PREVALENCE OF AND FACTORS ASSOCIATED WITH DEPRESSIVE AND ANXIETY SYMPTOMS AMONG PEOPLE LIVING WITH HIV INFECTION IN DAVAO CITY, PHILIPPINES

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Abstract. Depression and anxiety are common among people living with human immunodeficiency virus (PLWHIV) infection. In this study, we aimed to determine the prevalence of and factors associated with depression and anxiety among PLWHIV infection in Davao City, Philippines, in order to inform programs to minimize these mental health conditions in the study population. Study subjects were chosen from patients who accessed the HIV and AIDS Core Team (HACT) Clinic at an urban tertiary care hospital in Davao City, Philippines, during August-September 2019. Eligible study subjects were asked to complete the Patient Health Questionnaire (PHQ-9) and the General Anxiety Disorder (GAD-7) questionnaire to assess their depressive and anxiety symptoms. Selected factors were evaluated to determine their association with depressive and anxiety symptoms. A total of 145 subjects were included in the study, 95.9% male. The study subject mean (± standard deviation) age was 33.0 (± 8.4) years old. Among study subjects, 51.7% and 41.4% had symptoms of depression and anxiety, respectively. Factors significantly associated with depressive symptoms were being aged 25-34 years (adjusted prevalence ratio (aPR) = 1.55; 95% confidence interval (CI): 1.06-2.26; *p*-value = 0.023) compared to being aged >34 years and being unemployed (aPR = 1.62; 95% CI: 1.15-2.29; *p*-value = 0.006) compared to being employed. The factor significantly associated with anxiety symptoms was being aged 25- 34 years (aPR = 1.61; 95% CI: 1.03-2.51; *p*-value = 0.038) compared to being aged >34 years. In summary, a high prevalence of depressive and anxiety symptoms was observed among our study subjects; younger age and being unemployed were associated with depressive symptoms and being younger was associated with anxiety symptoms. We conclude there is a need for a program to reduce

depression and anxiety in the study population. Further studies are needed to determine what specific interventions can reduce these mental health symptoms in this vulnerable study population.

Keywords: anxiety; depression; education, people living with HIV-PLWHIV; Philippines; unemployed

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INTRODUCTION

Human Immunodeficiency Virus (HIV) infection is an important public health problem, particularly in the Philippines. In 2020, an estimated 37.7 million people were living with HIV infection (PLWHIV) worldwide and in 2021, 28.2 million people were receiving antiretroviral therapy worldwide (UNAIDS, 2021). In the Philippines, the incidence of HIV infection during 1984-2018 was 62,029 cases; 51% were aged 25-34 years (Restar *et al*, 2021).

Several studies have evaluated the quality of life and prevalence of depression and anxiety among PLWHIV (Ciesla and Roberts, 2001; Nicholas *et al*, 2007). It has been reported PLWHIV have a significantly greater risk of developing mental health problems than the general population and depression and anxiety are the most common of these mental disorders (Brousseau, 2007). The prevalence of mental illness among PLWHIV in the United States has been estimated to be 5-23%, whereas the prevalence of mental illness in the general population has been estimated to be 0.3-0.4% (Angelino, 2008; Carey *et al*, 1995; Cournos and McKinnon, 1997; McKinnon and Cournos, 1998). One study reported PLWHIV had twice the risk of developing depressive and anxiety symptoms than HIV-negative comparison subjects (Ciesla and Roberts, 2001). Another study reported 54% of PLWHIV studied reported depressive symptoms (Nicholas *et al*, 2007). Although there is a high prevalence of depressive and anxiety symptoms among PLWHIV, fewer than 50% of these cases are recognized clinically (Pence *et al*, 2012). Depressive symptoms in PLWHIV have been reported to be aggravated by the stigma and discrimination associated with being a PLWHIV (Vanable *et al*, 2006). PLWHIV who have a mental illness have a higher virologic failure rate and a higher mortality rate (Angelino, 2008; Ickovics *et al*, 2001;

Ickovics *et al*, 2006; Pence *et al*, 2007).

A study from the Philippines (Javate, 2017) found a high prevalence of depressive and anxiety symptoms among people with other disorders, such as being diagnosed with HIV/AIDS. In another study conducted at the Philippine General Hospital, lower prevalence of anxiety and depression among HIV patients was found using the Hospital Anxiety and Depression Scale tool (Gauiran *et al*, 2018). The Philippines passed the Republic Act 11036 Mental Health Law on 21 June 2018 which requires the setting up of a program to provide optimal mental healthcare in the Philippines (Lally *et al*, 2019). This law also includes PLWHIV.

It is crucial to identify mental health problems among PLWHIV in order to give adequate holistic care to this vulnerable population. The prevalence of depression and anxiety among PLWHIV in the Philippines is unclear. HIV-related morbidity can cause depression and anxiety. In order to adequately manage mental health issues in PLWHIV, it is vital to know the prevalence of and factors associated with these mental health problems. In this study, we aimed to determine the prevalence of and factors associated with depressive and anxiety symptoms among PLWHIV in Davao City, Philippines, in order to guide efforts to manage and possibly prevent these problems in this vulnerable study population.

MATERIALS AND METHODS

Study population and site

Our study subjects were PLWHIV, aged ≥18 years, treated at the HIV and AIDS Core Team (HACT) Clinic at an urban tertiary care hospital in Davao City, the Philippines, during August-September 2019. The HACT clinic offers HIV and CD_4 testing and treatment of HIV infection with antiretroviral (ARV) drugs. It serves an average of 20-30 patients per month, most of whom are men who have sex with men (MSM). Study subject inclusion criteria, in addition to age and being treated at the study clinic, were having at least a high school education, understanding and reading and writing English and being willing to participate in the study. Those already diagnosed with and being treated for depression or anxiety were excluded from the study. All patients meeting the inclusion criteria at the study institution during the study period were included in the study. Each subject was asked to complete a self-administered questionnaire asking about their HIV infection history, employment status, smoking status, relationship/partner status, family history of mental illness, medication use and other selected factors that could affect their health.

Health outcome assessment

Each subject was requested to complete a Patient Health Questionnaire

(PHQ-9) asking about depressive symptoms and a Generalized Anxiety Disorder 7-item (GAD-7) questionnaire asking about anxiety symptoms. The PHQ-9 was scored and classified as follows: 0-4 points (no depressive symptoms), 5-9 points (mild depressive symptoms), 10-14 points (moderate depressive symptoms), 15-19 points (moderately severe depressive symptoms) and 20-27 points (severe depressive symptoms). The GAD-7 was scored and classified as follows: 0-4 points (no anxiety symptoms), 5-9 points (mild anxiety symptoms), 10-14 points (moderate anxiety symptoms) and 15-21 points (severe anxiety symptoms). Any subject with a score >4 points on either study instrument were sent to a psychiatrist for further evaluation and treatment.

Statistical analysis

We used mean and standard deviation to describe the age and CD_4 cell counts and frequencies and percentages to describe the categorical variables and the prevalence of depression and anxiety symptoms. We used bivariate and multivariate analyses to evaluate associations between depression and anxiety symptoms and selected factors using generalized linear models with Poisson distribution, log link function and robust variance, since the health outcomes were not rare (Barros and Hirakata, 2003; McNutt *et al*, 2003; Spiegelman and Hertzmark, 2005; Tamhane *et al*, 2016; Zou, 2004). The selected factors evaluated were: age, sex, sexual orientation, employment status, education level, alcohol and smoking statuses, illegal drug use, relationship status, HIV immunological status, family history of mental health problems, route by which HIV infection was contracted and antiretroviral medication status.

The effect estimates were reported as crude prevalence ratios (cPR) with 95% confidence intervals (95% CI) on bivariate analyses (significance set at p <0.1) and adjusted prevalence ratios (aPR) with 95% CI on multivariate analyses (significance set at p <0.05). All statistical analyses were conducted using STATA software, version 17 (StataCorp LLC, College Station, TX).

Ethical considerations

All study subjects gave written informed consent prior to being included in the study. The ethics committee of the Department of Health XI Cluster Ethics Review Committee (DOH XI CERC) approved this study before it was conducted (Approval No. P19070802).

RESULTS

A total of 145 subjects were included in the study; 95.9% male. The mean (± standard deviation (SD)) age of study subjects was 33.0 (± 8.4) years old. 80.7% of subjects were enrolled in the Antiretroviral Therapy (ART) program of the HACT clinic. The mean (± SD) CD_4 cell count among study subjects was 406.1 (± 242.6) cells/mm^3.

42.0% of subjects had a CD_4 cell count ≤350 cells/mm^3. 15.2% of subjects had a family history of a mental health disorder. 51.7% and 41.4% of subjects had depressive and anxiety symptoms, respectively. 0.7% and 4.9% of study subjects had severe depressive and severe anxiety symptoms, respectively (Table 1).

On bivariate analyses, unemployed subjects were significantly (p <0.1) more likely to have depressive symptoms (cPR = 1.46; 95% CI: 1.08-1.97; p = 0.014) compared to employed subjects; subjects aged 25-34 years old were significantly more likely to have depressive symptoms (cPR = 1.62; 95% CI: 1.10-2.39; p = 0.014) than subjects aged > 34 years; subjects with a family history of mental illness were significantly more likely to have depressive symptoms (cPR = 1.40; 95% CI: 1.00-1.96; p = 0.053) than subjects without a family history of mental illness. Subjects aged 24-34 years were significantly more likely to have anxiety symptoms (cPR = 1.55; 95% CI: 0.99 - 2.43; p = 0.056) than subjects aged >34 years (Table 2).

Table 1

Study subject characteristics (n = 145)

Characteristics	Values
Mean (± SD) age in years	33.0 (± 8.4)
Age groups in years, n (%)	
19-24	16 (11.0)
25-34	77 (53.1)
>34	52 (35.9)
Sex, n (%)	
Male	139 (95.9)
Female	6 (4.1)
Mean (± SD) CD4 cell count in cells/mm^3	406.1 ± 242.6
CD_4 cell count, n (%)	
>500 cells/mm^3	42 (29.0)
351-500 cells/mm^3	42 (29.0)
7-350 cells/mm^3	61 (42.0)

Table 1 (cont)

Characteristics	Values
Sexual orientation, *n* (%)	
Heterosexual	38 (26.2)
Gay/homosexual	39 (26.9)
Bisexual	60 (41.4)
Others/preferred not to say	8 (5.5)
Smoking status, *n* (%)	
Never smoked	98 (67.6)
Current smoker	17 (11.7)
Occasional smoker	30 (20.7)
Alcohol drinking status, *n* (%)	
Never drank	23 (15.9)
Current drinker	20 (13.8)
Occasional drinker	102 (70.3)
Education, *n* (%)	
Up to college-level	58 (40.0)
College graduate	69 (47.6)
Post-graduate	18 (12.4)
Family history of mental illness, *n* (%)	
Yes	22 (15.2)
No	123 (84.8)
Employment status, *n* (%)	
Employed	103 (71.0)
Unemployed	42 (29.0)
Relationship status, *n* (%)	
With partner	60 (41.4)
Without partner	85 (58.6)

Table 1 (cont)

Characteristics	Values
Receiving antiretroviral therapy, *n* (%)	
Yes	117 (80.7)
Did not answer	8 (5.5)
No	20 (13.8)
Route contracted HIV infection, *n* (%)	
Unprotected sex	141 (97.2)
Others	4 (2.8)
Illegal drug use, *n* (%)	
Yes	5 (3.4)
No	140 (96.6)
PHQ-9 score category, *n* (%)	
No depressive symptoms	70 (48.3)
With depression symptoms	75 (51.7)
Mild	50 (34.5)
Moderate	19 (13.1)
Moderately severe	5 (3.4)
Severe	1 (0.7)
GAD-7 scores category, *n* (%)	
No anxiety symptoms	85 (58.6)
With anxiety symptoms	60 (41.4)
Mild	47 (32.4)
Moderate	6 (4.1)
Severe	7 (4.9)

GAD-7: Generalized Anxiety Disorder-7; mm^3: cubic millimeter; PHQ-9: Patient Health Questionnaire-9; SD: standard deviation

Table 2

Crude prevalence ratios with 95% confidence intervals for the association of selected factors with depressive and anxiety symptoms among study subjects

Factors	Crude prevalence ratio (95% confidence interval)	
	Depressive symptoms	Anxiety symptoms
Age groups in years		
19-24	1.14 (0.59-2.19)	0.76 (0.30-1.95)
25-34	1.62 (1.10-2.39)	1.55 (0.99-2.43)
>34	1	1
Sex		
Male	1.04 (0.46-2.35)	0.82 (0.36-1.88)
Female	1	1
CD_4 cell count		
>500 cells/mm^3	1.08 (0.74-1.56)	1.09 (0.68-1.74)
351-500 cells/mm^3	0.98 (0.66-1.46)	1.09 (0.68-1.74)
7-350 cells/mm^3	1	1
Sexual orientation		
Gay/homosexual	1.28 (0.86-1.91)	1.16 (0.71-1.90)
Bisexual	0.90 (0.59-1.38)	0.83 (0.50-1.38)
Others/preferred not to say	1.00 (0.47-2.15)	1.19 (0.54-2.62)
Heterosexual	1	1
Smoking status		
Current smoker	1.38 (0.91-2.08)	0.84 (0.42-1.68)
Occasional smoker	1.28 (0.89-1.83)	1.04 (0.65-1.66)
Never smoked	1	1
Alcohol drinking status		
Current drinker	1.25 (0.72-2.19)	0.86 (0.46-1.61)
Occasional drinker	1.07 (0.67-1.70)	0.73 (0.46-1.17)
Never drank	1	1

Table 2 (cont)

Factors	Crude prevalence ratio (95% confidence interval)	
	Depressive symptoms	Anxiety symptoms
Education level		
Post-graduate	0.83 (0.47-1.47)	1.32 (0.75-2.33)
College graduate	0.98 (0.70-1.36)	1.11 (0.72-1.71)
Up to college	1	1
Family history of mental illness		
Yes	1.40 (1.00-1.96)	1.26 (0.78-2.01)
No	1	1
Employment status		
Unemployed	1.46 (1.08-1.97)	1.23 (0.82- .83)
Employed	1	1
Relationship status		
With partner	1.05 (0.77-1.45)	1.24 (0.84-1.82)
Without partner	1	1
Receiving antiretroviral therapy		
No	1.21 (0.81-1.81)	1.43 (0.90-2.26)
Did not answer	1.26 (0.71-2.23)	1.30 (0.62-2.70)
Yes	1	1
Route contracted HIV infection		
Unprotected sex	2.10 (0.38-11.61)	1.67 (0.30-9.30)
Others	1	1
Illegal drug use		
Yes	1.58 (0.99-2.52)	1.47 (0.70-3.11)
No	1	1

mm^3: cubic millimeter

On multivariate analyses, subjects aged 25-34 years were significantly more likely to have depressive symptoms (aPR = 1.55; 95% CI: 1.06-2.26; p = 0.023) than subjects aged >34 years; unemployed subjects were significantly more likely to have depressive symptoms (aPR = 1.62; 95% CI: 1.15-2.29; p = 0.006) than employed subjects (Fig 1, Table 3). Subjects aged 25-34 years were significantly more likely to have anxiety symptoms (aPR = 1.61; 95% CI: 1.03-2.51; p = 0.038) than subjects aged >34 years (Fig 2, Table 3).

DISCUSSION

In our study, 51.7% of subjects had depressive symptoms; higher than the 20.7% reported by one study from the Philippines (Javate, 2017) and higher than the 3.1% reported by another study from the Philippines (Gauiran *et al*, 2018). The differences in the result of our study compared to these other two studies could be due to differences

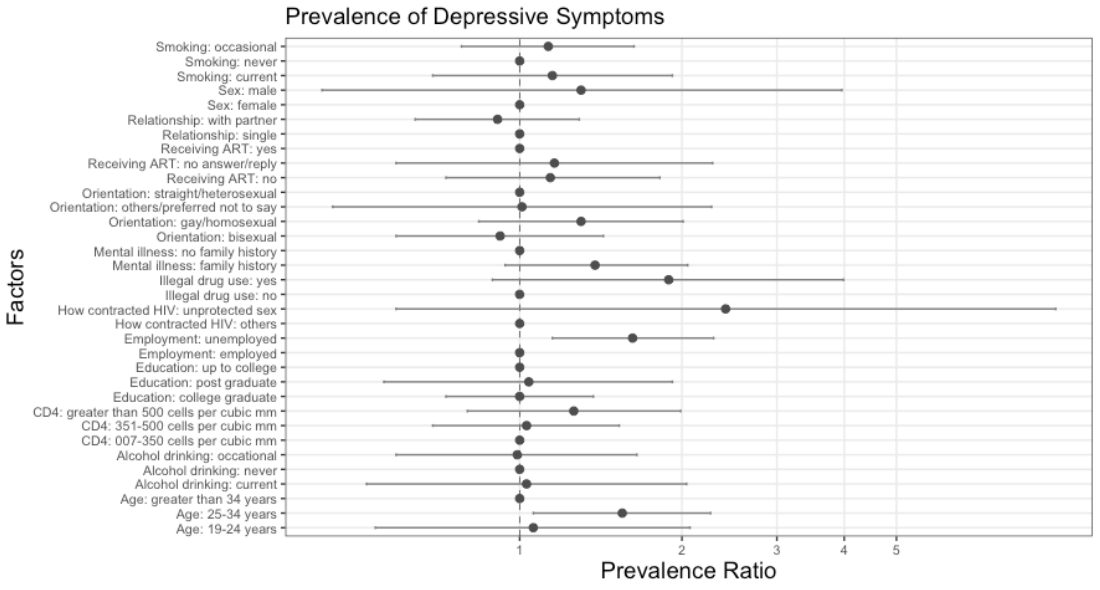

Fig 1 - Adjusted prevalence ratios (black point) with 95% confidence intervals (bars) for factors potentially associated with depressive symptoms among study subjects

ART: antiretroviral therapy

Table 3

Adjusted prevalence ratios with 95% confidence intervals for the association of selected factors with depression and anxiety symptoms among study subjects

Factors	Adjusted prevalence ratio (95% confidence interval)	
	Depressive symptoms	Anxiety symptoms
Age in years		
19-24	1.06 (0.54-2.07)	0.72 (0.26-2.04)
25-34	1.55 (1.06-2.26)	1.60 (1.02-2.51)
>35	1	1
Sex		
Male	1.30 (0.43-3.96)	0.98 (0.31-3.07)
Female	1	1
CD4 cell count		
>500 cells/mm^3	1.26 (0.80-1.99)	1.24 (0.70-2.19)
351-500 cells/mm^3	1.03 (0.69-1.53)	1.07 (0.66-1.73)
7-350 cells/mm^3	1	1
Sexual orientation		
Gay/homosexual	1.30 (0.84-2.01)	1.17 (0.65-2.11)
Bisexual	0.92 (0.59-1.43)	0.88 (0.50-1.54)
Others/preferred not to say	1.01 (0.45-2.27)	0.97 (0.43-2.20)
Heterosexual	1	1
Smoking status		
Current smoker	1.15 (0.69-1.92)	0.67 (0.31-1.47)
Occasional smoker	1.13 (0.78-1.63)	0.99 (0.59-1.65)
Never smoked	1	1
Alcohol drinking status		
Current drinker	1.03 (0.52-2.04)	0.91 (0.42-1.96)
Occasional drinker	0.99 (0.59-1.65)	0.73 (0.43-1.23)
Never drank	1	1

Table 3 (cont)

Factors	Adjusted prevalence ratio (95% confidence interval)	
	Depression	Anxiety
Education level		
Post-graduate	1.04 (0.56-1.92)	1.73 (0.97-3.10)
College graduate	1.00 (0.73-1.37)	1.12 (0.72-1.72)
Up to college	1	1
Family history of mental illness		
Yes	1.38 (0.94-2.05)	1.29 (0.73-2.30)
No	1	1
Employment status		
Unemployed	1.62 (1.15-2.29)	1.29 (0.84-1.97)
Employed	1	1
Relationship status		
With partner	0.91 (0.64-1.29)	1.12 (0.72-1.75)
Without partner	1	1
Receiving antiretroviral therapy		
No	1.14 (0.73-1.82)	1.63 (0.97-2.76)
Did not answer	1.16 (0.59-2.28)	1.44 (0.67-3.09)
Yes	1	1
Route contracted HIV infection		
Unprotected sex	2.41 (0.59-9.87)	1.67 (0.37-7.43)
Others	1	1
Illegal drug use		
Yes	1.89 (0.89-3.99)	1.67 (0.55-5.12)
No	1	1

mm^3:cubic millimeters

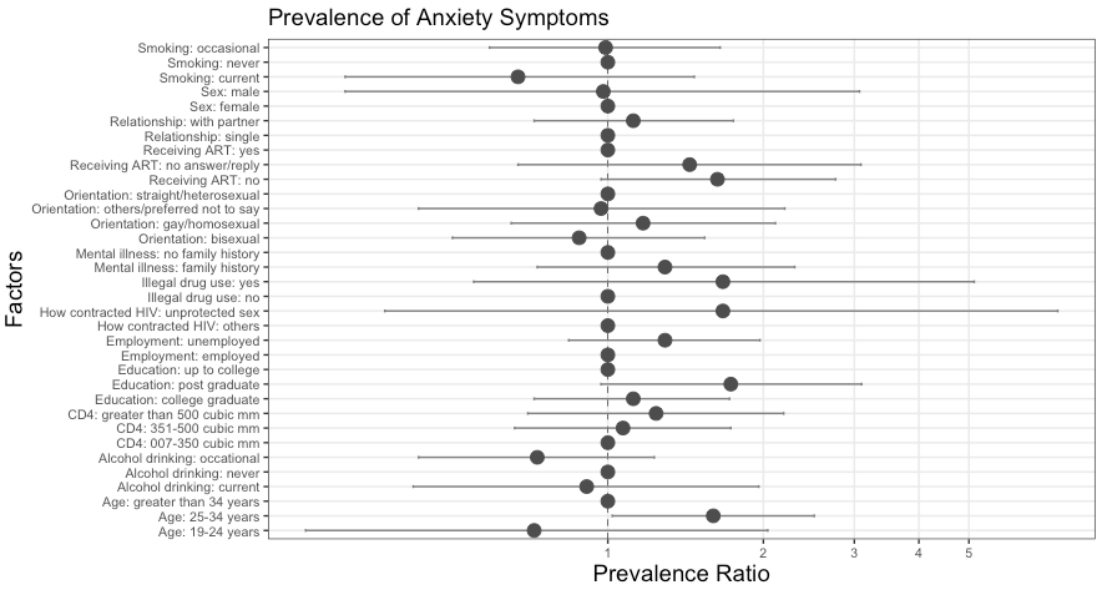

Fig 2 - Adjusted prevalence ratios (black point) with 95% confidence intervals (bars) for factors potentially associated with anxiety symptoms among study subjects

ART: antiretroviral therapy

in study design, study instruments and study populations. Another study from the Philippines reported 16.9% of subjects without HIV infection had moderate-to-severe depressive symptoms (Tee *et al*, 2020). Studies from other countries have reported the prevalence of depressive symptoms among PLWHIV to range from 30.0% to 73.0% (Berger-Greenstein *et al*, 2007; Mfusi and Mahabeer, 2000; Sebit *et al*, 2003; Stangl *et al*, 2007). One study from South Africa among PLWHIV reported 50.0% of subjects had some type of mental health disorder, depression being the most common (Brandt, 2009). Another study reported PLWHIV had more mental health problems than people without HIV infection (Brandt, 2009). It has been suggested there is a relationship between HIV-related stigma and discrimination and depressive symptoms (Jackson and Knight, 2006). HIV-related stigma and discrimination may be the reasons for the higher prevalence of depression

among PLWHIV (Jackson and Knight, 2006; Williams and Mohammed, 2009). Other studies from Asia have reported a higher prevalence of depression among PLWHIV, including studies from China (Su *et al*, 2013; Wang *et al*, 2012; Yu *et al*, 2009), Thailand (Li *et al*, 2009) and India (Steward *et al*, 2011).

The prevalence of anxiety symptoms among our study subjects was 41.4%, lower than the 55.2% reported in a previous study from the Philippines (Javate, 2017) but higher than the 10.1% reported in another previous study from the Philippines (Gauiran *et al*, 2018). Differences in the prevalence in our study and those of other studies may be due to differences in study design, study instruments and study populations. A previous study from the Philippines reported the prevalence of moderate to severe anxiety levels in those without HIV was 28.8% (Tee *et al*, 2020). Previous studies from other countries using the same study instrument used in our study have reported the prevalence of anxiety symptoms among PLWHIV to range from 19.0% to 23.0% (Beer *et al*, 2019; Shacham *et al*, 2012). Studies from other countries using other study instruments have found the prevalence of anxiety symptoms to range from 22.0% to 34.0% (Adeoti *et al*, 2018; Olagunju *et al*, 2012; Sivasubramanian *et al*, 2011; Steptoe *et al*, 2008); lower than that seen in our study.

In our study, being aged 25-34 years was significantly associated with a higher prevalence of depressive symptoms. A previous study from the United Kingdom has reported the prevalence of depression among those without HIV infection is also more common among younger than older subjects (Lee *et al*, 2021). One study among PLWHIV from Canada reported a significant association between depression and age and that the relationship between age and stigma was complex, varying by stigma type and depression level (Emlet *et al*, 2015). Our study results differ from a previous study from Zimbabwe that reported among PLWHIV that those aged 18 to 25 years had a higher prevalence of depressive symptoms (Mavhu *et al*, 2013). Another study from Malawi reported young PLWHIV are significantly more worried about being infected with HIV and its associated stigma and were significantly more likely to have depressive symptoms (Kamen *et al*, 2015). Another study from Ethiopia reported those aged 30-40 years were 2.9 times more likely to have depressive symptoms than those aged >50 (Duko *et al*, 2019).

In our study, subjects who were unemployed were significantly more likely to have depressive symptoms. Unemployment is more common among PLWHIV (Woods *et al*, 2011). A study from the Philippines reported unemployed PLWHIV were 3 times more likely to have

depressive symptoms than PLWHIV who were employed (Gauiran *et al*, 2018). A previous study from the United States estimated 50.0%-66.7% of PLWHIV were unemployed, with an unemployment rate 6 times higher than the general US population (Blalock *et al*, 2002). A study from the United States reported unemployed PLWHIV were twice as likely to be depressed as PLWHIV who were employed (Katz *et al*, 1996). Employment generates income, a positive self-opinion and the ability to live a healthier lifestyle, while unemployment leads to impoverishment, psychological stress, and participation in health-threatening coping behaviors (Leserman *et al*, 2007; Shittu *et al*, 2013).

In our study, subjects aged 25-34 years were significantly more likely to have anxiety symptoms than older subjects, similar to the findings of a previous study from Australia (McEvoy *et al*, 2011), Guinea (Camara *et al*, 2020) and Nigeria (Adeoti *et al*, 2018). However, our study is in disagreement with two studies from Africa (Brandt *et al*, 2016; Olagunju *et al*, 2012) that found no significant association between anxiety symptoms and age among PLWHIV.

To our knowledge, this is the first study from the Philippines that examined the associations between various selected factors and depressive and anxiety symptoms among PLWHIV. A strength of our study was that we used the PHQ-9 and GAD-7 instruments, which gave standardized, reproducible results that can be compared with other studies. Weaknesses of our study include the fact that the data was self-reported and subject to self-reporting bias (Xia *et al*, 2021). Other weaknesses of our study were its cross-sectional study design, the selected study factors (which did not include compliance with antiretroviral drugs and assessment of subject-perceived HIV stigma and discrimination) and its small sample size at a single study center (so it cannot be generalized to other institutions and populations).

In summary, the prevalence of depressive symptoms and anxiety symptoms in our subjects were high. Being aged 25-34 was significantly associated with both depressive and anxiety symptoms and being unemployed was significantly associated with depressive symptoms. We conclude, there is a need for better programs to diagnose and treat these patients in our study population. Such programs have been shown in other populations to improve quality of life among PLWHIV (Campos *et al*, 2009; IsHak *et al*, 2011; Lazarus *et al*, 2008; Mutabazi-Mwesigire *et al*, 2015). Future studies are needed to determine what methods are most effective to accomplish this but they should take into account the associated factors of age and unemployment. Besides, further studies are needed among other populations at other institutions to determine if these findings are found in other populations of the Philippines.

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CONFLICT OF INTEREST DISCLOSURE

The authors declare that they have no conflict of interest.

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