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Prevalence of mental distress and factors associated with symptoms of major depression among people living with HIV in Norway

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ABSTRACT

For people living with HIV (PLHIV) who can access lifesaving treatment, HIV has become a chronic lifelong condition; however, PLHIV have more mental and somatic comorbidities than their HIV-negative peers. In this cross-sectional study, we assessed the prevalence of mental distress and identified factors associated with major depression among 244 well-treated PLHIV residing in Norway. Participants completed validated questionnaires covering mental and somatic health. The prevalence of mental distress, defined as a score on the Hopkins Symptom Check List-25 >1.75, was 32%, and that of symptoms of major depression, defined as a score on the Beck Depression Inventory-II ≥20, was 15%. The factors associated with major depressive symptoms identified using logistic regression were risk of drug abuse (adjusted odds ratio (AOR) 15.1, 95% confidence interval (CI) 3.28, 69.3), fatigue (AOR 12.5, 95% CI 3.90, 40.0), trouble sleeping (AOR 7.90, 95% CI 2.85, 21.9), African origin (AOR 3.90, 95% CI 1.28, 11.9), low education (AOR 3.31, 95% CI 1.18, 9.30), and non-disclosure (AOR 3.22, 95% CI 1.04, 10.0). Our findings indicate that the prevalence rates of mental distress and major depressive symptoms are higher among well-treated PLHIV residing in Norway than in the general population. These conditions are under-diagnosed and under-treated, and increased awareness is needed.

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Introduction

HIV has changed from being a deadly disease to a manageable chronic disease for those having access to lifesaving highly active antiretroviral therapy (HAART). Consequently, the life expectancy gap between people living with HIV (PLHIV) and their HIV-negative peers has narrowed (Lohse & Obel, 2016). Despite the increased life expectancy among PLHIV, a difference in comorbidity-free years between PLHIV and uninfected adults has been reported (Marcus et al., 2020). The combination of immunosenescence and HIV-associated inflammation is implicated in the higher comorbidity rates among PLHIV compared with the general population (Deeks, 2011). Non-infectious comorbidities such as cardiovascular disease, hypertension, bone fractures, renal failure, diabetes mellitus, and neurocognitive disorders occur at higher rates among PLHIV (Deeks & Phillips, 2009; Guaraldi et al., 2014; Lerner et al., 2020; Shah et al., 2002; Vance et al., 2011).

Mental disorders are among the leading causes of the global health-related burden, and depressive and anxiety disorders are leading contributors to this burden (CMDC, 2021). In Norway, between 15% and 25% of the general adult population will meet the criteria for a mental disorder within a year, about 15% will have an anxiety disorder, and 10% a depressive disorder (NIPH, 2016). An older study by Sandanger and colleagues, that used the Hopkins Symptom Checklist-25 (HSCL-25) found a 15% prevalence of mental distress (Sandanger et al., 1999).

Mental health problems occur more frequently among PLHIV and mental health impairments can impact each step in the HIV care continuum from diagnosis to achieving viral suppression (Remien et al., 2019). Depression is the most common co-occurring neuropsychiatric condition among PLHIV (Nanni et al., 2015), and a two times greater risk has been reported for PLHIV compared with seronegative people (Ciesla & Roberts, 2001). The prevalence of depression

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among PLHIV varies widely and has been reported to be as high as 80%, depending on the study location and diagnostic instruments used (Sherr et al., 2011). A study from Aarhus, Denmark, reported prevalence rates of 38% for symptoms of depression and 26% for major depression among PLHIV, and highlighted that depression is an under-diagnosed condition (Rodkjaer et al., 2010). Bing and colleagues reported a prevalence of 38% for depression and generalised anxiety disorder among American PLHIV (Bing et al., 2001). A systematic review of mental illness among PLHIV residing in sub-Saharan Africa showed high prevalence levels; all but one study cited in this review noted a prevalence of 19% or higher (Breuer et al., 2011).

Links between HIV and depression have been proposed, including a biological model and a psychological model, and the predictors of depression among PLHIV seem to be multifactorial (Nanni et al., 2015).

To our knowledge, this is the first study to examine the prevalence of mental distress and factors associated with depressive symptoms among well-treated PLHIV residing in Norway.

Materials and methods

The cross-sectional survey included 244 adult PLHIV from the outpatient clinic at the Hospital of Southern Norway (SSHF) and University Hospital of North Norway (UNN), in 2014–2015. This number represents slightly less than 10% of the PLHIV in Norway (Bergersen, 2016). The survey used validated instruments: the Chalder Fatigue Questionnaire (CFQ), 36-Item Short Form Health Survey (SF-36), HSCL-25, Beck's Depression Inventory-II (BDI-II), 16-item Post Traumatic Stress Scale (PTSS-16), Alcohol Use Disorder Identification Test (AUDIT), and Drug Use Disorder Identification Test (DUDIT). One additional questionnaire covering sociodemographic variables was also included. The questionnaires were read, and the participants' answers were recorded by a trained nurse using an interpreter if needed. Those incapable of answering the questions because of cognitive impairment or severe mental disorders were excluded from the study, as previously described (Langseth et al., 2022; Skogen et al., 2023).

The widely used HSCL-25 was used to explore anxiety and depression (Derogatis et al., 1974). It has 10 items relating to anxiety symptoms and 15 items relating to depression. The response options for the items range from 1 to 4: "not at all", "a little", "quite a bit", and "extremely". The mean sum scores for the 10 anxiety items and the 15 depression items, and a total score (average of all 25 items) were calculated. The subscale scores were calculated in a similar manner for anxiety and depression. The HSCL-25 is a validated questionnaire and its usefulness as a screening tool in various settings, including in PLHIV, has been reported (Kaaya et al., 2002).

The BDI-II was completed by participants with an HSCL-25 score above 1.75 to strengthen the likelihood that symptoms of major depression were present. The BDI-II is a 21-question inventory designed to measure the severity of depression. It comprises four statements over the time frame of the previous 2 weeks. Each response is scored 0–3, and the responses are summed to yield a score of 0–63; higher scores indicate more severe depressive symptoms (Beck et al., 1993; Beck et al., 1998). The BDI-II scores were used to classify the participants into four categories: minimal depression (group 1), mild depression (group 2), moderate depression (group 3), and severe depression (group 4) using cut-offs of <14, 14–19, 20–29 and >29, respectively. In this study, groups 3 and 4 were merged into one group, labelled as symptoms of major depression (score ≥20). Participants who scored <1.75 on the HSCL-25 or <20 on the BDI-II were labelled as no symptoms of major depression, as used in a similar study (Rodkjaer et al., 2010).

Statistical analyses were performed using SPSS for Windows (version 28). Continuous variables are presented as mean with standard deviation and categorical variables as numbers and percentages. Comparisons between two groups were analysed using the chi-squared test for categorical variables and independent samples t-test for continuous variables.

Logistic regression model was used to examine associations between the independent demographic-, psychological- and clinical variables and major depression. The independent variables were chosen based on significant associations of major depression and associates reported in previous studies (Feuillet et al., 2017; Jallow et al., 2015; Nanni et al., 2015; Rodkjaer et al., 2010; Slot et al., 2015). Forward and backward logistic regression models were used, with and without age and gender as possible cofounding variables, to test for result consistency in the final model. The variables post-traumatic stress disorder (PTSD) and received psychiatric treatment were omitted because of collinearity with the dependent variable. The last step of the final forward regression model made up of six independent variables is presented as adjusted odds ratios. The unadjusted odds ratios were calculated and are presented for comparison. The level of significance was set at $p < 0.05$.

The study was approved by the Regional Committee for Medical Research Ethics in Norway (ref: 2011/1925 REK Nord).

Results

A total of 279 PLHIV from the outpatient clinics at UNN and SSHF were eligible to participate in this survey. Ten were excluded because of cognitive impairment or severe mental disorders, (eight men and two women; seven native Norwegians and three not Norwegian born), and 24 declined or otherwise did not participate (14 men and 10 women, 11 Norwegian and 13 not Norwegian born). One did not complete the BDI-II. A final total of 244 PLHIV were included in this study, 136 patients from UNN and 108 patients from SSHF. The mean age in the study population was 43.8 (SD 11.7) and the male:female ratio was 1.05 (Table 1).

Among the PLHIV, 77 (32%) had a mean HSCL-25 score >1.75, indicating mental distress. The participants with mental distress performed the BDI-II, 25 (10%) and classified as mild depression, 15 (6%), moderate depression, and 21 (9%) severe depression. However, the depression HSCL-25 subscale (score >1.75) identified depression among 37% (90/244) and anxiety among 26% (64/244) of participants (data not shown).

Participants classified with symptoms of major depression (BDI-II ≥20) were more likely to be living alone (67% vs 50%, $p = 0.057$), to be unemployed (28% vs 9%, $p < 0.001$), to smoke (50% vs 26%, $p = 0.003$), to be at risk of drug abuse (25% vs 5%, $p < 0.001$), to be at risk of alcohol abuse (30% vs 13%, $p = 0.017$), and to have non-disclosure of HIV status (36% vs 19%, $p = 0.023$) (Table 1). Among the 36 participants classified with symptoms of major depression, 19 (53%) were of African origin and all were from the sub-Saharan area (12 women and seven men). Thirteen (36%) of the participants with symptoms of major depression had never received psychiatric treatment, and eight of them (62%) were African born (five women and three men) (data not shown). None of the participants from Asian countries had symptoms of major depression (Table 1). All 16 participants with PTSD identified with the PTSS-16 questionnaire had symptoms of major depression (Table 1).

The adjusted factors associated with symptoms of major depression, identified by logistic regression model, were African origin (adjusted odds ratio (AOR): 3.9, 95% confidence interval (CI): 1.28, 11.9), low education level (AOR: 3.31, 95% CI 1.2, 9.3), risk of drug abuse (AOR: 15.1, 95% CI 3.3, 69.3), non-disclosure of HIV status (AOR: 3.2, 95% CI 1.0, 10.0), trouble sleeping (AOR: 7.9, 95% CI 2.3, 21.9), and being fatigued (AOR: 12.5, 95% CI 3.9, 40.0) (Table 2).

Discussion

In this cross-sectional survey of 244 well-treated PLHIV residing in Norway, 15% had symptoms of major depression. PLHIV with symptoms of major depression were more likely to be unemployed, to have body pain, to have trouble sleeping, PTSD, non-disclosure of HIV status, to smoke and to be at risk of drug and alcohol abuse. Anxiety was also prevalent in this study population, and about one-quarter of participants were regarded as having anxiety based on the HSCL-25 subscale score. Although anxiety and depression are common among PLHIV, determining the prevalence across studies is difficult because of the use of different diagnostic criteria and settings. We used the HSCL-25 as a screening tool to identify mental distress and found that 32% of the participants had a score above the 1.75 cut-off. However, 37% showed symptoms of depression at some level, as indicated by the HSCL subscale. Symptoms of depression were observed among 61 (25%) participants using BDI-II.

In this study, symptoms of mental distress and depression were only measured using self-reporting questionnaires (HSCL-25 and BDI-II). While the psychometric properties of the BDI-II all over have been found relatively sound both for research and clinical purposes (Wang & Gorenstein, 2013), several studies have found the sensitivity and positive predictive diagnostic value of HSCL-25 to be relatively weak. In a Norwegian two-stage survey, mental health problems were measured by the HSCL-25 and the Composite International Diagnostic Interview (CIDI). Only 46% of the present CIDI diagnoses were predicted by the HSCL-25 and the two instruments to a large extent identified different cases. However, the HSCL-25 proved suitable for selecting individuals who were diagnosed with depression (Sandanger et al., 1998) – for which purpose it was used in our study.

In two studies from Denmark performed in 2005 and 2013, the prevalence rates of depression were 38% and 35%, and major depression was 26% in both studies (Rodkjaer et al., 2010; Slot et al., 2015). These rates are higher than those found in our study of PLHIV. However, similar to our study, Rodkjaer and colleagues (Rodkjaer et al., 2010) found that depression was underdiagnosed among PLHIV. Similar results have been reported by Asch et al. (2003). The provision of adequate HIV care requires the ability to identify mental health impairment and offer proper treatment. Other studies have found higher prevalence of depression in PLHIV residing in Europe than in the general population; a French study found a prevalence of 28% of

Table 1. Demographic characteristics of the study sample ($N = 244$).

	Total		No symptoms of major depression		Symptoms of major depression		
	$n = 244$		$n = 208$	(85%)	$n = 36$	(15%)	p
Demographics							
Age (yr), (18–77), mean (SD)	43.8	(11.7)	44.1	(12.3)	42.1	(9.9)	.475
Male, *n* (%)	130	(53%)	108	(52%)	22	(61%)	.308
Native origin							.032*
African, *n* (%)	100	(41%)	81	(39%)	19	(53%)	.119
European, *n* (%)	16	(6.5%)	14	(7%)	2	(6%)	
American, *n* (%)	9	(4%)	6	(3%)	3	(8%)	
Asian, *n* (%)	38	(15.5%)	38	(18%)	0	(0%)	
Norwegian, *n* (%)	81	(33%)	69	(33%)	12	(33%)	
Hospital of Southern Norway	108	(44%)	86	(41%)	22	(61%)	.027*
Have children, *n* (%)	146	(60%)	127	(61%)	19	(53%)	.349
Living alone, *n* (%)	127	(52%)	103	(50%)	24	(67%)	.057
Unemployed, *n* (%)	28	(12%)	18	(9%)	10	(28%)	.000*
Low education level <13 yr, *n* (%)	141	(58%)	116	(56%)	25	(70%)	.125
Smoker, *n* (%)	71	(29%)	53	(26%)	18	(50%)	.003*
Risk of drug abuse, *n* (%)	19	(8%)	10	(5%)	9	(25%)	.000*
Risk of alcohol abuse, *n* (%)	36	(15%)	26	(13%)	10	(30%)	.017*
HIV related							
Anti-retroviral treatment, *n* (%)	228	(93%)	193	(93%)	35	(97%)	.321
HIV viral load >50 copies/mL, *n* (%)	33	(14%)	30	(14%)	3	(8%)	.324
CD4+ $< 0.2 \times 10^9$/L	16	(7%)	14	(7%)	2	(6%)	.793
CDC 1993 Category B and C, *n* (%)	57	(23%)	51	(25%)	6	(11%)	.304
HIV-diagnosed (yr), (0–32), mean (SD)	9.4	(8.0)	9.4	(7.3)	9.7	(8.1)	.564
Non-disclosure, *n* (%)	53	(22%)	40	(19%)	13	(36%)	.023*
Somatic							
Hepatitis C antibody, *n* (%)	28	(11%)	22	(11%)	6	(17%)	.290
Somatic comorbidity, *n* (%)	54	(22%)	47	(22%)	7	(20%)	.674
Body pain (1–10), mean (SD)	4.2	(3.0)	3.7	(2.9)	6.5	(2.8)	.000*
Psychological							
Trouble sleeping, *n* (%)	63	(26%)	38	(18%)	25	(74%)	.000*
Received psychiatric treatment, *n* (%)	74	(30%)	51	(25%)	23	(64%)	.000*
Post-traumatic stress disorder, *n* (%)	16	(7%)	0	(0%)	16	(46%)	.000*
Fatigued, *n* (%)	93	(38%)	146	(70%)	31	(86%)	.000*
HSCL-25, mean (SD)	1.6	0.6	1.5	0.4	2.6	0.5	
HSCL-25_Anxiety, mean (SD)	1.5	0.5	1.4	0.4	2.4	0.6	
HSCL-25_Depression, mean (SD)	1.7	0.6	1.5	0.4	2.8	0.6	

Notes: Mental health and quality of life among people living with HIV in Northern and Southern Norway, 2014–2015. HSCL-25: Hopkins Symptoms Checklist-25 (range 1–4) performed to identify those at risk of mental distress ($n = 76$); BDI-II: Beck's Depression Inventory version 2 (range 0–63); Not major depression: BDI-II <20 or HSCL-25 < 1.75; Major depression: BDI-II ≥20; Southern Hospital of Norway (1) University Hospital of North Norway (0); CD4+: number of T lymphocytes bearing the CD4 + receptor (range 0.1–1.8); Post-traumatic stress disorder: 16-item Post Traumatic Stress Scale >2.5 (range 0–4); Risk of drug abuse: Drug Use Disorder Identification Test >6 (m) and >1 (w) (range 0–44); Risk of alcohol abuse: Alcohol Use Disorder Identification Test >8 (m) > 6 (w) (range 0–40); Fatigued: Chalder Fatigue Scale >4 (range 0–11). Continuous variables are presented as the mean and standard deviation (SD) and categorical variables as number and percentage (%). The chi-squared was used to compare differences in categorical variables and Student's *t*-test to compare differences in continuous variables.

*Significant at the 5% level.

major depressive episodes among PLHIV(Feuillet et al., 2017) and a Swedish study reported 3–4 times higher age-adjusted odds of being diagnosed with depression and three times higher odds of anxiety among men, and 1.6–2 times higher age-adjusted odds of depression and anxiety disorders among women (Jallow et al., 2015). We also found a high prevalence of anxiety in our study, as found in other studies (Gonzalez et al., 2012; Ivanova et al., 2012). In our study, all patients with PTSD were classified as having symptoms of major depression. A link between PTSD and HIV has been reported (APA, 2012).

We found an association between being at risk of drug abuse and symptoms of major depression among the PLHIV. It is well documented that people with a substance use disorder also are at risk of mental health conditions such as depression (Anagnostopoulos et al., 2015; Levintow et al., 2018; Li et al., 2014; Li et al., 2015). However, this association was not identified among our PLHIV at risk of alcohol abuse in the adjusted model. It is important to focus on mental health issues among PLHIV with substance use disorder to prevent HIV transmission and to improve HIV care (Levintow et al., 2018; Mellins et al., 2009).

Fatigue was another factor associated with symptoms of major depression in the PLHIV in our study. The prevalence of fatigue ranges from 33% to 88% in different international studies (Barroso & Voss, 2013; Jong et al., 2010; Payne et al., 2013; Perazzo et al., 2017), and a prevalence of 39% of PLHIV residing in

Table 2. Logistic regression of factors associated with symptoms of major depression ($N = 244$).

	Crude Odds Ratio			Adjusted Odds Ratio		
	OR	95% CI	*p*	AOR	95% CI	*p*
African origin	1.75	(0.86, 3.57)	.122	3.90	(1.28, 11.9)	.017*
Hospital of Southern Norway	8.92	(4.76, 16.7)	.000*			
Living alone	2.04	(0.97, 4.29)	.061			
Unemployed	4.06	(1.69, 9.74)	.002*			
Low education level	1.80	(0.84, 3.85)	.129	3.31	(1.18, 9.30)	.023*
Smoker	2.93	(1.42, 6.03)	.004*			
Risk of Drug abuse	6.60	(2.46, 17.7)	.001*	15.1	(3.28, 69.3)	.000*
Risk of Alcohol abuse	2.69	(1.17, 6.22)	.020*			
Non-disclosure	2.37	(1.11, 5.09)	.023*	3.22	(1.04, 10.0)	.043*
Body pain	7.95	(3.53, 17.9)	.000*			
Trouble sleeping	10.2	(4.61, 22.4)	.000*	7.90	(2.85, 21.9)	.000*
Fatigued	14.6	(5.42, 39.3)	.000*	12.5	(3.90, 40.0)	.000*
Constant						

Notes: Mental health and quality of life among people living with HIV in Northern and Southern Norway, 2014–2015. OR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval; Major depression: Beck's Depression Inventory version 2 score ≥20, Low education level: < 13 years of school; Body Pain: OR per 1-unit increase (scale 1–10). AOR: forward logistic regression, final step shown.
*Significant at the 5% level.

Norway has been reported earlier in the same study cohort (Langseth et al., 2022). The association between fatigue and major depression has also been reported in international studies (Ferrando et al., 1998; Millikin et al., 2003; Wagner & Rabkin, 2000). Future research is needed to develop and evaluate instruments to differentiate depression-related fatigue from fatigue that may reflect underlying disease (Millikin et al., 2003).

Trouble sleeping was the third factor associated with symptoms of major depression among the PLHIV in our study. The association between sleep disorders and depression has also been reported previously (Daubert et al., 2022; Gutierrez et al., 2019). Sleep disorders are largely undiagnosed and untreated, and it is important to be aware of the connection between depression and sleep disorders (Gutierrez et al., 2019). Therefore, screening for sleep problems should be part of routine HIV care.

The continent of origin was associated with symptoms of major depression among PLHIV residing in Norway. In the multivariate analysis, it was associated with an African origin. All the participants from Africa came from the sub-Saharan area, an area with a disproportionately concentrated burden of the global HIV epidemic (Dwyer-Lindgren et al., 2019). We noted that many of the people with symptoms of major depression who originated from Africa had not been diagnosed correctly nor had they received psychiatric treatment. Therefore, it advocates that this group needs more attention regarding mental health. The paucity of knowledge regarding the healthcare experiences and needs of African immigrants in the U.S.A. has recently been highlighted in a scoping review by Omenka and colleagues (Omenka et al., 2020). A recent qualitative study by Ojikutu et al. explored the psychosocial and mental health challenges of African-born women living with HIV in the U.S.A. reported that the psychological and mental health needs were largely unmet (Ojikutu et al., 2018). Feuillet and colleagues found a 28% prevalence (range 11–56%) of major depressive events among PLHIV residing in France and that the prevalence of depression differed according to the place of origin (Feuillet et al., 2017). In our study, there were no individuals residing in Norway born in Asia where we identified a major depression. People residing in Norway who were born in Asia are often of Thai origin and married to Norwegians. This is in contrast to PLHIV residing in Norway with an African origin, who are often immigrants and asylum seekers.

In our study, symptoms of major depression were associated with a low education level, defined as <13 years of education. For people residing in Norway, this low level of education is associated with low income. Despite Norway's participation in the Scandinavian healthcare system, which is built on the principle of universalism and the aim to provide equal access to services regardless of social class, income, or place of residence (Magnussen, 2009), there are inequalities in Norwegian society. Two Danish studies by Slot and Rodkjaer also identified that being in a difficult financial situation was associated with depression among PLHIV (Rodkjaer et al., 2010; Slot et al., 2015).

Finally, we found that non-disclosure of HIV status was associated with depression, and this phenomenon seems to be a global phenomenon among PLHIV. In a study from the U.K., Daskalopoulou and colleagues reported a similar association between non-disclosure of HIV status and psychological factors (Daskalopoulou et al., 2017). Unfortunately, we did not use a validated instrument for assessing HIV stigma in our study population, although it is known that stigma and non-disclosure are closely related, and we could not use these data to explore the non-disclosure of HIV participants further.

Strengths and limitations

The strengths of our study are the high response rate, the fact that few participants were excluded, and that

no variables were missing from the regression analyses. Recruitment through scheduled clinical follow-ups and data collection by trained nurses likely increased the data accuracy compared with data obtained from self-referral and self-report. The inclusion of PLHIV in Norway who do not speak the national language and people with poor reading and writing skills likely helped to improve the study's external validity.

One limitation is that the use of the cross-sectional design means that causality cannot be established. Another limitation is the number of variables that could be entered into the final regression model because with 244 participants some estimates had wide confidence intervals. To limit the possible effects of confounding variables, all variables identified previously as confounders and predictors were adjusted in the final regression model (Skogen et al., 2023).

Conclusions

In this sample of PLHIV residing in Norway, 31% had mental distress and 15% had symptoms of major depression. These rates are much higher than the estimated prevalence rates in the general population. The strongest factors associated with symptoms of major depression were drug abuse, fatigue, trouble sleeping, African origin, low education level, and non-disclosure of HIV status. Despite the improvements in HIV care, this PLHIV population would benefit from a greater focus on prevention, diagnostic, and treatment strategies for those experiencing mental distress.

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Disclosure statement

The Project group comprised Vegard Skogen, M.D., Ph.D., a specialist in clinical microbiology, internal medicine, and infectious diseases at UNN and University of Tromsø, The Arctic University (UiT); Tore Sørlie, M.D., Ph.D., a specialist in psychiatry at UNN and UiT; Ole Rysstad, M.D., a specialist in internal medicine and pulmonary diseases at the SSHF; and Birgit Lie, M.D., Ph.D., a specialist in community medicine at the SSHF.

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References

Anagnostopoulos, A., Ledergerber, B., Jaccard, R., Shaw, S. A., Stoeckle, M., Bernasconi, E., Barth, J., Calmy, A., Berney, A., Jenewein, J., & Weber, R. (2015). Frequency of and risk factors for depression among participants in the Swiss HIV Cohort Study (SHCS). *PLoS One*, *10*(10), e0140943. https://doi.org/10.1371/journal.pone.0140943

APA. (2012). *American Psychiatric Association: HIV and cognitive disorders* (APA Commission on AIDS: HIV Mental Health Treatment Issues). https://www.psychiatry.org/File%20Library/Psychiatrists/Practice/Professional-Topics/HIV-Psychiatry/FactSheet-Anxiety-2012.pdf

Asch, S. M., Kilbourne, A. M., Gifford, A. L., Burnam, M. A., Turner, B., Shapiro, M. F., & Bozzette, S. A. (2003). Underdiagnosis of depression in HIV: Who are we missing? *Journal of General Internal Medicine*, *18*(6), 450–460. https://doi.org/10.1046/j.1525-1497.2003.20938.x

Barroso, J., & Voss, J. G. (2013). Fatigue in HIV and AIDS: An analysis of evidence. *Journal of the Association of Nurses in AIDS Care*, *24*(1 Suppl), S5–S14. https://doi.org/10.1016/j.jana.2012.07.003

Beck, A. T., Steer, R. A., Beck, J. S., & Newman, C. F. (1993). Hopelessness, depression, suicidal ideation, and clinical diagnosis of depression. *Suicide and Life-Threatening Behavior*, *23*(2), 139–145. https://doi.org/10.1111/j.1943-278X.1993.tb00378.x

Beck, A. T., Steer, R. A., & Garbin, M. C. (1998). Psychometric properties of the Beck Depression Inventory. Twenty-five years of evaluation. *Clinical Psychology Review*, *8*(1), 77–100. https://doi.org/10.1016/0272-7358(88)90050-5

Bergersen, B. M. (2016). *Norsk kvalitetsregister for hiv (NORHIV): Årsrapport for 2015 med plan for forbedringstiltak* (Norsk kvalitetsregister for hiv Issue). https://www.kvalitetsregistre.no/sites/default/files/2022-01/%C3%85rsrapport%20NORHIV%202015.pdf

Bing, E. G., Burnam, M. A., Longshore, D., Fleishman, J. A., Sherbourne, C. D., London, A. S., Turner, B. J., Eggan, F., Beckman, R., Vitiello, B., Morton, S. C., Orlando, M., Bozzette, S. A., Ortiz-Barron, L., & Shapiro, M. (2001). Psychiatric disorders and drug use among human immunodeficiency virus-infected adults in the United States. *Archives of General Psychiatry*, *58*(8), 721–728. https://doi.org/10.1001/archpsyc.58.8.721

Breuer, E., Myer, L., Struthers, H., & Joska, J. A. (2011). HIV/AIDS and mental health research in sub-Saharan Africa: A systematic review. *African Journal of AIDS Research*, *10*(2), 101–122. https://doi.org/10.2989/16085906.2011.593373

Ciesla, J. A., & Roberts, J. E. (2001). Meta-analysis of the relationship between HIV infection and risk for depressive disorders. *American Journal of Psychiatry*, *158*(5), 725–730. https://doi.org/10.1176/appi.ajp.158.5.725

CMDC. (2021). COVID-19 mental disorders collaborators: Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. *The Lancet*, *398*(10312), 1700–1712. https://doi.org/10.1016/s0140-6736(21)02143-7

Daskalopoulou, M., Lampe, F. C., Sherr, L., Phillips, A. N., Johnson, M. A., Gilson, R., Perry, N., Wilkins, E., Lascar, M., Collins, S., Hart, G., Speakman, A., & Rodger, A. J. (2017). Non-disclosure of HIV status and associations with psychological factors, ART non-adherence, and viral load non-suppression among people living with HIV in the UK. *AIDS and Behavior*, *21*(1), 184–195. https://doi.org/10.1007/s10461-016-1541-4

Daubert, E., French, A. L., Burgess, H. J., Sharma, A., Gustafson, D., Cribbs, S. K., Weiss, D. J., Ramirez, C., Konkle-Parker, D., Kassaye, S., & Weber, K. M. (2022). Association of poor sleep with depressive and anxiety symptoms by HIV disease status: Women's interagency HIV study. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *89*(2), 222–230. https://doi.org/10.1097/qai.0000000000002847

Deeks, S. G. (2011). HIV infection, inflammation, immunosenescence, and aging. *Annual Review of Medicine*, *62*(1), 141–155. https://doi.org/10.1146/annurev-med-042909-093756

Deeks, S. G., & Phillips, A. N. (2009). HIV infection, antiretroviral treatment, ageing, and non-AIDS related morbidity. *BMJ*, *338*(2), Article a3172. https://doi.org/10.1136/bmj.a3172

Derogatis, L. R., Lipman, R. S., Rickels, K., Uhlenhuth, E. H., & Covi, L. (1974). The Hopkins Symptom Checklist (HSCL): A self-report symptom inventory. *Behavioral Science*, *19*(1), 1–15. https://doi.org/10.1002/bs.3830190102

Dwyer-Lindgren, L., Cork, M. A., Sligar, A., Steuben, K. M., Wilson, K. F., Provost, N. R., Mayala, B. K., VanderHeide, J. D., Collison, M. L., Hall, J. B., Biehl, M. H., Carter, A., Frank, T., Douwes-Schultz, D., Burstein, R., Casey, D. C., Deshpande, A., Earl, L., El Bcheraoui, C., … Hay, S. I. (2019). Mapping HIV prevalence in sub-Saharan Africa between 2000 and 2017. *Nature*, *570*(7760), 189–193. https://doi.org/10.1038/s41586-019-1200-9

Ferrando, S., Goggin, K., Sewell, M., Evans, S., Fishman, B., & Rabkin, J. (1998). Substance use disorders in gay/bisexual men with HIV and AIDS. *The American Journal on Addictions*, *7*(1), 51–60. https://doi.org/10.1111/j.1521-0391.1998.tb00467.x

Feuillet, P., Lert, F., Tron, L., Aubriere, C., Spire, B., & Dray-Spira, R. (2017). Prevalence of and factors associated with depression among people living with HIV in France. *HIV Medicine*, *18*(6), 383–394. https://doi.org/10.1111/hiv.12438

Gonzalez, A., Zvolensky, M. J., Parent, J., Grover, K. W., & Hickey, M. (2012). HIV symptom distress and anxiety sensitivity in relation to panic, social anxiety, and depression symptoms among HIV-positive adults. *AIDS Patient Care and STDs*, *26*(3), 156–164. https://doi.org/10.1089/apc.2011.0309

Guaraldi, G., Silva, A. R., & Stentarelli, C. (2014). Multimorbidity and functional status assessment. *Current Opinion in HIV and AIDS*, *9*(4), 386–397. https://doi.org/10.1097/coh.0000000000000079

Gutierrez, J., Tedaldi, E. M., Armon, C., Patel, V., Hart, R., & Buchacz, K. (2019). Sleep disturbances in HIV-infected patients associated with depression and high risk of obstructive sleep apnea. *SAGE Open Medicine*, *7*, 2050312119842268. https://doi.org/10.1177/2050312119842268

Ivanova, E. L., Hart, T. A., Wagner, A. C., Aljassem, K., & Loutfy, M. R. (2012). Correlates of anxiety in women living with HIV of reproductive age. *AIDS and Behavior*, *16*(8), 2181–2191. https://doi.org/10.1007/s10461-011-0133-6

Jallow, A., Ljunggren, G., Wändell, P., & Carlsson, A. C. (2015). Prevalence, incidence, mortality and co-morbidities amongst human immunodeficiency virus (HIV) patients in Stockholm County, Sweden – the Greater Stockholm HIV Cohort Study. *AIDS Care*, *27*(2), 142–149. https://doi.org/10.1080/09540121.2014.963012

Jong, E., Oudhoff, L. A., Epskamp, C., Wagener, M. N., van Duijn, M., Fischer, S., & van Gorp, E. C. (2010). Predictors and treatment strategies of HIV-related fatigue in the combined antiretroviral therapy era. *Aids*, *24*(10), 1387–1405. https://doi.org/10.1097/QAD.0b013e328339d004

Kaaya, S. F., Fawzi, M. C., Mbwambo, J. K., Lee, B., Msamanga, G. I., & Fawzi, W. (2002). Validity of the Hopkins symptom checklist-25 amongst HIV-positive pregnant women in Tanzania. *Acta Psychiatrica Scandinavica*, *106*(1), 9–19. https://doi.org/10.1034/j.1600-0447.2002.01205.x

Langseth, R., Berg, R. C., Rysstad, O., Sørlie, T., Lie, B., & Skogen, V. (2022). Prevalence and predictors of fatigue among people living with HIV in Norway. *AIDS Care*, *34*(8), 1008–1013. https://doi.org/10.1080/09540121.2021.1934379

Lerner, A. M., Eisinger, R. W., & Fauci, A. S. (2020). Comorbidities in persons with HIV: The lingering challenge. *JAMA*, *323*(1), 19–20. https://doi.org/10.1001/jama.2019.19775

Levintow, S. N., Pence, B. W., Ha, T. V., Minh, N. L., Sripaipan, T., Latkin, C. A., Vu, P. T., Quan, V. M., Frangakis, C., & Go, V. F. (2018). Prevalence and predictors of depressive symptoms among HIV-positive men who inject drugs in Vietnam. *PLoS One*, *13*(1), e0191548. https://doi.org/10.1371/journal.pone.0191548

Li, J., Gu, J., Lau, J. T. F., Chen, H., Mo, P. K. H., & Tang, M. (2015). Prevalence of depressive symptoms and associated factors among people who inject drugs in China. *Drug and Alcohol Dependence*, *1*(151), 228–235. https://doi.org/10.1016/j.drugalcdep.2015.03.028

Li, Y., Hershow, R., Irwanto, Praptoraharjo, I., Setiawan, M., & Levy, J. (2014). Factors associated with symptoms of depression among injection drug users receiving antiretroviral treatment in Indonesia. *Journal of AIDS & Clinical Research*, *5*(5), 303. https://doi.org/10.4172/2155-6113.1000303

Lohse, N., & Obel, N. (2016). Update of survival for persons with HIV infection in Denmark. *Annals of Internal Medicine*, *165*(10), 749–750. https://doi.org/10.7326/l16-0091

Magnussen, J. (2009). The Scandinavian healthcare system. *Siemens healthineers: Medical solutions*. https://cdn0.scrvt.com/39b415fb07de4d9656c7b516d8e2d907/1800000000068243/cb0dfc126b65/Essay_Medical_Solutions_May_2009_Scandinavia_1800000000068243.pdf

Marcus, J. L., Leyden, W. A., Alexeeff, S. E., Anderson, A. N., Hechter, R. C., Hu, H., Lam, J. O., Towner, W. J., Yuan, Q., Horberg, M. A., & Silverberg, M. J. (2020). Comparison of overall and comorbidity-free life expectancy between insured adults with and without HIV infection, 2000–

2016. *JAMA Network Open*, *3*(6), e207954. https://doi.org/10.1001/jamanetworkopen.2020.7954

Mellins, C. A., Havens, J. F., McDonnell, C., Lichtenstein, C., Uldall, K., Chesney, M., Santamaria, E. K., & Bell, J. (2009). Adherence to antiretroviral medications and medical care in HIV-infected adults diagnosed with mental and substance abuse disorders. *AIDS Care*, *21*(2), 168–177. https://doi.org/10.1080/09540120802001705

Millikin, C. P., Rourke, S. B., Halman, M. H., & Power, C. (2003). Fatigue in HIV/AIDS is associated with depression and subjective neurocognitive complaints but not neuropsychological functioning. *Journal of Clinical and Experimental Neuropsychology*, *25*(2), 201–215. https://doi.org/10.1076/jcen.25.2.201.13644

Nanni, M. G., Caruso, R., Mitchell, A. J., Meggiolaro, E., & Grassi, L. (2015). Depression in HIV infected patients: A review. *Current Psychiatry Reports*, *17*(1), 530. https://doi.org/10.1007/s11920-014-0530-4

NIPH. (2016). *Norwegian Institute of Public Health: Mental illness among adults in Norway* (Public Health Report – Health Status in Norway Issue). https://www.fhi.no/en/op/hin/mental-health/psykisk-helse-hos-voksne

Ojikutu, B. O., Nnaji, C., Sithole-Berk, J., Masongo, D., Nichols, K., Weeks, N., Ngminebayihi, M., Bishop, E., & Bogart, L. M. (2018). African born women living with HIV in the United States: Unmet needs and opportunities for intervention. *AIDS Care*, *30*(12), 1542–1550. https://doi.org/10.1080/09540121.2018.1497767

Omenka, O. I., Watson, D. P., & Hendrie, H. C. (2020). Understanding the healthcare experiences and needs of African immigrants in the United States: A scoping review. *BMC Public Health*, *20*(1), 27. https://doi.org/10.1186/s12889-019-8127-9

Payne, B. A., Hateley, C. L., Ong, E. L., Premchand, N., Schmid, M. L., Schwab, U., Newton, J. L., & Price, D. A. (2013). HIV-associated fatigue in the era of highly active antiretroviral therapy: Novel biological mechanisms? *HIV Medicine*, *14*(4), 247–251. https://doi.org/10.1111/j.1468-1293.2012.01050.x

Perazzo, J. D., Webel, A. R., Voss, J. G., & Prince-Paul, M. (2017). Fatigue symptom management in people living with human immunodeficiency virus. *Journal of Hospice & Palliative Nursing*, *19*(2), 122–127. https://doi.org/10.1097/njh.0000000000000329

Remien, R. H., Stirratt, M. J., Nguyen, N., Robbins, R. N., Pala, A. N., & Mellins, C. A. (2019). Mental health and HIV/AIDS: The need for an integrated response. *AIDS*, *33*(9), 1411–1420. https://doi.org/10.1097/qad.0000000000002227

Rodkjaer, L., Laursen, T., Balle, N., & Sodemann, M. (2010). Depression in patients with HIV is under-diagnosed: A cross-sectional study in Denmark. *HIV Medicine*, *11*(1), 46–53. https://doi.org/10.1111/j.1468-1293.2009.00741.x

Sandanger, I., Moum, T., Ingebriktsen, G., Dalgard, O. S., Sørensen, T., & Bruusgaard, D. (1998). Concordance between symptom screening and diagnostic procedure: The Hopkins symptoms checklist-25 and the composite international diagnostic interview 1. *Social Psychiatry and Psychiatric Epidemiology*, *33*(7), 345–354. https://doi.org/10.1007/s001270050064

Sandanger, I., Nygård, J. F., Ingebrigtsen, G., Sørensen, T., & Dalgard, O. S. (1999). Prevalence, incidence and age at onset of psychiatric disorders in Norway. *Social Psychiatry and Psychiatric Epidemiology*, *34*(11), 570–579. https://doi.org/10.1007/s001270050177

Shah, S. S., McGowan, J., Smith, C., Blum, S., & Klein, R. S. (2002). Comorbid conditions, treatment, and health maintenance in older persons with human immunodeficiency virus infection in New York City. *Clinical Infectious Diseases*, *15*(35), 1238–1243. https://doi.org/10.1086/343048

Sherr, L., Clucas, C., Harding, R., Sibley, E., & Catalan, J. (2011). HIV and depression – a systematic review of interventions. *Psychology, Health & Medicine*, *16*(5), 493–527. https://doi.org/10.1080/13548506.2011.579990

Skogen, V., Rohde, G. E., Langseth, R., Rysstad, O., Sørlie, T., & Lie, B. (2023). Factors associated with health-related quality of life in people living with HIV in Norway. *Health and Quality of Life Outcomes*, *21*(1), 14. https://doi.org/10.1186/s12955-023-02098-x

Slot, M., Sodemann, M., Gabel, C., Holmskov, J., Laursen, T., & Rodkjaer, L. (2015). Factors associated with risk of depression and relevant predictors of screening for depression in clinical practice: A cross-sectional study among HIV-infected individuals in Denmark. *HIV Medicine*, *16*(7), 393–402. https://doi.org/10.1111/hiv.12223

Vance, D. E., Mugavero, M., Willig, J., Raper, J. L., & Saag, M. S. (2011). Aging with HIV: A cross-sectional study of comorbidity prevalence and clinical characteristics across decades of life. *Journal of the Association of Nurses in AIDS Care*, *22*(1), 17–25. https://doi.org/10.1016/j.jana.2010.04.002

Wagner, G. J., & Rabkin, R. (2000). Effects of dextroamphetamine on depression and fatigue in men with HIV: A double-blind, placebo-controlled trial. *The Journal of Clinical Psychiatry*, *61*(6), 436–440. https://doi.org/10.4088/jcp.v61n0608

Wang, Y. P., & Gorenstein, C. (2013). Psychomatric properties of the Bech Depression Inventory-II: A comprehensive review. *Revista Brasileira de Psiquiatria*, *35*(4), 416–431. https://doi.org/10.1590/1516-4446-2012-1048