

1-1-2022

## Psychiatric comorbidity and psychosocial stressors among people initiating HIV care in Cameroon

Angela M. Parcesepe  
*University of North Carolina at Chapel Hill*

Lindsey M. Filiatreau  
*Washington University School of Medicine in St. Louis*

Peter Vanes Ebasone  
*Clinical Research Education Networking and Consultancy*

Anastase Dzudie  
*Clinical Research Education Networking and Consultancy*

Brian W. Pence  
*University of North Carolina at Chapel Hill*

*See next page for additional authors*

Follow this and additional works at: [https://digitalcommons.wustl.edu/oa\\_4](https://digitalcommons.wustl.edu/oa_4)



Part of the [Medicine and Health Sciences Commons](#)

---

### Recommended Citation

Parcesepe, Angela M.; Filiatreau, Lindsey M.; Ebasone, Peter Vanes; Dzudie, Anastase; Pence, Brian W.; Wainberg, Milton; Yotebieng, Marcel; Anastos, Kathryn; Pefura-Yone, Eric; Nsame, Denis; Ajeh, Rogers; and Nash, Denis, "Psychiatric comorbidity and psychosocial stressors among people initiating HIV care in Cameroon." *PLoS One*. 17, 6. e0270042 (2022).  
[https://digitalcommons.wustl.edu/oa\\_4/1012](https://digitalcommons.wustl.edu/oa_4/1012)

This Open Access Publication is brought to you for free and open access by the Open Access Publications at Digital Commons@Becker. It has been accepted for inclusion in 2020-Current year OA Pubs by an authorized administrator of Digital Commons@Becker. For more information, please contact [vanam@wustl.edu](mailto:vanam@wustl.edu).

---

**Authors**

Angela M. Parcesepe, Lindsey M. Filiatreau, Peter Vanes Ebasone, Anastase Dzudie, Brian W. Pence, Milton Wainberg, Marcel Yotebieng, Kathryn Anastos, Eric Pefura-Yone, Denis Nsame, Rogers Ajeh, and Denis Nash

## RESEARCH ARTICLE

# Psychiatric comorbidity and psychosocial stressors among people initiating HIV care in Cameroon

Angela M. Parcesepe<sup>1,2\*</sup>, Lindsey M. Filiatreau<sup>3</sup>, Peter Vanes Ebasone<sup>4</sup>, Anastase Dzudie<sup>4</sup>, Brian W. Pence<sup>5</sup>, Milton Wainberg<sup>6</sup>, Marcel Yotebieng<sup>7</sup>, Kathryn Anastos<sup>8</sup>, Eric Pefura-Yone<sup>9</sup>, Denis Nsame<sup>10</sup>, Rogers Ajeh<sup>4</sup>, Denis Nash<sup>11</sup>

**1** Department of Maternal and Child Health, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, United States of America, **2** Carolina Population Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, United States of America, **3** Department of Psychiatry, School of Medicine, Washington University in St. Louis, St. Louis, MO, United States of America, **4** Clinical Research Education Networking and Consultancy, Yaounde, Cameroon, **5** Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, United States of America, **6** Department of Psychiatry and New York State Psychiatric Institute, Columbia University, New York, NY, United States of America, **7** Department of Medicine, Albert Einstein College of Medicine, Bronx, NY, United States of America, **8** Departments of Medicine and Epidemiology & Population Health, Albert Einstein College of Medicine, Bronx, NY, United States of America, **9** Jamot Hospital, Yaounde, Cameroon, **10** Bamenda Regional Hospital, Bamenda, Cameroon, **11** Institute for Implementation Science in Population Health, City University of New York, New York, NY, United States of America

\* [angela\\_parcesepe@unc.edu](mailto:angela_parcesepe@unc.edu)



## OPEN ACCESS

**Citation:** Parcesepe AM, Filiatreau LM, Ebasone PV, Dzudie A, Pence BW, Wainberg M, et al. (2022) Psychiatric comorbidity and psychosocial stressors among people initiating HIV care in Cameroon. PLoS ONE 17(6): e0270042. <https://doi.org/10.1371/journal.pone.0270042>

**Editor:** Nitin Gupta, Kasturba Medical College Manipal, INDIA

**Received:** September 15, 2021

**Accepted:** June 3, 2022

**Published:** June 30, 2022

**Copyright:** © 2022 Parcesepe et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

**Data Availability Statement:** Data cannot be made publicly available due to participant privacy restrictions. Upon request, data are available to interested parties pending IRB approval from the University of North Carolina at Chapel Hill and the National Ethics Committee of Cameroon. Requests for the data can be sent to [irb\\_questions@unc.edu](mailto:irb_questions@unc.edu).

**Funding:** This research was supported by NIMH grant K01 MH114721, NICHD grant P2C HD050924 (Carolina Population Center), and NIAID grant U01AI096299. This work is solely the

## Abstract

### Background

Psychiatric comorbidity, the presence of two or more mental health disorders, has been associated with suboptimal HIV treatment outcomes. Little is known about the prevalence of psychiatric comorbidity among people with HIV (PWH) in sub-Saharan Africa.

### Methods

We conducted interviews with PWH initiating HIV care in Cameroon between June 2019 and March 2020. Depression, anxiety, post-traumatic stress disorder (PTSD), and harmful drinking were dichotomized to represent those with and without symptoms of each. Psychiatric comorbidity was defined as having symptoms of two or more disorders assessed. Moderate or severe household hunger, high anticipatory HIV-related stigma, low social support, and high number of potentially traumatic events were hypothesized as correlates of psychiatric comorbidity. Bivariable log binomial regression models were used to estimate unadjusted associations between psychosocial stressors and psychiatric comorbidity.

### Results

Among 424 participants interviewed, the prevalence of psychiatric comorbidity was 16%. Among those with symptoms of at least one mental health or substance use disorder ( $n = 161$ ), the prevalence of psychiatric comorbidity was 42%. The prevalence of psychiatric

responsibility of the authors and does not necessarily represent the official views of any of the institutions mentioned above. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

**Competing interests:** The authors have declared that no competing interests exist.

comorbidity was 33%, 67%, 76%, and 81% among those with symptoms of harmful drinking, depression, anxiety, and PTSD, respectively. Among individuals with symptoms of a mental health or substance use disorder, a high number of potentially traumatic events (prevalence ratio (PR) 1.71 [95% CI 1.21, 2.42]) and high anticipatory HIV-related stigma (PR 1.45 [95% CI 1.01, 2.09]) were associated with greater prevalence of psychiatric comorbidity.

## Conclusion

Psychiatric comorbidity was common among this group of PWH in Cameroon. The effectiveness and implementation of transdiagnostic or multi-focus mental health treatment approaches in HIV care settings should be examined.

## Introduction

Mental health disorders are common among people with HIV (PWH) and are associated with worse HIV care continuum outcomes, including delayed engagement in HIV care, suboptimal ART adherence, and virologic failure [1–4]. Among the general population, psychiatric comorbidity, the presence of two or more co-occurring mental health disorders, is common and has been associated with greater psychiatric symptom severity and worse mental health treatment outcomes [5–7]. Similarly, compared to PWH with a single disorder, PWH with co-occurring mental health and substance use disorders have more persistent symptoms and worse mental health, substance use, and HIV treatment outcomes [8, 9]. However, research into the prevalence and correlates of psychiatric comorbidity among PWH in sub-Saharan Africa remains limited, and existing research has generally involved small samples [10–12]. One study in South Africa found that, among 17 PWH with at least one psychiatric disorder, the prevalence of psychiatric comorbidity was 29% (n = 5) [10]. A study of 200 pregnant women living with HIV in Tanzania found that 18% met screening criteria for depression and anxiety while a study of 44 PWH in the Gambia found that 32% met screening criteria for depression and post-traumatic stress disorder (PTSD) [11, 12].

Previous research has found psychosocial stressors, including material hardship, HIV-related stigma, traumatic life experiences, and low social support to be associated with poor mental health among PWH [13–19]. For example, results from a meta-analysis of studies conducted with PWH in Ethiopia found that the odds of depression among those with poor social support were 2.3 (95% confidence interval [CI]: 1.7, 2.9) times that among those with strong social support [15]. Similarly, among a sample of adolescents living with HIV in South Africa, the prevalence of anxiety symptomology among those with higher social support was 0.30 (95% CI: 0.13, 0.71) times the prevalence among those with lower social support [20]. A meta-analysis of the relationship between HIV-related stigma and mental health found that experiencing HIV-related stigma was associated with higher prevalence of depression [14]. Exposure to potentially traumatic life events has also been consistently associated with mental health disorders, including depression, anxiety, and PTSD [21, 22]. Despite established relationships between psychosocial stressors and poor mental health, little is known about the extent to which such psychosocial stressors are associated with psychiatric comorbidity among PWH in sub-Saharan Africa where psychosocial stressors are common and may present a substantial barrier to mental health and HIV care engagement and retention.

A better understanding of the prevalence and correlates of psychiatric comorbidity among PWH in resource-constrained settings can influence the development, implementation, and

targeting of interventions to support the mental and physical health of PWH with psychiatric comorbidity and has the potential to improve HIV care continuum outcomes. For example, the Common Elements Treatment Approach (CETA), an evidence-based mental health treatment for depression, anxiety, substance use, and trauma- and stress-related disorders was developed with the purpose of treating individuals with co-occurring disorders [23]. In settings where psychiatric comorbidity is common, implementation of transdiagnostic or multi-focus interventions may be warranted.

The objectives of this analysis are to assess the prevalence of psychiatric comorbidity among PWH initiating HIV care in Cameroon and to characterize psychosocial correlates of psychiatric comorbidity. Specifically, this analysis investigates the extent to which four psychosocial stressors (household hunger, potentially traumatic events, anticipatory HIV-related stigma, and low social support) are associated with psychiatric comorbidity among PWH initiating HIV care in Cameroon.

## Methods

### Data collection

As previously described, data were collected from in-person interviews with 424 individuals initiating HIV care at three HIV treatment clinics in Cameroon between June 2019 and March 2020 [24]. Individuals were eligible to participate if they were 21 years or older and newly enrolling in HIV care at one of the three HIV clinics. Individuals transferring HIV care were ineligible for study participation. Data collection consisted of a structured interview conducted by a trained research assistant that included questions on mental health, substance use, psychosocial stressors, and sociodemographics. This study was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill and the National Ethical Committee of Research for Human Health in Cameroon. All participants provided written informed consent.

### Measures

**Depressive symptoms.** Depressive symptoms were assessed with the Patient Health Questionnaire-9 (PHQ-9) [25]. The PHQ-9 is a 9-item screener that assesses the presence of depressive symptoms within the last two weeks. Scores for the PHQ-9 range from 0–27. Scores of 10 or greater are commonly considered an indication of a likely depressive disorder [25]. The PHQ-9 has been previously validated with PWH in sub-Saharan Africa [26–28].

**Anxiety symptoms.** Anxiety symptoms were assessed with the General Anxiety Disorder-7 (GAD-7) [29]. The GAD-7 is a 7-item screener that assesses the presence of anxiety symptoms within the past two weeks. Scores for the GAD-7 range from 0–21. Scores of 10 or greater are commonly considered an indication of moderate or severe anxiety symptoms [29]. The GAD-7 has been validated in a range of cultural settings, including among a primary care population with a high prevalence of HIV in sub-Saharan Africa [30–32].

**Post-traumatic stress disorder symptoms.** Post-traumatic stress disorder (PTSD) symptoms were assessed with the PTSD Checklist for DSM-5 (PCL-5) [33]. The PCL-5 is a 20-item screener that assesses the presence of PTSD symptoms in the past month. Scores range from 0–80. Scores of 31 or greater are indicative of probable PTSD. The PCL-5 has been validated across a range of cultural settings, including among a primary care population with a high prevalence of HIV in Zimbabwe [34–37].

**Alcohol use.** Alcohol use was measured using the 10-item Alcohol Use Disorders Identification Test (AUDIT) [38]. Scores range from 0 to 40. Scores equal to or greater than 16 were considered indicative of harmful drinking or potential alcohol use disorder [38]. This scale has

been validated and used in populations with high HIV prevalence in sub-Saharan Africa [39, 40].

**Psychiatric comorbidity.** We created a dichotomous variable to represent individuals with and without symptoms of two or more of the following: depression, anxiety, PTSD, or harmful drinking.

**Household hunger.** Household hunger was assessed using the Household Hunger Scale [41]. This scale consisted of three questions about household hunger in the past 30 days: *was there ever no food to eat of any kind in your house because of lack of resources to get food; did you or any household member go to sleep at night hungry because there was not enough food; did you or any household member go a whole day and night without eating anything because there was not enough food.* If participants responded affirmatively to any question, they were asked about frequency of the occurrence. Responses indicating the event never occurred received a score of 0, responses indicating the event occurred “Rarely/Sometimes” received a score of 1, and responses indicating the event occurred “Often” received a score of 2, yielding an overall scale score ranging from 0–6. Scores of 2 and greater were considered indicative of moderate to severe household hunger [41]. This instrument was developed and validated for cross-cultural use to measure a household’s ability to access food within the last 30 days.

**Potentially traumatic events.** Lifetime exposure to twelve potentially traumatic events (PTE) was assessed, including experiences of physical and sexual violence, natural disaster, and the loss of a child, among others. One additional question asked individuals to identify any other PTE experienced during childhood or adulthood. The number of PTE reported was summed and categorized into quartiles based on distribution in the study sample (lower three quartiles = referent).

**Social support.** Social support was assessed using four items from the Multidimensional Scale of Perceived Social Support (MSPSS) that evaluated perceptions of social support from family and friends [42]. This scale has been previously validated with populations in sub-Saharan Africa [43, 44]. Participants were asked how much they agreed or disagreed with each of the following items: *I get the emotional help and support I need from my family; I can talk about my problems with my family; I can count on my friends when things go wrong; and I have friends with whom I can share my joys and sorrows.* Response options to each question ranged from strongly disagree to strongly agree. Responses were summed (such that higher scores were indicative of greater social support) and categorized into quartiles based on distribution in the study sample (upper three quartiles = referent).

**Anticipatory HIV-related stigma.** Anticipatory HIV-related stigma was assessed with 12 yes/no items created in accordance with the concept described by Earnshaw and Chadoir (e.g., *if others know or suspect you are living with HIV, you might lose your job, your partner might leave you, your family members might treat you differently*) [45]. A total anticipatory stigma score was constructed as the proportion of endorsed items from among all questions the participant was eligible to answer (i.e., participants without children or a partner were ineligible to answer related items). Anticipatory stigma scores were categorized into quartiles based on distribution in the study sample (lower three quartiles = referent).

**Sociodemographics.** Sociodemographic characteristics explored included age, gender, education, relationship status, employment, time away from home, and number of children.

**Missing mental health symptom data.** For individuals missing data on less than 10% of items for any given scale, the mean of the individual’s non-missing scale response was imputed for missing items.

**Data analysis.** Univariate analyses were conducted to assess the prevalence of psychiatric comorbidity in the study population overall. Bivariate analyses between each psychosocial stressor (household hunger, potentially traumatic events, anticipatory HIV-related stigma, and

low social support) and psychiatric comorbidity were conducted using Pearson chi-squared tests among those reporting symptoms of at least one mental health disorder assessed. Separate bivariable log binomial regression models were used to estimate the prevalence ratios and 95% confidence intervals assessing the strength of the association of each psychosocial stressor with psychiatric comorbidity among those reporting symptoms of at least one mental health disorder assessed. Multivariable regression was not utilized as the aim of this analysis was to characterize marginal associations. All analyses were conducted with SAS Version 9.4 (Cary, NC).

## Results

Among the entire sample, over half of participants were female (58.5%), between 21 and 39 years of age (58.7%), and currently in a relationship (58.5%) (Table 1). Most participants were working for pay (64.4%) and had at least one child (81.3%).

Among the entire sample, the prevalence of psychiatric comorbidity was 16% (Table 2). Among those with symptoms of at least one mental health or substance use disorder ( $n = 161$ ), the prevalence of psychiatric comorbidity was 42%. The prevalence of psychiatric comorbidity was 33%, 67%, 76%, and 81% among those with symptoms of harmful drinking, depression, anxiety, and PTSD, respectively.

The prevalence of psychiatric comorbidity was higher among those who reported a higher number of potentially traumatic events (58.2% vs 34.0%; PR 1.71 [95% CI 1.21, 2.42]) (Table 3). Similarly, the prevalence of psychiatric comorbidity was 51.9% among those in the

**Table 1. Sociodemographics and psychiatric comorbidity among 424 PWH initiating HIV care in Cameroon.**

	Total N = 424	No MSD N = 263	One MSD N = 93 N (%)	2+ MSDs N = 68 N (%)	p-value
Age					0.36
21–39	249 (58.7)	149 (56.7)	55 (59.1)	45 (66.2)	
40+	175 (41.3)	114 (43.3)	38 (40.9)	23 (33.8)	
Gender					0.85
Male	176 (41.5)	107 (40.7)	41 (44.1)	28 (41.2)	
Female	248 (58.5)	156 (59.3)	52 (55.9)	40 (58.8)	
Relationship Status					0.11
Single	176 (41.5)	105 (39.9)	35 (37.6)	36 (52.9)	
Partnered	248 (58.5)	158 (60.1)	58 (62.4)	32 (47.1)	
Education					0.20
None	30 (7.1)	14 (5.3)	8 (8.6)	8 (11.8)	
Primary	218 (51.4)	131 (49.8)	52 (55.9)	35 (51.5)	
≥ Secondary	176 (41.5)	118 (44.9)	33 (35.5)	25 (36.8)	
Employment					0.34
Not working for pay	151 (35.6)	95 (36.1)	28 (30.1)	28 (41.2)	
Working for pay	273 (64.4)	168 (63.9)	65 (69.9)	40 (58.8)	
Away from home >1 month in past year					0.18
No	261 (61.6)	170 (64.6)	55 (59.1)	36 (52.9)	
Yes	163 (38.4)	93 (35.4)	38 (40.9)	32 (47.1)	
Number of children					0.96
0	79 (18.7)	49 (18.6)	18 (19.6)	12 (17.9)	
1+	343 (81.3)	214 (81.4)	74 (80.4)	55 (82.1)	
Missing	2	0	1	1	

MSD: symptoms of a mental health or substance use disorder

<https://doi.org/10.1371/journal.pone.0270042.t001>

**Table 2. Mental health and substance use disorder symptoms of 424 individuals initiating HIV care in Cameroon.**

	N (%)
<i>Among the entire study population</i>	N = 424
No mental health outcome of interest	263 (62.0)
At least one mental health outcome of interest	161 (38.0)
1 disorder only	93 (21.9)
2+ disorders	68 (16.0)
<i>Among those with one or more mental health disorder</i>	N = 161
1 disorder only	93 (57.8)
2+ disorders	68 (42.2)
<i>Among those with depression</i>	N = 87
Depression only	29 (33.3)
Depression with 1+ comorbidity	58 (66.7)
<i>Among those with anxiety</i>	N = 54
Anxiety only	13 (24.1)
Anxiety with 1+ comorbidity	41 (75.9)
<i>Among those with PTSD</i>	N = 67
PTSD only	13 (19.4)
PTSD with 1+ comorbidity	54 (80.6)
<i>Among those with harmful drinking</i>	N = 57
Harmful drinking only	38 (66.7)
Harmful drinking with 1+ comorbidity	19 (33.3)

<https://doi.org/10.1371/journal.pone.0270042.t002>

upper quartile of anticipatory HIV-related stigma compared to 35.9% among those in the lower three quartiles (PR 1.45 [95% CI 1.01, 2.09]). Although not statistically significant, the prevalence of psychiatric comorbidity was 53.5% among those in the lowest quartile of social support compared to 38.8% among those in the top three quartiles of social support (PR 1.38 [95% CI 0.96, 1.98]) and 50.9% among those with moderate or severe household hunger compared to 37.4% among those with no or little household hunger (PR 1.36 [95% CI 0.95, 1.95]).

**Table 3. Psychosocial stressors and psychiatric comorbidity among PWH with symptoms of depression, anxiety, post-traumatic stress disorder, or harmful alcohol use who are initiating HIV care in Cameroon.**

	Total N = 161	One MSD N = 93 N (%)	2+ MSDs N = 68 N (%)	PR (95% CI)*
Household hunger <sup>†</sup>				
No/Little	107 (66.9)	67 (62.6)	40 (37.4)	1 (ref)
Moderate+	53 (33.1)	26 (49.1)	27 (50.9)	1.36 (0.95, 1.95)
Trauma				
Lower 75 <sup>th</sup>	106 (65.8)	70 (66.0)	36 (34.0)	1 (ref)
Upper 25 <sup>th</sup>	55 (34.2)	23 (41.8)	32 (58.2)	1.71 (1.21, 2.42)
Stigma <sup>†</sup>				
Lower 75 <sup>th</sup>	106 (67.1)	68 (64.2)	38 (35.9)	1 (ref)
Upper 25 <sup>th</sup>	52 (32.9)	25 (48.1)	27 (51.9)	1.45 (1.01, 2.09)
Social support <sup>†</sup>				
Lower 25 <sup>th</sup>	43 (27.0)	20 (46.5)	23 (53.5)	1.38 (0.96, 1.98)
Upper 75 <sup>th</sup>	116 (73.0)	71 (61.2)	45 (38.8)	1 (ref)

MSD: symptoms of a mental health or substance use disorder; PR: prevalence ratio; CI: confidence interval

<sup>†</sup>Missing: household hunger n = 1; stigma n = 3; social support n = 2

\*Modelling outcome of 2+MSDs (referent = one MSD)

<https://doi.org/10.1371/journal.pone.0270042.t003>



## Discussion

The prevalence of psychiatric comorbidity was 16% among the entire sample population of PWH initiating HIV in Cameroon and 42% among those who screened positive for at least one mental health disorder assessed. Among those with symptoms of at least one mental health disorder assessed, the prevalence of psychiatric comorbidity was positively associated with anticipatory HIV-related stigma and experiences of trauma. Previous research with PWH in sub-Saharan Africa has estimated the prevalence of psychiatric comorbidity to be between 18–32% among PWH with at least one mental health disorder [10, 12, 46]. A study with PWH in South Africa found the prevalence of psychiatric comorbidity to be approximately 6% among the entire sample population (whether or not they had any mental health disorders assessed) [10]. It remains unclear why the prevalence of psychiatric comorbidity among this sample of PWH in Cameroon was higher than has been previously estimated. However, the current study assessed psychiatric comorbidity among PWH initiating HIV care. As such, we suspect that some portion of participants was newly diagnosed with HIV. The true portion of newly diagnosed participants in our sample is unknown, however, because date of first HIV diagnosis was not available for study participants. PWH newly diagnosed or initiating HIV care may be particularly vulnerable to psychiatric comorbidity, as HIV diagnosis has been found to be an acute stressor for many PWH [47]. Longitudinal analyses to examine the prevalence and persistence of psychiatric comorbidity following HIV diagnosis is needed. It is also worth noting that since 2016 Cameroon has experienced escalating political instability and violence as separatists seek independence for the country's Anglophone regions. The mental health impact of this protracted conflict remains unknown. However, the mental health impact of protracted political instability and conflict has been previously established [48, 49].

Given that psychiatric comorbidity was common among PWH with symptoms of at least one mental health disorder assessed, the effectiveness of transdiagnostic or multi-focus treatment approaches for PWH and integration of such interventions into HIV care settings should be examined. Such approaches are designed to address common elements and mechanisms across mental health diagnoses and have been found to be effective when provided by trained, non-specialized providers in resource-constrained settings [50–52]. In addition, the effectiveness and durability of adaptive intervention approaches in which more and less intensive treatment approaches are targeted to PWH according to psychiatric need should be investigated. The extent to which evidence-based interventions developed to address one mental health disorder are effective in the presence of multiple mental health disorders also warrants investigation.

Psychiatric comorbidity was highest among those who screened positive for PTSD. Previous research with general populations has found that PTSD commonly co-occurs with other mental health disorders [53, 54]. Research into psychiatric comorbidity among PWH with PTSD remains limited. One study with PWH in the Gambia found that 32% met screening criteria for PTSD and depression [12]. Given that most participants with PTSD symptoms experienced psychiatric comorbidity, PWH with PTSD symptoms in Cameroon should be screened for other common mental health disorders. Transdiagnostic or integrated mental health treatment approaches that address common elements of multiple mental health diagnoses may be particularly appropriate for PWH with PTSD symptoms.

Our study found that psychiatric comorbidity was least common among those with harmful drinking. We are not aware of previous estimates of psychiatric comorbidity among PWH with harmful drinking in sub-Saharan Africa. Alcohol consumption is common among the general population in Cameroon, with 55% of men and 33% of women reporting recent alcohol use and 31% of men and 6% of women reporting recent heavy episodic drinking [55].

Cultural norms around alcohol use, including norms around drinking in recreational or social contexts, may influence our findings that harmful drinking commonly occurs in the absence of other mental health symptoms. Greater understanding of the context of harmful drinking among PWH in Cameroon could provide useful insight into why psychiatric comorbidity may be less common among this population.

Among PWH who screened positive for at least one mental health disorder assessed, having experienced a greater number of potentially traumatic events, compared to fewer, was associated with significantly greater prevalence of psychiatric comorbidity. Research into the relationship between psychiatric comorbidity and trauma among PWH is limited. However, our findings are consistent with research with a sample of Tanzanian adults with and without HIV that found that each additional traumatic event reported was associated with increased symptomatology of both PTSD and depression [56]. Trauma has also been associated with suboptimal HIV care outcomes, including suboptimal ART adherence, increased viral load, and lack of viral suppression [21, 57, 58]. Research to understand to what extent mental health disorders or psychiatric comorbidity mediate the relationship between traumatic experiences and suboptimal HIV care outcomes is warranted. The extent to which trauma screening and the integration of trauma-focused interventions into HIV care improves mental health and HIV care outcomes should be investigated [59].

Among PWH who screened positive for at least one mental health disorder assessed, high anticipatory HIV-related stigma was associated with significantly greater prevalence of psychiatric comorbidity. This is consistent with research with pregnant women living with HIV in Tanzania which found that HIV-related shame was associated with screening positive for comorbid depression and anxiety [11]. The mechanisms between anticipatory HIV-stigma and psychiatric comorbidity remain unclear. In addition, the relationship between other forms of HIV-related stigma, including internalized and enacted HIV-related stigma, and psychiatric comorbidity remains largely unexplored. Similarly, the relationship between psychiatric comorbidity and non-HIV-related stigma, including mental health-related stigma, stigma related to one's sexual orientation or gender identity, or stigma related to engaging in sex work, could yield important insights. Research into the relationship between intersectional stigma and psychiatric comorbidity is needed.

Our findings support the need for strategies to address and prevent HIV-related stigma. However, evidence on the effectiveness of HIV-related stigma interventions remains mixed. Interventions that included both structural and individual-level components were found to be more effective than interventions with only individual-level components [60, 61]. While limited, there is evidence that mental health symptoms moderate the effectiveness of stigma-reduction interventions among PWH [62, 63]. An intervention with PWH newly entering HIV care in the U.S. found that depressive symptoms moderated intervention effectiveness, with greater decreases in internalized HIV-related stigma among those with higher levels of depressive symptoms [63]. Such findings suggest that stigma-reduction interventions may be particularly beneficial for PWH with mental health disorders.

Household hunger and low levels of social support were not associated with significantly greater prevalence of psychiatric comorbidity in regression analyses. We are not aware of previous research into the relationship between hunger or social support and psychiatric comorbidity among PWH. However, both hunger and low social support have been associated with poor mental health among PWH in sub-Saharan Africa [64–68].

This research should be considered in light of its limitations. All data were collected at entry into HIV care. As discussed, we were unable to distinguish between those who were and were not newly diagnosed with HIV. The relationship between psychosocial stressors and psychiatric comorbidity may differ at other points in the HIV care continuum and between those

who were and were not recently diagnosed. In addition, data were collected from three urban hospital-based HIV treatment clinics in Cameroon and may not be generalizable to other populations or settings. Finally, the GAD-7, PCL-5, and AUDIT have not been validated in Cameroon.

## Conclusions

Psychiatric comorbidity was common among PWH entering HIV care in Cameroon with symptoms of at least one mental health disorder. Potentially traumatic events and anticipatory HIV-related stigma were associated with greater prevalence of psychiatric comorbidity. The effectiveness and implementation of transdiagnostic or multi-focus treatment approaches in HIV care to treat co-occurring mental health and substance use disorders among PWH should be examined in this setting. Future research should longitudinally investigate mechanisms through which potentially traumatic events and anticipatory HIV-related stigma are associated with psychiatric comorbidity and the extent to which these relationships persist throughout the HIV care continuum.

## Author Contributions

**Conceptualization:** Angela M. Parcesepe, Brian W. Pence, Milton Wainberg, Denis Nash.

**Data curation:** Angela M. Parcesepe.

**Formal analysis:** Lindsey M. Filiatreau.

**Funding acquisition:** Angela M. Parcesepe.

**Methodology:** Lindsey M. Filiatreau.

**Project administration:** Peter Vanes Ebasone, Anastase Dzudie.

**Supervision:** Anastase Dzudie.

**Writing – original draft:** Angela M. Parcesepe.

**Writing – review & editing:** Lindsey M. Filiatreau, Peter Vanes Ebasone, Anastase Dzudie, Brian W. Pence, Milton Wainberg, Marcel Yotebieng, Kathryn Anastos, Eric Pefura-Yone, Denis Nsame, Rogers Ajeh, Denis Nash.

## References

1. Brandt R. The mental health of people living with HIV/AIDS in Africa: a systematic review. *Afr J AIDS Res.* 2009; 8(2):123–33. Epub 2009/06/01. <https://doi.org/10.2989/AJAR.2009.8.2.1.853> PMID: 25875564.
2. Velloza J, Celum C, Haberer JE, Ngure K, Irungu E, Mugo N, et al. Depression and ART Initiation Among HIV Serodiscordant Couples in Kenya and Uganda. *AIDS Behav.* 2017; 21(8):2509–18. Epub 2017/06/22. <https://doi.org/10.1007/s10461-017-1829-z> PMID: 28634661; PubMed Central PMCID: PMC5552192.
3. Nakimuli-Mpungu E, Bass JK, Alexandre P, Mills EJ, Musisi S, Ram M, et al. Depression, alcohol use and adherence to antiretroviral therapy in sub-Saharan Africa: a systematic review. *AIDS Behav.* 2012; 16(8):2101–18. Epub 2011/11/26. <https://doi.org/10.1007/s10461-011-0087-8> PMID: 22116638.
4. Martinez P, Andia I, Emenyonu N, Hahn JA, Hauff E, Pepper L, et al. Alcohol use, depressive symptoms and the receipt of antiretroviral therapy in southwest Uganda. *AIDS Behav.* 2008; 12(4):605–12. Epub 2007/10/31. <https://doi.org/10.1007/s10461-007-9312-x> PMID: 17968651; PubMed Central PMCID: PMC3591721.
5. Kessler RC, Chiu WT, Demler O, Merikangas KR, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry.* 2005; 62(6):617–27. Epub 2005/06/09. <https://doi.org/10.1001/archpsyc.62.6.617> PMID: 15939839; PubMed Central PMCID: PMC2847357.

6. Plana-Ripoll O, Pedersen CB, Holtz Y, Benros ME, Dalsgaard S, de Jonge P, et al. Exploring Comorbidity Within Mental Disorders Among a Danish National Population. *JAMA Psychiatry*. 2019; 76(3):259–70. Epub 2019/01/17. <https://doi.org/10.1001/jamapsychiatry.2018.3658> PMID: 30649197; PubMed Central PMCID: PMC6439836.
7. Hasin DS, Sarvet AL, Meyers JL, Saha TD, Ruan WJ, Stohl M, et al. Epidemiology of Adult DSM-5 Major Depressive Disorder and Its Specifiers in the United States. *JAMA Psychiatry*. 2018; 75(4):336–46. Epub 2018/02/17. <https://doi.org/10.1001/jamapsychiatry.2017.4602> PMID: 29450462; PubMed Central PMCID: PMC5875313.
8. Cook JA, Burke-Miller JK, Steigman PJ, Schwartz RM, Hessol NA, Milam J, et al. Prevalence, Comorbidity, and Correlates of Psychiatric and Substance Use Disorders and Associations with HIV Risk Behaviors in a Multisite Cohort of Women Living with HIV. *AIDS Behav*. 2018; 22(10):3141–54. Epub 2018/02/21. <https://doi.org/10.1007/s10461-018-2051-3> PMID: 29460130; PubMed Central PMCID: PMC6153984.
9. Gaynes BN, Pence BW, Eron JJ Jr., Miller WC. Prevalence and comorbidity of psychiatric diagnoses based on reference standard in an HIV+ patient population. *Psychosom Med*. 2008; 70(4):505–11. Epub 2008/04/02. <https://doi.org/10.1097/PSY.0b013e31816aa0cc> PMID: 18378865; PubMed Central PMCID: PMC2900836.
10. Belus JM, Cholera R, Miller WC, Bassett J, Gaynes BN. Psychiatric Comorbidity of Unipolar Mood, Anxiety, and Trauma Disorders Prior to HIV Testing and the Effect on Linkage to Care Among HIV-Infected Adults in South Africa. *AIDS Behav*. 2019; 23(12):3444–51. Epub 2019/07/13. <https://doi.org/10.1007/s10461-019-02586-6> PMID: 31297682.
11. Ngocho JS, Watt MH, Minja L, Knettel BA, Mmbaga BT, Williams PP, et al. Depression and anxiety among pregnant women living with HIV in Kilimanjaro region, Tanzania. *PloS One*. 2019; 14(10): e0224515. Epub 2019/11/02. <https://doi.org/10.1371/journal.pone.0224515> PMID: 31671160; PubMed Central PMCID: PMC6822761.
12. Klis S, Velding K, Gidron Y, Peterson K. Posttraumatic stress and depressive symptoms among people living with HIV in the Gambia. *AIDS Care*. 2011; 23(4):426–34. Epub 2011/01/29. <https://doi.org/10.1080/09540121.2010.507756> PMID: 21271395.
13. Ayano G, Tsegay L, Solomon M. Food insecurity and the risk of depression in people living with HIV/AIDS: a systematic review and meta-analysis. *AIDS Res Ther*. 2020; 17(1):36. Epub 2020/06/24. <https://doi.org/10.1186/s12981-020-00291-2> PMID: 32571426; PubMed Central PMCID: PMC7310141.
14. Rueda S, Mitra S, Chen S, Gogolishvili D, Globerman J, Chambers L, et al. Examining the associations between HIV-related stigma and health outcomes in people living with HIV/AIDS: a series of meta-analyses. *BMJ Open*. 2016; 6(7):e011453. Epub 2016/07/15. <https://doi.org/10.1136/bmjopen-2016-011453> PMID: 27412106; PubMed Central PMCID: PMC4947735.
15. Weldesenbet AB, Kebede SA, Tusa BS. The Effect of Poor Social Support on Depression among HIV/AIDS Patients in Ethiopia: A Systematic Review and Meta-Analysis. *Depress Res Treat*. 2020; 2020:6633686. Epub 2021/01/26. <https://doi.org/10.1155/2020/6633686> PMID: 33489371; PubMed Central PMCID: PMC7787864.
16. Zeng C, Li L, Hong YA, Zhang H, Babbitt AW, Liu C, et al. A structural equation model of perceived and internalized stigma, depression, and suicidal status among people living with HIV/AIDS. *BMC Public Health*. 2018; 18(1):138. Epub 2018/01/18. <https://doi.org/10.1186/s12889-018-5053-1> PMID: 29334959; PubMed Central PMCID: PMC5769512.
17. Logie CH, Marcus N, Wang Y, Kaida A, O'Campo P, Ahmed U, et al. A longitudinal study of associations between HIV-related stigma, recent violence and depression among women living with HIV in a Canadian cohort study. *J Int AIDS Soc*. 2019; 22(7):e25341. Epub 2019/07/23. <https://doi.org/10.1002/jia2.25341> PMID: 31328891; PubMed Central PMCID: PMC6643300.
18. Spies G, Konkiewitz EC, Seedat S. Incidence and Persistence of Depression Among Women Living with and Without HIV in South Africa: A Longitudinal Study. *AIDS Behav*. 2018; 22(10):3155–65. Epub 2018/02/25. <https://doi.org/10.1007/s10461-018-2072-y> PMID: 29476437.
19. Filiatreau LM, Giovenco D, Twine R, Gómez-Olivé FX, Kahn K, Haberland N, Pettifor A. Examining the relationship between physical and sexual violence and psychosocial health in young people living with HIV in rural South Africa. *J Int AIDS Soc*. 23(12). <https://doi.org/10.1002/jia2.25654> PMID: 33340267
20. West N, Schwartz S, Mudavanhu M, Hanrahan C, France H, Nel J, et al. Mental health in South African adolescents living with HIV. *AIDS Care*. 2019; 31(1):117–24. <https://doi.org/10.1080/09540121.2018.1533222> PMID: 30304947
21. LeGrand S, Reif S, Sullivan K, Murray K, Barlow ML, Whetten K. A Review of Recent Literature on Trauma Among Individuals Living with HIV. *Curr HIV/AIDS Rep*. 2015; 12(4):397–405. Epub 2015/10/01. <https://doi.org/10.1007/s11904-015-0288-2> PMID: 26419376; PubMed Central PMCID: PMC4837695.

22. Machtinger EL, Wilson TC, Haberer JE, Weiss DS. Psychological trauma and PTSD in HIV-positive women: a meta-analysis. *AIDS Behav.* 2012; 16(8):2091–100. Epub 2012/01/18. <https://doi.org/10.1007/s10461-011-0127-4> PMID: 22249954.
23. Murray LK, Haroz E, Dorsey S, Kane J, Bolton PA, Pullmann MD. Understanding mechanisms of change: An unpacking study of the evidence-based common-elements treatment approach (CETA) in low and middle income countries. *Behav Res Ther.* 2020; 130:103430. Epub 2019/11/30. <https://doi.org/10.1016/j.brat.2019.103430> PMID: 31780251.
24. Parcesepe AM, Filiatreau LM, Ebasone PV, Dzudie A, Ajeh R, Wainberg M, et al. Gender, Mental Health, and Entry Into Care with Advanced HIV Among People Living with HIV in Cameroon Under a National 'Treat All' Policy. *AIDS Behav.* 2021. Epub 2021/06/07. <https://doi.org/10.1007/s10461-021-03328-3> PMID: 34091803.
25. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med.* 2001; 16(9):606–13. Epub 2001/09/15. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x> PMID: 11556941; PubMed Central PMCID: PMC1495268.
26. Pence BW, Gaynes BN, Atashili J, O'Donnell JK, Tayong G, Kats D, et al. Validity of an interviewer-administered patient health questionnaire-9 to screen for depression in HIV-infected patients in Cameroon. *J Affect Disord.* 2012; 143(1–3):208–13. Epub 2012/07/31. <https://doi.org/10.1016/j.jad.2012.05.056> PMID: 22840467; PubMed Central PMCID: PMC3500577.
27. Monahan PO, Shacham E, Reece M, Kroenke K, Ong'or WO, Omollo O, et al. Validity/reliability of PHQ-9 and PHQ-2 depression scales among adults living with HIV/AIDS in western Kenya. *J Gen Intern Med.* 2009; 24(2):189–97. Epub 2008/11/26. <https://doi.org/10.1007/s11606-008-0846-z> PMID: 19031037; PubMed Central PMCID: PMC2629000.
28. Akena D, Joska J, Obuku EA, Stein DJ. Sensitivity and specificity of clinician administered screening instruments in detecting depression among HIV-positive individuals in Uganda. *AIDS Care.* 2013; 25(10):1245–52. Epub 2013/02/13. <https://doi.org/10.1080/09540121.2013.764385> PMID: 23398282.
29. Spitzer RL, Kroenke K, Williams JB, Lowe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med.* 2006; 166(10):1092–7. Epub 2006/05/24. <https://doi.org/10.1001/archinte.166.10.1092> PMID: 16717171.
30. Chibanda D, Verhey R, Gibson LJ, Munetsi E, Machando D, Rusakaniko S, et al. Validation of screening tools for depression and anxiety disorders in a primary care population with high HIV prevalence in Zimbabwe. *J Affect Disord.* 2016; 198:50–5. Epub 2016/03/25. <https://doi.org/10.1016/j.jad.2016.03.006> PMID: 27011359.
31. Zhong QY, Gelaye B, Zaslavsky AM, Fann JR, Rondon MB, Sánchez SE, et al. Diagnostic Validity of the Generalized Anxiety Disorder—7 (GAD-7) among Pregnant Women. *PloS One.* 2015; 10(4):e0125096. Epub 2015/04/29. <https://doi.org/10.1371/journal.pone.0125096> PMID: 25915929; PubMed Central PMCID: PMC4411061.
32. Ruiz MA, Zamorano E, García-Campayo J, Pardo A, Freire O, Rejas J. Validity of the GAD-7 scale as an outcome measure of disability in patients with generalized anxiety disorders in primary care. *J Affect Disord.* 2011; 128(3):277–86. Epub 2010/08/10. <https://doi.org/10.1016/j.jad.2010.07.010> PMID: 20692043.
33. Blevins CA, Weathers FW, Davis MT, Witte TK, Domino JL. The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and Initial Psychometric Evaluation. *J Trauma Stress.* 2015; 28(6):489–98. Epub 2015/11/26. <https://doi.org/10.1002/jts.22059> PMID: 26606250.
34. Verhey R, Chibanda D, Gibson L, Brakarsh J, Seedat S. Validation of the posttraumatic stress disorder checklist—5 (PCL-5) in a primary care population with high HIV prevalence in Zimbabwe. *BMC Psychiatry.* 2018; 18(1):109. Epub 2018/04/25. <https://doi.org/10.1186/s12888-018-1688-9> PMID: 29685117; PubMed Central PMCID: PMC5913864.
35. Ibrahim H, Ertl V, Catani C, Ismail AA, Neuner F. The validity of Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) as screening instrument with Kurdish and Arab displaced populations living in the Kurdistan region of Iraq. *BMC Psychiatry.* 2018; 18(1):259. Epub 2018/08/18. <https://doi.org/10.1186/s12888-018-1839-z> PMID: 30115040; PubMed Central PMCID: PMC6097219.
36. Ashbaugh AR, Houle-Johnson S, Herbert C, El-Hage W, Brunet A. Psychometric Validation of the English and French Versions of the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5). *PloS One.* 2016; 11(10):e0161645. Epub 2016/10/11. <https://doi.org/10.1371/journal.pone.0161645> PMID: 27723815; PubMed Central PMCID: PMC5056703.
37. Barthel D, Barkmann C, Ehrhardt S, Bindt C. Psychometric properties of the 7-item Generalized Anxiety Disorder scale in antepartum women from Ghana and Côte d'Ivoire. *J Affect Disord.* 2014; 169:203–11. Epub 2014/09/13. <https://doi.org/10.1016/j.jad.2014.08.004> PMID: 25212996.
38. Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful

- Alcohol Consumption—II. *Addiction* (Abingdon, England). 1993; 88(6):791–804. Epub 1993/06/01. <https://doi.org/10.1111/j.1360-0443.1993.tb02093.x> PMID: 8329970
39. Adewuya AO. Validation of the alcohol use disorders identification test (AUDIT) as a screening tool for alcohol-related problems among Nigerian university students. *Alcohol Alcoholism*. 2005; 40(6):575–7. Epub 2005/08/24. <https://doi.org/10.1093/alcalc/agh197> PMID: 16115823.
  40. Blair AH, Pearce ME, Katamba A, Malamba SS, Muyinda H, Schechter MT, et al. The Alcohol Use Disorders Identification Test (AUDIT): Exploring the Factor Structure and Cutoff Thresholds in a Representative Post-Conflict Population in Northern Uganda. *Alcohol Alcoholism*. 2017; 52(3):318–27. Epub 2016/12/23. <https://doi.org/10.1093/alcalc/agw090> PMID: 28003244.
  41. Ballard T, Coates J, Sindale A, Deitchler M. Household Hunger Scale: Indicator Definition and Measurement Guide. Washington DC: Food and Nutrition Technical Assistance II Project, FHI 360, 2011.
  42. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The Multidimensional Scale of Perceived Social Support. *J Pers Assess*. 1988; 52(1):30–41. [https://doi.org/10.1207/s15327752jpa5201\\_2](https://doi.org/10.1207/s15327752jpa5201_2)
  43. Stewart RC, Umar E, Tomenson B, Creed F. Validation of the multi-dimensional scale of perceived social support (MSPSS) and the relationship between social support, intimate partner violence and antenatal depression in Malawi. *BMC Psychiatry*. 2014; 14:180. Epub 2014/06/19. <https://doi.org/10.1186/1471-244X-14-180> PMID: 24938124; PubMed Central PMCID: PMC4074419.
  44. Nakigudde J, Musisi S, Ehnvall A, Airaksinen E, Agren H. Adaptation of the multidimensional scale of perceived social support in a Ugandan setting. *African Health Sciences*. 2009; 9 Suppl 1(Suppl 1):S35–41. Epub 2010/07/09. PMID: 20589159; PubMed Central PMCID: PMC2890995.
  45. Earnshaw VA, Chaudoir SR. From conceptualizing to measuring HIV stigma: a review of HIV stigma mechanism measures. *AIDS Behav*. 2009; 13(6):1160–77. Epub 2009/07/29. <https://doi.org/10.1007/s10461-009-9593-3> PMID: 19636699; PubMed Central PMCID: PMC4511707.
  46. Olley BO, Zeier MD, Seedat S, Stein DJ. Post-traumatic stress disorder among recently diagnosed patients with HIV/AIDS in South Africa. *AIDS Care*. 2005; 17(5):550–7. Epub 2005/07/23. <https://doi.org/10.1080/09540120412331319741> PMID: 16036241.
  47. Antoni MH, Baggett L, Ironson G, LaPerriere A, August S, Klimas N, et al. Cognitive-behavioral stress management intervention buffers distress responses and immunologic changes following notification of HIV-1 seropositivity. *J Consult Clin Psychol*. 1991; 59(6):906–15. Epub 1991/12/01. <https://doi.org/10.1037//0022-006x.59.6.906> PMID: 1774375
  48. Haar RJ, Rubenstein LS. Health in fragile and post-conflict states: a review of current understanding and challenges ahead. *Med Confl Surviv*. 2012; 28(4):289–316. Epub 2013/02/21. <https://doi.org/10.1080/13623699.2012.743311> PMID: 23421305.
  49. Tol WA, Kohrt BA, Jordans MJ, Thapa SB, Pettigrew J, Upadhaya N, et al. Political violence and mental health: a multi-disciplinary review of the literature on Nepal. *Soc Sci Med*. 2010; 70(1):35–44. Epub 2009/10/17. <https://doi.org/10.1016/j.socscimed.2009.09.037> PMID: 19833427.
  50. Bolton P, Lee C, Haroz EE, Murray L, Dorsey S, Robinson C, et al. A transdiagnostic community-based mental health treatment for comorbid disorders: development and outcomes of a randomized controlled trial among Burmese refugees in Thailand. *PLoS Med*. 2014; 11(11):e1001757. Epub 2014/11/12. <https://doi.org/10.1371/journal.pmed.1001757> PMID: 25386945; PubMed Central PMCID: PMC4227644.
  51. Murray LK, Kane JC, Glass N, Skavenski van Wyk S, Melendez F, Paul R, et al. Effectiveness of the Common Elements Treatment Approach (CETA) in reducing intimate partner violence and hazardous alcohol use in Zambia (VATU): A randomized controlled trial. *PLoS Med*. 2020; 17(4):e1003056. Epub 2020/04/18. <https://doi.org/10.1371/journal.pmed.1003056> PMID: 32302308; PubMed Central PMCID: PMC7164585.
  52. Murray LK, Dorsey S, Haroz E, Lee C, Alsiary MM, Haydari A, et al. A Common Elements Treatment Approach for Adult Mental Health Problems in Low- and Middle-Income Countries. *Cogn Behav Pract*. 2014; 21(2):111–23. Epub 2015/01/27. <https://doi.org/10.1016/j.cbpra.2013.06.005> PMID: 25620867; PubMed Central PMCID: PMC4304666.
  53. Brady KT, Killeen TK, Brewerton T, Lucerini S. Comorbidity of psychiatric disorders and posttraumatic stress disorder. *J Clin Psychiatry*. 2000;61 Suppl 7:22–32. Epub 2000/05/05. PMID: 10795606.
  54. Greene T, Neria Y, Gross R. Prevalence, Detection and Correlates of PTSD in the Primary Care Setting: A Systematic Review. *J Clin Psychol Med Settings*. 2016; 23(2):160–80. Epub 2016/02/13. <https://doi.org/10.1007/s10880-016-9449-8> PMID: 26868222.
  55. World Health Organization. Global status report on alcohol and health. Geneva: World Health Organization, 2018.
  56. Pence BW, Shirey K, Whetten K, Agala B, Itemba D, Adams J, et al. Prevalence of psychological trauma and association with current health and functioning in a sample of HIV-infected and HIV-

- uninfected Tanzanian adults. *PloS One*. 2012; 7(5):e36304. Epub 2012/05/19. <https://doi.org/10.1371/journal.pone.0036304> PMID: 22606252; PubMed Central PMCID: PMC3351441.
57. Cuca YP, Shumway M, Machtinger EL, Davis K, Khanna N, Cocohoba J, et al. The Association of Trauma with the Physical, Behavioral, and Social Health of Women Living with HIV: Pathways to Guide Trauma-informed Health Care Interventions. *Womens Health Issues*. 2019; 29(5):376–84. Epub 2019/07/16. <https://doi.org/10.1016/j.whi.2019.06.001> PMID: 31303419; PubMed Central PMCID: PMC6755036.
  58. Brown MJ, Harrison SE, Li X. Gender Disparities in Traumatic Life Experiences and Antiretroviral Therapy Adherence Among People Living with HIV in South Carolina. *AIDS Behav*. 2019; 23(11):2904–15. Epub 2019/02/25. <https://doi.org/10.1007/s10461-019-02440-9> PMID: 30798459; PubMed Central PMCID: PMC6707907.
  59. Pence BW. The impact of mental health and traumatic life experiences on antiretroviral treatment outcomes for people living with HIV/AIDS. *J Antimicrob Chemother*. 2009; 63(4):636–40. Epub 2009/01/21. <https://doi.org/10.1093/jac/dkp006> PMID: 19153077; PubMed Central PMCID: PMC2654041.
  60. Ma PHX, Chan ZCY, Loke AY. Self-Stigma Reduction Interventions for People Living with HIV/AIDS and Their Families: A Systematic Review. *AIDS Behav*. 2019; 23(3):707–41. Epub 2018/10/10. <https://doi.org/10.1007/s10461-018-2304-1> PMID: 30298241.
  61. Pantelic M, Steinert JI, Park J, Mellors S, Murau F. 'Management of a spoiled identity': systematic review of interventions to address self-stigma among people living with and affected by HIV. *BMJ Global Health*. 2019; 4(2):e001285. Epub 2019/04/19. <https://doi.org/10.1136/bmjgh-2018-001285> PMID: 30997170; PubMed Central PMCID: PMC6441299.
  62. Fabian KE, Huh D, Kemp CG, Nevin PE, Simoni JM, Andrasik M, et al. Moderating Factors in an Anti-stigma Intervention for African American Women with HIV in the United States: A Secondary Analysis of the UNITY Trial. *AIDS Behav*. 2019; 23(9):2432–42. Epub 2019/06/21. <https://doi.org/10.1007/s10461-019-02557-x> PMID: 31218545; PubMed Central PMCID: PMC6860974.
  63. Yigit I, Modi RA, Weiser SD, Johnson MO, Mugavero MJ, Turan JM, et al. Effects of an intervention on internalized HIV-related stigma for individuals newly entering HIV care. *AIDS*. 2020; 34 Suppl 1:S73–s82. Epub 2020/09/04. <https://doi.org/10.1097/QAD.0000000000002566> PMID: 32881796.
  64. Woollett N, Cluver L, Bandeira M, Brahmabhatt H. Identifying risks for mental health problems in HIV positive adolescents accessing HIV treatment in Johannesburg. *J Child Adolesc Ment Health*. 2017; 29(1):11–26. Epub 2017/03/14. <https://doi.org/10.2989/17280583.2017.1283320> PMID: 28287023.
  65. Kinyanda E, Hoskins S, Nakku J, Nawaz S, Patel V. Prevalence and risk factors of major depressive disorder in HIV/AIDS as seen in semi-urban Entebbe district, Uganda. *BMC Psychiatry*. 2011; 11:205. Epub 2012/01/03. <https://doi.org/10.1186/1471-244X-11-205> PMID: 22208452; PubMed Central PMCID: PMC3260105.
  66. Tsai AC, Bangsberg DR, Frongillo EA, Hunt PW, Muzoora C, Martin JN, et al. Food insecurity, depression and the modifying role of social support among people living with HIV/AIDS in rural Uganda. *Soc Sci Med*. 2012; 74(12):2012–9. Epub 2012/04/20. <https://doi.org/10.1016/j.socscimed.2012.02.033> PMID: 22513248; PubMed Central PMCID: PMC3348339.
  67. Brittain K, Mellins CA, Phillips T, Zerbe A, Abrams EJ, Myer L, et al. Social Support, Stigma and Antenatal Depression Among HIV-Infected Pregnant Women in South Africa. *AIDS Behav*. 2017; 21(1):274–82. Epub 2016/04/08. <https://doi.org/10.1007/s10461-016-1389-7> PMID: 27052843; PubMed Central PMCID: PMC6116836.
  68. Yeji F, Klipstein-Grobusch K, Newell ML, Hirschhorn LR, Hosegood V, Bärnighausen T. Are social support and HIV coping strategies associated with lower depression in adults on antiretroviral treatment? Evidence from rural KwaZulu-Natal, South Africa. *AIDS Care*. 2014; 26(12):1482–9. Epub 2014/07/06. <https://doi.org/10.1080/09540121.2014.931561> PMID: 24991994.