	20 (20.0)	23 (17.7)	43 (18.7)
History of admission within the past 3 years; n (%)	21 (21.0)	32 (24.6)	53 (23.0)
Presence of lipodystrophy; n (%)	5 (5.0)	3 (2.3)	8 (3.5)

Notes: IQR: interquartile range, LGBT: Lesbian, Gay, Bisexual, Transgender, MSM: men who have sex with men, TGW: transgender women, CDC: Center for Disease Control and Prevention, Clinical staging N: Asymptomatic, A: Mildly symptomatic HIV, B: Moderately symptomatic HIV not A or C conditions, C: Severely symptomatic with AIDS-defining conditions, NRTI: nucleoside reverse transcriptase inhibitors, EFV: efavirenz, RPV: rilpivirine, DOR: doravirine, LPV/r: lopinavir with ritonavir, ATV/r: atazanavir with ritonavir, ATV/COBI: atazanavir with cobicistat, DRV/r: darunavir with ritonavir, EVG/COBI: elvitegravir with cobicistat, RAL: raltegravir, DTG: dolutegravir, BIC: bictegravir.

<sup>a</sup>Denominator, unless otherwise indicated.

<sup>b</sup>Result of the tests within 12 months.

<sup>c</sup>The numbers of youth participants with the conditions were: 16 for dyslipidemia; 10 for hyperbilirubinemia; 5 for retinitis; 2 for TB infection; 2 for HIV encephalopathy; 1 for HIV-related dermatitis, and 1 for transaminitis. The numbers of young adult participants with the conditions were: 11 for dyslipidemia; 8 for transaminitis; 2 for Tuberculosis; 3 for carcinoma in situ neoplasm; 2 for Mycobacterium avium complex infection; 2 for impaired blood sugar; 1 for IRIS; 1 for lymphoma; 1 for pneumocystis pneumonia (PCP), and 1 for Kaposi sarcoma.

<sup>d</sup>The numbers of youth participants with the conditions were: 4 for allergic rhinitis; 4 for mild intellectual deficit; 3 for hypertension; 2 for iron deficiency anemia; 2 for Thalassemia; 1 for Primary pulmonary hypertension; 1 for Turner syndrome; 1 for alopecia universalis; 1 for Vitiligo; 1 for Vitamin D deficiency, and 1 for asthma. The numbers of young adult participants with the conditions were: 4 for hypertension; 3 for obesity; 3 for Thalassemia; 2 for Grave's disease; 2 for Psoriasis; 2 for fatty liver; 2 for end stage renal disease; 1 for Type 1 diabetes; 1 for hemorrhoid; 1 for venous sinus thrombosis; 1 for migraine; 1 for chronic otitis media; 1 for allergic rhinitis; 1 for splenic hamatoma; 1 for anal fistula; 1 for cataract, and 1 for thyroid carcinoma.

All the variables in relation to demographics, clinical characteristics, and health-related behaviours were included in the univariate analysis. The variables with  $p < 0.1$  in the univariate model were included in the stepwise multivariate model. All analyses were carried out using Stata® software version 11.2 (StataCorp 4905 Lakeway Drive, College Station, Texas, 77845, USA).

## Results

One hundred youth with a median age of 19 (interquartile range (IQR) 17–22) years, and 130 young adults with a median age of 30 (IQR 27–33) years were invited and all agreed to participate in the study (Table 1). Thirteen (13.0%) youth and 71 (54.6%) adults identified as LGBT; of which, 10 (10.0%) youth and 60 (46.2%) adults were men who have sex with men (MSM), respectively. The predominant mode of transmission was perinatal (77.0%) in youth and sexual (96.9%) in young adults. In youth the median (IQR) CD4 count was 605 (443–830) cells/mm<sup>3</sup>; 81 (81.0%) had an undetectable viral load (<40 copies/mL), and 33 (33.0%) experienced CDC clinical stage C. In young adults, the median (IQR) CD4 count was 561 (365–737) cells/mm<sup>3</sup>; 112 (86.2%) had an undetectable viral load (<40 copies/mL), and 32 (24.6%) experienced CDC clinical stage C. The current antiretroviral regimens were non-nucleoside reverse-transcriptase inhibitors (NNRTI)-based in 54 (54.0%) of youth and 116 (89.2%) of adult participants. Of these, 29 (29.0%) of youth and 83 (63.8%) of young adults were receiving efavirenz (EFV). Adherence to ART by self-report was > 90% at the current visit in 85 (85.0%) youth and 126 (96.9%) young adults. Thirty-two youth (32.0%) and 41 (31.5%) young adults had HIV or ART-related comorbidities. The most common condition was dyslipidemia that was identified in 16 youth (16.0%) and 11 (8.5%) young adult participants.

## Socio-Demographic Data, and Health Related Behaviours (from Self-Report Questionnaires)

Among youth, 32 (32.0%) were working and 56 (56.0%) were still in school/college, while 117 (90.0%) of young adults were working and 68 (52.3%) had graduated from college with a bachelor's degree (Table 2). There were 34 (34.0%) youth and 74 (56.9%) young adults in relationship with sex partners; of these, 18 youth (52.9%) and 22 (29.7%) adults, respectively, disclosed their HIV status to the sex partners. Of interest was that only one youth (2.9%) reported having the HIV-positive of the partner while 33 (45.8%) adults reported having HIV-positive partners. Alcohol use was at dangerous level in approximately similar proportion of both groups, 11.0% of youth and 10.0% of adults. In contrast, only 5 (5.0%) youth but 21 (16.2%) adults reported using substance other than alcohol. Social media use and watching TV/listening to music were two most common leisure activities among all participants, 68.0% and 60.0% of youth; and 59.2% and 61.5%, respectively, of young adults. Eight (8.0%) youth and 20 (15.4%) adults felt discriminated against or stigmatized, mostly by their family and friends. The most common stressful events in the past 12 months reported were loss of relatives or close friends, 20 (20.0%) in youth and 33 (25.4%) in young adults. High proportion, 83.0–94.0% in youth and 76.9–96.2% in young adults reported had someone to talk to or get help including financial support.

## The Frequencies and Associated Factors of Depression and Anxiety

Using the PHQ-A and SCARED, 15 (15.0%) youth had depression, 10 (10.0%) had anxiety, and 8 (8.0%) had both

**Table 2.** Sociodemographic and Health Related Behaviors of the Study Sample (N = 230).

	Youth (N = 100) <sup>a</sup>	Young Adult (N = 130) <sup>a</sup>	Total (N = 230) <sup>a</sup>
Employment; n (%)			
Unemployed/ Housework	12 (12.0)	9 (6.9)	21 (9.1)
Student	56 (56.0)	4 (3.1)	60 (26.1)
Employed/ Working	32 (32.0)	117 (90.0)	149 (64.8)
Highest Education; n (%)			
Never attend school	2 (2.0)	-	2 (0.9)
High school and less	54 (54.0)	37 (28.5)	91 (39.6)
Diploma degree	15 (15.0)	8 (6.2)	23 (10.0)
Bachelor degree	28 (28.0)	68 (52.3)	96 (41.7)
Master degree and above	1 (1.0)	17 (13.1)	18 (7.8)
GPA (only in student); n (%)	N = 56	N = 4	N = 60
≥3.00	14 (25.0)	1 (25.0)	15 (25.0)
2.00–2.99	30 (53.6)	-	30 (50.0)
<2.00	2 (3.6)	-	2 (3.3)
No answer	10 (17.9)	3 (75.0)	13 (21.7)
Living home during childhood; n (%)			
Biological family	98 (98.0)	130 (100.0)	228 (99.0)
Orphanage	1 (1.0)	-	1 (0.5)
Foster family	1 (1.0)	-	1 (0.5)
Current relationship with sex partner; n (%)			
Single or no sex partner	66 (66.0)	56 (43.1)	122 (53.0)
In relationship but not moving in	24 (24.0)	28 (21.5)	52 (22.6)
Living together	10 (10.0)	46 (35.4)	56 (24.3)
HIV status disclosed to partner; n (%)	18 (52.9)	22 (29.7)	30 (27.8)
Partner's HIV status; n (%)			
Positive	1 (2.9)	33 (45.8)	34 (32.1)
Negative	26 (76.5)	32 (44.4)	58 (54.7)
Unknown	7 (20.6)	7 (9.7)	14 (13.2)
Father's status; n (%)			
Alive	65 (65.0)	107 (82.3)	172 (74.8)
Died	34 (34.0)	20 (15.4)	54 (23.5)
Unknown	1 (1.0)	3 (2.3)	4 (1.7)
Age at losing father (years); median (IQR)	n = 34 4 (1–7)	n = 20 13 (5–25)	n = 64 4.5 (1.5–13)
Mother's status; n (%)			
Alive	67 (67.0)	118 (90.8)	185 (80.4)
Died	33 (33.0)	9 (6.9)	42 (18.3)
Unknown	-	3 (2.3)	3 (1.3)
Age at losing mother (years); median (IQR)	(n = 33) 5 (3–10)	(n = 9) 6 (3–8)	(n = 42) 5.5 (3–10)
Current supportive household member; n (%)			
Parents	50 (50.0)	47 (36.2)	97 (42.2)
Relatives	38 (38.0)	34 (26.2)	72 (31.3)
Partner	9 (9.0)	45 (34.6)	54 (23.5)
Daughter/Son	-	11 (8.5)	11 (4.8)
Alone	8 (8.0)	32 (24.6)	40 (17.4)
Current alcohol consumption score; n (%)			
Dangerous (by AUDIT)	11 (11.0)	13 (10.0)	24 (10.4)
Social drink	34 (34.0)	40 (30.8)	74 (32.2)
Never	55 (55.0)	77 (59.2)	132 (57.4)
Using substances other than alcohol; n (%)			
Never	93 (93.0)	108 (83.1)	201 (87.4)
Ever	5 (5.0)	21 (16.2)	26 (11.3)
Currently using	2 (2.0)	1 (0.8)	3 (1.3)
Currently smoking; n (%)	19 (19.2)	23 (17.8)	42 (18.4)
Income per month (Thai baht); median (IQR)	10000 (7000–15000)	19000 (15000–25000)	16000 (12000–22530)
≤10000	18 (60.0)	13 (10.9)	31 (20.8)

(continued)

Table 2. (continued)

	Youth (N = 100) <sup>a</sup>	Young Adult (N = 130) <sup>a</sup>	Total (N = 230) <sup>a</sup>
10001–30000	12 (40.0)	91 (76.5)	103 (69.1)
30001–60000	-	12 (10.1)	12 (8.1)
>60000	-	3 (2.5)	3 (2.0)
Felt discriminated against or stigmatized; n (%)	8 (8.0)	20 (15.4)	28 (12.2)
Hobbies; n (%)			
Having leisure time without specific activity	95 (95.0)	128 (98.5)	223 (97.0)
Playing games	42 (42.0)	52 (40.0)	94 (40.9)
Using social media	68 (68.0)	77 (59.2)	145 (63.0)
Playing sports	19 (19.0)	44 (33.8)	63 (27.4)
Watching TV/Listening to music	60 (60.0)	80 (61.5)	140 (60.9)
Reading books	16 (16.0)	18 (13.8)	34 (14.8)
Duration of sleep; median (IQR)	8 (7–8)	8 (7–8)	8 (7–8)
>8 hours; n (%)	19 (19.4)	18 (13.8)	37 (16.2)
6–8 hours; n (%)	74 (75.5)	107 (82.3)	181 (79.4)
<6 hours; n (%)	5 (5.1)	5 (3.8)	10 (4.4)
Number of current partners; median (IQR)	0 (0–1)	1 (0–1)	0 (0–1)
No partner; n (%)	70 (70.0)	50 (39.4)	120 (52.9)
1; n (%)	28 (28.0)	75 (59.1)	103 (45.4)
Multiple partners; n (%)	2 (2.0)	2 (1.6)	4 (1.8)
Ever had sexual intercourse; n (%)			
Yes	52 (52.0)	117 (90.0)	169 (73.5)
No	43 (43.0)	1 (0.8)	44 (19.1)
No answer	5 (5.0)	12 (9.2)	17 (7.4)
Frequency of condom using; median (IQR)			
Always use condom; n (%)	32 (61.5)	72 (61.5)	104 (61.5)
Use condom for sometimes; n (%)	14 (26.9)	37 (31.6)	51 (30.2)
Never use condom; n (%)	6 (11.5)	8 (6.8)	14 (8.3)
Ever had STD; n (%)	11 (11.0)	46 (35.4)	57 (24.8)
Stressful event in the past 12 months; n (%)			
Loss of close relatives or friends	20 (20.0)	33 (25.4)	53 (23.0)
Broke up with partner	13 (13.0)	20 (15.4)	33 (14.3)
Being assaulted	5 (5.0)	8 (6.2)	13 (5.7)
No work/ Unemployed/ School exclusion	15 (15.0)	22 (16.9)	37 (16.1)
Having someone to talk to or get help; n (%)			
Having someone to talk to when needed	83 (83.0)	100 (76.9)	183 (79.6)
Having loved ones	94 (94.0)	125 (96.2)	219 (95.2)
Having someone who can trust	91 (91.0)	117 (90.0)	208 (90.4)
Having someone to provide financial support	86 (86.0)	113 (86.9)	199 (86.5)

Notes: NA: not answer/ not available, GPA: grade point average, IQR: interquartile range, AUDIT: alcohol use identification test, STD: sexual transmitted diseases.  
<sup>a</sup>Denominator, unless otherwise indicated.

conditions. On the other hand, using PHQ-9 and GAD-7 among young adults found 25 (19.2%) participants had depression, 11 (8.5%) had anxiety, and 10 (7.7%) had both conditions (Fig. 1).

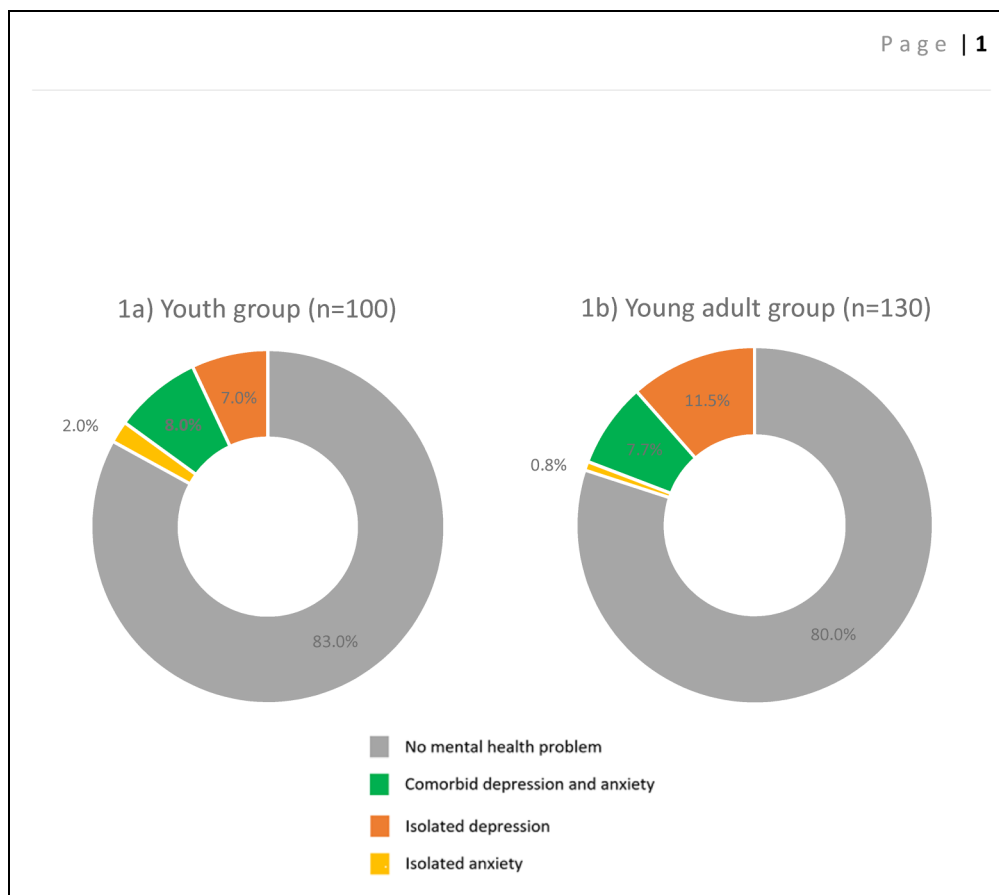
In the univariate analysis of all the demographic and socio-behavioural factors among youth, poor adherence, loss of their relatives or close friends, and being unemployed or not enrolled in school were associated with depression. In the multivariate analysis, loss of the participant's father ( $p = 0.045$ ; aOR 4.8 (95% CI 1.03 to 22.6)), loss of close relatives or friends ( $p = 0.011$ ; 8.1 (1.6 to 41.3)) and being unemployed or excluded from school ( $p = 0.001$ ; 14.7 (3.1 to 68.9)) were independently associated with depression (Table 3).

In the univariate analysis among young adults, being in a relationship, currently smoking, dangerous alcohol consumption, and

being discriminated against were independently associated with depression. Participants that reported having someone to talk to when needed were less likely to have depression. In the multivariate analysis, dangerous alcohol use ( $p = 0.008$ ; 9.0 (1.8 to 46.3)), felt discriminated against and stigmatized ( $p = 0.002$ ; 8.3 (2.2 to 30.9)), and lipodystrophy ( $p = 0.012$ ; 28.7 (2.1 to 387.3)) were independently associated with depression. The loss of the participant's father ( $p = 0.028$ ; 0.08 (0.01 to 0.76)) and having someone to talk to when needed ( $p = 0.023$ ; 0.25 (0.07 to 0.82)) were associated with a lower risk of depression (Table 4).

## Discussion

Mental health affects the ability to cope with problems, live in a changing society, and perform various tasks.<sup>20</sup> Depression and



**Figure 1.** Mental health screening outcomes. 1a) Youth group, 1b) Young adult group. The Thai version of the 9-item depression scale from the Patient Health Questionnaire (PHQ-9) and modified PHQ-9 for Adolescents (PHQ-A) were used to evaluate depression in adults and adolescents, respectively. Depression was defined as having PHQ-A score of  $\geq 10$  or PHQ-9 of  $\geq 9$ . The Child Anxiety Related Disorder (SCARED) and the 7-item anxiety scale (GAD-7) were used to evaluate anxiety in youth in young adults, respectively. Anxiety was defined as having SCARED score of  $\geq 25$  or GAD-7 of  $\geq 10$  to identify anxiety disorder.

anxiety disorder are among the most significant mental health difficulties affecting the quality of life in most settings, including among individuals living with HIV. The burden of depression and anxiety and associated factors vary in different settings and different age groups. This study evaluated the depression and anxiety of the two predominant populations living with HIV, youth, and young adults, in the same setting. Of note was the difference of the two populations in our study: majority of youth were perinatally HIV-infected with only one in ten were MSM, whereas almost all young adults were sexually acquired HIV with almost half were MSM. The participants from both groups had high CD4 count (median  $> 500$  cells/mL) and more than 80% were virologically suppressed. The frequency of depression and anxiety identified by the screening tests were 15% and 10% in youth; and 19% and 8%, respectively, in young adults. Moreover, we found depression and anxiety were comorbid in about half of depressed individuals.

The burden of depression and anxiety in HIV-infected individuals may be higher than in general healthy people,<sup>21</sup> although a study reported similar rate.<sup>22</sup> Globally, the prevalence of

depression in youth with HIV is 10–30%, while the prevalence of anxiety was 20–30%.<sup>3,22–24</sup> The frequency of depression in general Thai youth was reported 15–35%,<sup>25–27</sup> while the frequency of anxiety is 7–17%.<sup>28</sup> Among young adults with HIV, the global prevalence of depression was 30–40%, while the prevalence of anxiety was 20–30%.<sup>29–32</sup> The rates of depression in Thai adults vary from 4% in a national survey of mental disorders by the Department of Mental Health in 2008, to 11% in adult accessing an outpatient department at a hospital,<sup>33,34</sup> while the frequency of anxiety was 4–19%.<sup>35</sup> In the present study, we found similar frequencies of depression and anxiety in the youth group comparable to the general population of Thai youth. The results suggested that, among youth, living with HIV in Thailand may not significantly increase the risk of depression and anxiety. Young adults, in contrast, had higher rate of depression than the rate in general population. Being HIV-infected may contribute to the increased burden of depression in these young adults in our study.

Factors reported associated with depression in youth living with HIV varied in other studies, mostly perinatally infected, including alcohol abuse, parental death, conflicts with the caregiver, traumatic

**Table 3.** Factors Associated with Depression in Youths – Multivariable Analysis.

Factors	No Depression (N = 85)	Depression (N = 15)	Crude OR (95%CI)	p value	Adjusted OR (95%CI)	p value
Gender; n (%)						
Heterosexual male	32 (91.4)	3 (8.6)	1			
Heterosexual female	41 (78.8)	11 (21.2)	2.9 (0.7–11.1)	0.129		
LGBT +	12 (92.3)	1 (7.7)	0.9 (0.1–9.4)	0.922		
Father's status; n (%)						
Alive	58 (89.2)	7 (10.8)	1		1	
Died	26 (76.5)	8 (23.5)	2.5 (0.8–7.8)	0.100	4.8 (1.03–22.6)	0.045
Unknown	1 (100.0)	0 (0.0)	-	-	-	-
Mother's status; n (%)						
Alive	58 (86.6)	9 (13.4)	1			
Died	27 (81.8)	6 (18.2)	1.4 (0.5–4.4)	0.533		
Unknown	-	-	-	-	-	-
Relationship with sex partner; n (%)						
Single or no relationship	54 (81.8)	12 (18.2)	1			
In relationship	22 (91.7)	2 (8.3)	0.4 (0.1–2.0)	0.267		
Living together	9 (90.0)	1 (10.0)	0.5 (0.1–4.3)	0.529		
Adherence to antiretroviral treatment by pill count; n (%)						
Good adherence (>90%)	75 (88.2)	10 (11.8)	1		-	
Poor adherence (<90%)	10 (66.7)	5 (33.3)	3.8 (1.1–13.2)	0.040	-	-
Current viral load; n (%)						
Undetectable (<40 copies/mL)	71 (87.7)	10 (12.3)	1		-	
40–1000 copies/mL	2 (50.0)	2 (50.0)	7.1 (0.9–56.2)	0.063	-	-
>1000 copies/mL	11 (78.6)	3 (21.4)	1.9 (0.5–8.2)	0.368	-	-
Current alcohol consumption score; n (%)						
Dangerous (by AUDIT)	10 (90.9)	1 (9.1)	0.7 (0.1–6.2)	0.737		
Social drink	27 (79.4)	7 (20.6)	1.8 (0.6–5.6)	0.326		
Never	48 (87.3)	7 (12.7)	1			
Using substance other than alcohol; n (%)						
Never	79 (84.9)	14 (15.1)	1			
Ever	4 (80.0)	1 (20.0)	1.4 (0.1–13.6)	0.766		
Currently using	2 (100.0)	0 (0.0)	-	-		
Currently smoking; n (%)						
Yes	15 (78.9)	4 (21.1)	1.7 (0.5–6.1)	0.416		
No	70 (86.4)	11 (13.6)	1			
Using social media; n (%)						
Yes	55 (80.9)	13 (19.1)	3.5 (0.7–16.8)	0.110	4.1 (0.7–24.8)	0.122
No	30 (93.8)	2 (6.3)	1		1	
Loss of close relatives or friends; n (%)						
Yes	13 (65.0)	7 (35.0)	4.8 (1.5–15.7)	0.008	8.1 (1.6–41.3)	0.011
No	72 (90.0)	8 (10.0)	1		1	
No work/ Unemployed/ School exclusion; n (%)						
Yes	7 (46.7)	8 (53.3)	12.7 (3.6–45.6)	<0.001	14.7 (3.1–68.9)	0.001
No	78 (91.8)	7 (8.2)	1		1	
Felt discriminated against or stigmatized; n (%)						
Yes	7 (87.5)	1 (12.5)	0.8 (0.1–7.0)	0.837		
No	78 (84.8)	14 (15.2)	1			
Presence of lipodystrophy; n (%)						
Yes	4 (80.0)	1 (20.0)	1.4 (0.2–13.9)	0.749		
No	81 (85.3)	14 (14.7)	1			
Having someone to talk to when needed; n (%)						
Yes	71 (85.5)	12 (14.5)	0.8 (0.2–3.2)	0.738		
No	14 (82.4)	3 (17.6)	1			

incidents, quitting school, low self-esteem, low CD4 level, malnutrition, and older age at disclosure.<sup>22,36</sup> Youth who figured out their HIV status on their own were more likely to have depression or emotional/behavioural difficulties.<sup>37</sup> Stigmatization and

poor adherence to treatment regimen is associated with the mental health of both youth and adults living with HIV.<sup>31,36</sup> Frequent use of social media is an important factor associated with depression and anxiety in the healthy youth.<sup>38–40</sup> Some



**Table 4.** Factors Associated with Depression in Young Adults – Multivariable Analysis.

Factors	No Depression (N = 105)	Depression (N = 25)	Crude OR (95%CI)	p value	Adjusted OR (95%CI)	p value
Gender; n (%)						
Heterosexual male	20 (69.0)	9 (31.0)	1		-	
Heterosexual female	26 (86.7)	4 (13.3)	0.3 (0.1–1.3)	0.109	-	-
LGBT +	59 (83.1)	12 (16.9)	0.4 (0.2–1.2)	0.120	-	-
Father's status; n (%)						
Alive	83 (77.6)	24 (22.4)	1		1	
Died	19 (95.0)	1 (5.0)	0.2 (0.02–1.4)	0.105	0.08 (0.01–0.76)	0.028
Unknown	3 (100.0)	0 (0.0)	-	-	-	-
Mother's status; n (%)						
Alive	95 (80.5)	23 (19.5)	1			
Died	7 (77.8)	2 (22.2)	1.2 (0.2–6.1)	0.843		
Unknown	3 (100.0)	-	-	-		
Relationship with sex partner; n (%)						
Single or no relationship	49 (87.5)	7 (12.5)	1		-	
In relationship	19 (67.9)	9 (32.1)	3.3 (1.1–10.2)	0.036	-	-
Living together	37 (80.4)	9 (19.6)	1.7 (0.6–5.0)	0.332	-	-
Adherence to antiretroviral treatment by pill count; n (%)						
Good adherence (>90%)	102 (81.0)	24 (19.0)	1			
Poor adherence (<90%)	3 (75.0)	1 (25.0)	1.4 (0.1–14.2)	0.767		
Current viral load; n (%)						
Undetectable (<40 copies/mL)	91 (81.3)	21 (18.8)	1		-	
40–1000 copies/mL	2 (50.0)	2 (50.0)	4.3 (0.6–32.6)	0.154	-	-
>1000 copies/mL	7 (87.5)	1 (12.5)	0.6 (0.1–5.3)	0.662	-	-
Current alcohol consumption score; n (%)						
Dangerous (by AUDIT)	7 (53.8)	6 (46.2)	5.1 (1.5–18.2)	0.011	9.0 (1.8–46.3)	0.008
Social drink	32 (80.0)	8 (20.0)	1.5 (0.5–4.0)	0.429	23 (0.7–7.9)	0.184
Never	66 (85.7)	11 (14.3)	1		1	
Using substance other than alcohol; n (%)						
Never	90 (83.3)	18 (16.7)	1		1	
Ever	14 (66.7)	7 (33.3)	2.5 (0.9–7.1)	0.084	2.5 (0.7–9.3)	0.164
Currently using	1 (100.0)	0 (0.0)	-	-	-	-
Currently smoking; n (%)						
Yes	15 (65.2)	8 (34.8)	2.8 (1.04–7.7)	0.042	-	-
No	90 (84.1)	17 (15.9)	1		-	
Using social media; n (%)						
Yes	64 (83.1)	13 (16.9)	0.7 (0.3–1.7)	0.414		
No	41 (77.4)	12 (22.6)	1			
Loss of close relatives or friends; n (%)						
Yes	26 (78.8)	7 (21.2)	1.2 (0.4–3.1)	0.738		
No	79 (81.4)	18 (18.6)	1			
No work/ Unemployed/ School exclusion; n (%)						
Yes	17 (77.3)	5 (22.7)	1.3 (0.4–3.9)	0.649		
No	88 (81.5)	20 (18.5)	1			
Felt discriminated against or stigmatized; n (%)						
Yes	11 (55.0)	9 (45.0)	4.8 (1.7–13.4)	0.003	8.3 (2.2–30.9)	0.002
No	94 (85.5)	16 (14.5)	1		1	
Presence of lipodystrophy; n (%)						
Yes	1 (33.3)	2 (66.7)	9.0 (0.8–104.0)	0.077	28.7 (2.1–387.3)	0.012
No	104 (81.9)	23 (18.1)	1		1	
Having someone to talk to when needed; n (%)						
Yes	86 (86.0)	14 (14.0)	0.3 (0.1–0.7)	0.008	0.25 (0.07–0.82)	0.023
No	19 (63.3)	11 (36.7)	1		1	

similar socio-behavioural factors have been associated with mental health problems in youth with and without HIV, including female gender, low education level, school exclusion, low IQ, poor self-esteem, losing a father or mother, violence,

poverty, substance abuse, breaking up with their partner and stressful life events.<sup>22,24,29,31,33,35,41,42</sup>

In our study, however, we found different factors associated with depression among youth and young adults; i.e, loss of their

father, loss of close relatives or friends, and being unemployed or school exclusion were the factors in youth; while dangerous alcohol use, feeling discriminated against and having lipodystrophy were the factors in young adults. The developmental task of adolescents is development of identity separating from their parents and family members. This separation-individuation process is continuing during youth period as most youths in our setting still lived with and financially dependent on their family. Therefore, the family circumstances have crucial influence on their psychological well-being. In contrast, the developmental task of the adults aged 25–35 is development of long-term relationship and intimacy. HIV viral load and ART-related factors, as well as frequent use of social media, were not found associated with depression in our study. Although more than half of the young adults in this study had been receiving efavirenz which could have neuropsychiatric side effects, we did not find the association of EFV and depression or anxiety. We also found that having someone to confide to is associated with a lower risk of depression in young adults, but not in youth. Interestingly, we found that in young adults the loss of a participant's father during childhood was associated with a less risk of depression. The reason for this is unclear. However, compared to the youth in our setting, the adults experienced the loss of father at older age: median 4 years in youth and 13 years in young adults. Losing a parent due to death during childhood is associated with negative outcomes in later life including depression, anxiety, and educational attainment.<sup>43–46</sup> There is also a negative association between child's age at parental death and child's education; the younger the child is at parental death, the less likely the child enters university education.<sup>47</sup> However, bereavement distress and problematic adjustments following a childhood parental loss fade over time with resilience in adapting to their loss circumstances and the power of time-after-loss in psychological healing.<sup>45</sup> It is possible the adult participants in our study had learned valuable coping skills and developed resilience.

In this study, more than half of young adults are LGBT. LGBT persons may be more likely to develop depression and anxiety because they are often discriminated against and stigmatized by society.<sup>48</sup> However, we found no correlation between being LGBT and depression, which could be due to the favourable attitude toward LGBT in the Thai community.<sup>49</sup> Factors associated with depression in youth with perinatal HIV infection also have no significant difference compared to youth infected by sexual transmission.

There were several limitations, including the cross-sectional design with convenient samples among mostly stable well treated patients. The nature of many data collected were subjective as they were based on self-report. Although the referral to the hospital's psychiatric department or other mental health services was made for all participants, the outcomes of those referrals were not included in the study. The measures used are not psychiatric diagnostic assessments, therefore the distress could be a transient condition. Depression and anxiety disorder are complex and dynamic that have many potential confounding factors. A single cross-sectional evaluation may not be able to provide comprehensive insight and may miss the possibility of

recurrent lifetime burden of anxiety and depressive disorder. Long-term cohort studies are needed to follow the mental health status of participants and identify changing factors affecting depression and anxiety disorder. The study from single centre may not be able to represent other settings; however, allow the appropriate comparison between youth and young adults in the same setting and underscore the nature of the difference between these two age groups.

## Conclusions

Depression or anxiety in Thai youth and young adults living with HIV were found in about every five cases. Factors associated with depression identified were different in these age groups; socio-environmental factors affected youth while behavioural factors and perception affected young adults. Comprehensive HIV care with targeted strategies to these factors should be optimized to improve health outcomes.

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## Availability of Data and Materials

The dataset used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Consent for Publication

Not applicable.

## 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.


## Ethics Approval and Consent to Participate

The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki. The study was approved by Siriraj Institutional Review Board (SiRB) of the Faculty of Medicine Siriraj hospital, Thailand (approval no. 291/2562(EC4)). All participants and their guardians provided written consent prior to enrollment in the study.

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## Supplemental material

Supplemental material for this article is available online.

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