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Depression, Anxiety and Stress among People Living with HIV from a Gender and Sexual Orientation Perspective: A Brazilian Cross-Sectional Study

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Abstract

Nearly 40 years after the beginning of the HIV epidemic and the remarkable biomedical advances that have enabled people living with HIV (PLHIV) to achieve a good quality of life and increased life expectancy, research in developed countries continues to indicate a high frequency of psychopathology among this population. However, little is known about the mental health problems of PLHIV in underdeveloped or developing countries, such as Brazil. This study aimed to assess the frequency of symptoms of depression, anxiety, and stress among PLHIV and to evaluate possible differences in these mental health problems according to gender and sexual orientation. This cross-sectional, quantitative study assessed 91 individuals living with HIV (mean age = 46.82) in a specialized health service within the Brazilian public health system. Data were collected using the Depression, Anxiety, and Stress Scale (DASS-21) and through clinical record analysis. A high frequency of anxiety (45.16%, 95%CI: 34.81-53.83%), stress (37.89%, 95%CI: 28.14-48.43%), and depression symptoms (29.35%, 95%CI: 20.31-39.76%) was found among participants. Being gay or bisexual was associated with higher levels of depressive symptoms and stress. No differences in psychopathology were found in terms of gender. Although the overall sample showed high rates of depression, anxiety, and stress symptoms, our findings indicate that gay and bisexual participants experienced greater severity of mental health problems.

Keywords: HIV, AIDS, depression, anxiety, stress

DEPRESSÃO, ANSIEDADE E ESTRESSE EM PESSOAS QUE VIVEM COM HIV SOB A PERSPECTIVA DE GÊNERO E ORIENTAÇÃO SEXUAL: UM ESTUDO TRANSVERSAL BRASILEIRO

Depressão, Ansiedade e Estresse em Pessoas que Vivem com HIV

Resumo

Quase 40 anos após o início da epidemia do HIV e dos notáveis avanços biomédicos que possibilitaram uma boa qualidade de vida e uma alta expectativa de vida, pesquisas em países desenvolvidos indicam uma alta frequência de psicopatologias entre pessoas vivendo com HIV (PVHIV). No entanto, pouco se sabe sobre a saúde mental dessa população em países subdesenvolvidos ou em desenvolvimento, como o Brasil. O objetivo deste estudo foi avaliar a frequência de sintomas de depressão, ansiedade e estresse em pessoas vivendo com HIV, bem como avaliar possíveis diferenças na frequência desses problemas de saúde mental de acordo com o gênero e orientação sexual. Trata-se de um estudo quantitativo transversal, no qual foram avaliadas 91 PVHIV (idade média: 46,82 anos) em um serviço especializado do sistema público de saúde brasileiro. Os dados foram coletados por meio da Escala de Depressão, Ansiedade e Estresse (DASS-21) e pela análise de prontuários clínicos. Encontramos uma alta frequência de sintomas de ansiedade (45,16%, IC95%: 34,81-53,83%), estresse (37,89%, IC95%: 28,14-48,43%) e depressão (29,35%, IC95%: 20,31-39,76%) entre as PVHIV avaliadas. Ser gay ou bissexual esteve associado níveis mais elevados de sintomas de depressão e estresse. Não encontramos diferenças de gênero nos indicadores de psicopatologias. Embora a amostra geral tenha apresentado altas taxas de sintomas de depressão, ansiedade e estresse, nossos resultados indicam que ser gay ou bissexual esteve associado a maior gravidade dos problemas de saúde mental em PVHIV brasileiros.

Palavras-chave: HIV, AIDS, depressão, ansiedade, estresse

DEPRESIÓN, ANSIEDAD Y ESTRÉS EN PERSONAS QUE VIVEN CON VIH DESDE UNA PERSPECTIVA DE GÉNERO Y ORIENTACIÓN SEXUAL: UN ESTUDIO TRANSVERSAL BRASILEÑO

Depresión, Ansiedad y Estrés en Personas que Viven con VIH

Resumen

Casi 40 años después del inicio de la epidemia del VIH y de los notables avances biomédicos que han permitido una buena calidad de vida y alta expectativa de vida, investigaciones en países desarrollados indican una alta frecuencia de psicopatologías entre las personas que viven con VIH (PVVIH). Sin embargo, se sabe poco sobre la salud mental de esta población en países subdesarrollados o en desarrollo, como Brasil.

El objetivo de este estudio fue evaluar la frecuencia de síntomas de depresión, ansiedad y estrés en personas que viven con VIH, así como analizar las posibles diferencias en estos problemas de salud mental según el género y la orientación sexual. Se trata de un estudio cuantitativo de corte transversal, en el que se evaluaron 91 PVVIH (edad media: 46,82 años) en tratamiento en un servicio especializado del sistema público de salud brasileño. Los datos se recolectaron mediante la Escala de Depresión, Ansiedad y Estrés (DASS-21) y el análisis de registros clínicos. Encontramos una alta frecuencia de síntomas de ansiedad (45,16%; IC95%: 34,81–53,83%), estrés (37,89%; IC95%: 28,14–48,43%) y depresión (29,35%; IC95%: 20,31–39,76%). Ser gay o bisexual predijo mayores niveles de síntomas depresivos y de estrés. No se observaron diferencias significativas en indicadores de psicopatologías según el género. A pesar de las altas tasas generales de síntomas de depresión, ansiedad y estrés, los resultados indican que ser gay o bisexual fue un factor importante asociado a mayor gravedad de los problemas de salud mental PVVIH en Brasil.

Palabras clave: VIH, SIDA, depresión, ansiedad, estrés

Nearly four decades after the onset of the HIV epidemic, HIV/AIDS remains a major public health concern (Benzaken et al., 2019; Joint United Nations Programme on HIV/AIDS [UNAIDS], 2022). In 2021, approximately 38.4 million people were living with HIV/AIDS, and about 1.5 million individuals were newly diagnosed that year (UNAIDS, 2022). Between 2007 and 2022, Brazil reported 434,803 HIV infections, with the southern region presenting a rate of 9.9% and accounting for 16.9% of new cases (Brasil, 2023). The epidemic remains concentrated among "key populations," a term used by leading global health authorities to describe groups with a higher risk of infection due to barriers in accessing prevention, diagnosis, and treatment. These populations include gay men and other men who have sex with men (MSM), transgender individuals, and sex workers (World Health Organization [WHO], 2024).

From a global perspective, MSM are approximately 26 times more likely to be infected with HIV than the general population (WHO, 2024). Despite the global decline in HIV prevalence, rates among key populations continue to rise (WHO, 2024). For example, Leal et al. (2024) compared the results of two epidemiological studies on HIV in Brazil (2009 vs. 2016) and found that HIV prevalence among MSM increased from 11.9% to 19.1%, with an even greater rise among low-income MSM. Several biomedical advances, including the simplification of HIV diagnostic strategies, the development of highly effective antiretroviral drugs with lower toxicity, and more convenient treatment regimens, have transformed HIV into a chronic and manageable condition in most cases. The progress achieved in HIV/AIDS treatment is considered one of the greatest successes in modern medicine, as the life expectancy of people living with HIV (PLHIV) is now comparable to that of the general population. With adequate adherence to antiretroviral therapy and the adoption of healthy lifestyle habits, most individuals can maintain good physical health and a high quality of life without major medical complications (May et al., 2014; Trickey et al., 2023).

However, despite these biomedical advances, several studies indicate that PLHIV experience higher levels of psychological distress and other mental health problems, largely due to the effects of HIV-related stigma (Nakimuli-Mpungu et al., 2021). Recent research has found that HIV-related stigma is associated with increased symptoms of depression and anxiety (Dave, 2024), as well as chronic stress, which can impair adaptive functioning, life satisfaction, and overall quality of life (Lam et al., 2019). Systematic reviews consistently show that HIV-related stigma is linked to poorer mental health outcomes, reduced utilization of health services, and lower adherence to antiretroviral therapy (Gesesew et al., 2017; Rueda et al., 2016; Sweeney & Vanable, 2016).

Studies indicate that adequate adherence to antiretroviral therapy can reduce HIV levels in an individual's blood plasma to the point of preventing transmission, even in serodiscordant sexual relationships without the use of preventive methods (Rodger et al., 2016; Rodger et al., 2019). Consequently, consistent treatment that achieves and maintains an undetectable viral load is a key strategy for interrupting the chain of transmission and controlling the HIV/AIDS epidemic worldwide (UNAIDS, 2023). In addition, maintaining an undetectable viral

load significantly reduces the severity of HIV-related illness and mortality. This improvement is associated with a marked decrease in chronic immune system activation and persistent inflammation, processes that are also linked to lipid disorders, cardiovascular disease, and premature aging (Hunt, 2012; Stein & Hsue, 2012). Mental health problems represent a significant risk factor for PLHIV, as they can hinder adherence to antiretroviral therapy (ART), which, in turn, is associated with increased viral load levels and greater transmissibility (Nogueira et al., 2019). Psychopathologies, particularly depression, are among the main factors contributing to inadequate ART adherence and treatment discontinuation (Alckmin-Carvalho et al., 2024; Safren et al., 2021). Therefore, regularly assessing the mental health of PLHIV, providing care for those experiencing psychological difficulties, and implementing interventions to reduce HIV-related stigma are essential strategies for achieving the Joint United Nations Programme on HIV/AIDS (UNAIDS, 2024) goal of ending the HIV/AIDS epidemic: identifying 95% of cases early, ensuring adequate adherence in 95% of those diagnosed, and achieving an undetectable viral load in 95% of PLHIV receiving treatment.

Therefore, controlling the HIV/AIDS epidemic requires understanding the key barriers and facilitators that influence the achievement of an undetectable viral load—a critical indicator of both individual and community-level progress in HIV treatment—which includes addressing psychological distress among PLHIV. Although international studies have shown that the prevalence of depression among PLHIV ranges from 30% to 54% (Azhar et al., 2023; Barradas, 2025; Bernabe Jr et al., 2022; Den Boer et al., 2025; Nakimuli-Mpungu et al., 2021), there is limited research on the prevalence of mental disorders among PLHIV in less developed countries, such as Brazil.

The relevance of this study is particularly significant in the context of underdeveloped and developing countries, where social inequalities, HIV-related stigma, and limited access to mental health care continue to pose substantial barriers to the well-being of PLHIV (Alckmin-Carvalho et al., 2024; Azhar et al., 2023; Barradas, 2025; Brandelli Costa et al., 2024; Lam et al., 2019). In contrast to developed countries, where the relationship between mental health and HIV has been more extensively examined, there is a lack of systematic data on the prevalence of psychopathological symptoms among this population in contexts of greater socioeconomic vulnerability. By identifying sociodemographic variables associated with higher levels of depression, anxiety, and stress among PLHIV, this study seeks to deepen understanding of the multiple layers of vulnerability that affect the mental health of this population in Brazil. Furthermore, it provides evidence to inform public policies and clinical practices aimed at integrating psychological care into specialized HIV services, thereby promoting more equitable interventions that are responsive to local realities.

The general objective of this study was to assess the frequency of symptoms of depression, anxiety, and stress among PLHIV receiving treatment in a specialized HIV/AIDS unit of the Brazilian public health system. The specific objectives were: (a) to examine potential differences in psychological distress between heterosexual and non-heterosexual individuals; (b) to examine

potential differences in psychological distress between men and women; and (c) to explore associations between gender, sexual orientation, and psychological distress among PLHIV.

Method

Study design and setting

This quantitative, cross-sectional study was conducted at a public HIV/AIDS specialized healthcare service in the city of Francisco Beltrão, located in the state of Paraná, southern Brazil. Francisco Beltrão is a medium-sized city with a population of 96,666 inhabitants, according to the most recent census by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística [IBGE], 2025) and has a Human Development Index (HDI) of 0.774, classified as high. This study is nested within a longitudinal research project titled "*Monitoring People Living with HIV/AIDS in the Southwestern Region of Paraná*," which is following the sample from 2019 to 2029. To date, no longitudinal analyses have been published.

Participants and procedures

All patients receiving care at the specialized HIV/AIDS treatment unit who were aged 18 or older, regardless of gender or sexual orientation, were invited to participate in the study. The exclusion criteria specified that individuals with physical or cognitive impairments preventing them from understanding the study objectives or the questions in the psychological assessment instrument were not eligible. However, all individuals met the inclusion criteria, and no cases were excluded.

Data were collected between 2019 and 2022 at a health institution specializing in HIV/AIDS diagnosis and treatment, in a private setting during intervals between medical consultations. A team of medical and graduate students from a Brazilian public university, trained by the last author (PhD in Psychology), conducted the data collection. Participants completed the instruments manually, and the process took approximately 15 minutes.

Instruments

Sociodemographic questionnaire: information was collected on gender, age, marital status, educational level, sexual orientation and income. The time elapsed since HIV diagnosis was obtained from participants' medical records.

Depression, Anxiety, and Stress Scale (DASS-21): Originally developed by Lovibond and Lovibond, 1995 and validated in its 21-item version for Brazilian Portuguese by Vignola & Tucci (2013), this instrument assesses self-reported signs and symptoms of depression, anxiety, and stress. The DASS-21 is based on the tripartite model, which identifies distinct factors for each condition, as well as a shared factor that can inform personalized treatment approaches (Lovibond & Lovibond, 1996; Vignola & Tucci, 2014). The 21 items are divided into three subscales: depression (items 3, 5, 10, 13, 16, 17, 21); anxiety (items 2, 4, 7, 9, 15, 19, 20); and stress (items 1, 6, 8, 11, 12, 14, 18). Responses are rated on a four-point Likert scale ranging from 0 (Did not

apply to me at all) to 3 (Applied to me very much or most of the time). Total scores range from 0 to 63 points, with each subscale ranging from 0 to 21 points. Higher scores indicate a greater frequency of signs and symptoms of depression, stress, and anxiety. The frequency of clinically significant symptoms was determined using cut-off points established for the DASS-21 (Vignola & Tucci, 2013), classifying participants as having normal/minimal or clinically significant (moderate to very severe) symptoms. The internal consistency of the instrument in this study was excellent ($\alpha = 0.94$).

Statistical analysis and ethical considerations

Data were analyzed using IBM SPSS Statistics, version 29. All analyses adopted a significance threshold of $p < .05$, unless otherwise specified. Descriptive statistics were calculated for all study variables. Given the non-normal distribution of the outcome variables (depression, anxiety, and stress), confirmed through Shapiro–Wilk tests and visual inspection of histograms, robust descriptive indicators were reported, including medians, interquartile ranges (IQR), and 95% confidence intervals for the median, estimated via bootstrapping with 10,000 samples.

To compare symptom scores across binary categories (e.g., gender and sexual orientation), nonparametric Mann–Whitney *U* tests were applied. Effect sizes (*r*) were calculated for all comparisons using the formula $r = |Z| / \sqrt{N}$, with interpretation based on conventional thresholds: small ≈ .10, medium ≈ .30, large ≥ .50.

For comparisons involving three groups based on the combination of gender and sexual orientation (heterosexual men, non-heterosexual men, and heterosexual women), Kruskal–Wallis tests were conducted. When the omnibus test yielded statistically significant results, pairwise Mann–Whitney tests were performed using Bonferroni-adjusted alpha values ($\alpha = .0167$) to control for Type I error inflation due to multiple comparisons.

Finally, to examine whether gender–orientation group membership was associated with the severity of depression, anxiety, and stress symptoms, multiple linear regression analyses were conducted. The group variable was dummy-coded into two binary predictors (non-heterosexual men and heterosexual women), with heterosexual men serving as the reference category. Only participants with complete data for both gender and sexual orientation were included in these analyses ($n = 76$). Standardized coefficients (β) were reported as measures of effect size in the regression models, along with adjusted R^2 values. The study was approved by the Research Ethics Committee of the Universidade Estadual do Oeste de Paraná (CAAE: 22273419.4.0000.0107, approval No. 3.611.523, October 1, 2019). All participants provided informed consent in accordance with Brazilian legislation and the principles of the Declaration of Helsinki.

Results

The sample comprised 91 people living with HIV, with a mean age of 46.82 (SD = 14.24, range = 21–80). Most participants (55.7%) had completed at least high school, 67.1% reported earning more than one minimum wage, and 78.8% were sexually active. The majority were

heterosexual (72.7%) and male (59.8%), and 56.4% were single. Time since HIV diagnosis was evenly distributed: 49.3% had been diagnosed for up to nine years, whereas 50.7% had lived with HIV for ten years or more. The mean age at diagnosis was 34.88 (SD = 14.90, range = 15–67). Additional demographic information is presented in Supplementary Table 1.

As shown in Table 1, stress presented the highest median score (7, IQR = 2–12), followed by anxiety (4, IQR = 1–10) and depression (3, IQR = 0–8). The wide interquartile ranges and broad 95% confidence intervals for each median indicate substantial variability in symptom severity among participants.

Table 1

Robust descriptive statistics for depression, anxiety, and stress symptoms (n = 91)

Outcome	Score range	Median	IQR (Q1 – Q3)	Min	Max	95% CI (Median)
Depression	0 – 21	3	0 – 8	0	21	1 – 5
Anxiety	0 – 21	4	1 – 10	0	20	3 – 5
Stress	0 – 21	7	2 – 12	0	21	4 – 9

Note: IQR = interquartile range; CI = confidence interval (bootstrap, 10,000 samples).

Regarding severity levels, anxiety symptoms had the highest proportion of participants scoring in the moderate to very severe range. Depression was the least prevalent; however, nearly one-third of participants reported at least moderate symptoms. Stress was also common, affecting more than one-third of the sample. Full severity classifications are presented in Supplementary Table 2.

To examine potential differences in symptom scores by gender and sexual orientation, Mann–Whitney *U* tests were conducted (Table 2). No statistically significant differences emerged between men and women. In contrast, non-heterosexual participants reported significantly higher depression and stress scores compared with heterosexual participants, with medium effect sizes (r = .26 and r = .29, respectively). No significant differences were observed for anxiety. These results underscore disparities in psychological distress affecting non-heterosexual individuals.

Table 2

Mann–Whitney comparisons of depression, anxiety and stress by gender and sexual orientation

Outcome	Men (n = 52)	Women (n = 35)	U	p	r	Heterosexual (n = 56)	Non-HT† (n = 21)	U	p	r
Depression	43.42	44.86	897.0	.913	.01	35.77	50.67	389.0	.021	.26
Anxiety	42.31	46.81	837.0	.528	.07	38.62	39.98	562.5	.774	.03
Stress	41.70	47.12	861.0	.674	.05	35.05	50.48	365.5	.011	.29

Note: U = Mann–Whitney statistic; r = |Z| / √N (small ≈ .10, medium ≈ .30, large ≥ .50). † Non-HT = gay or bisexual participants.

Participants were grouped into four categories based on gender and sexual orientation: heterosexual women, non-heterosexual women, heterosexual men, and non-heterosexual men. The non-heterosexual women group was excluded from further analysis due to having only one participant (n = 1), which precluded valid group-level comparisons. Table 3 presents the results for the remaining three groups.

Table 3

Kruskal–Wallis tests for depression, anxiety and stress by gender–orientation group

Outcome	Heterosexual Women (n = 31)	Heterosexual Men (n = 25)	Non-Heterosexual Men (n = 20)	H(2)	p	ε^2
Depression	38.06	32.18	47.08	5.28	.071	.045
Anxiety	40.18	35.64	39.48	0.64	.725	.000
Stress	38.00	31.02	48.63	7.13	.028	.070

Note: ε^2 ≈ .01 (small), .06 (medium), .14 (large).

As shown, only stress symptoms differed significantly between groups ($H(2)$ = 7.13, p = .028). Depression approached statistical significance, whereas anxiety showed no significant group differences. Pairwise comparisons for stress are presented in Table 4.

Table 4

Pairwise Mann–Whitney tests for stress (Bonferroni-adjusted α = .0167)

Comparison	U	p	r
Heterosexual Men × Non-Heterosexual Men	139.0	.011	.38
Heterosexual Women × Non-Heterosexual Men	218.5	.077	.25
Heterosexual Women × Heterosexual Men	311.5	.208	.17

To further investigate the observed patterns, multiple linear regression analyses were conducted using a three-level group variable (reference group: heterosexual men). Due to missing

data and the exclusion of one non-heterosexual woman, the regression analyses were performed on a subsample of 76 participants with complete information. Table 5 presents the results.

Table 5

Linear regressions of depression, anxiety, and stress from gender–orientation group (n = 76)

Outcome	Predictor (ref = heterosexual men)	B	SE	β	t	p	Adjusted R^2
Depression	Non-heterosexual men	3.65	1.60	.30	2.29	.025	.05
	Heterosexual women	0.61	1.43	.06	0.42	.673	
Anxiety	Non-heterosexual men	1.59	1.58	.14	1.01	.317	−.01
	Heterosexual women	0.86	1.41	.08	0.61	.545	
Stress	Non-heterosexual men	4.41	1.87	.31	2.36	.021	.05
	Heterosexual women	1.10	1.68	.09	0.66	.513	

Note: B = unstandardized coefficient; β = standardized coefficient (small ≈ .10, medium ≈ .30, large ≥ .50).

Non-heterosexual men reported significantly higher levels of both depression and stress compared with heterosexual men. No statistically significant differences were found between heterosexual women and heterosexual men. The models explained approximately 5% of the variance in depression and stress scores, while no significant variance was explained for anxiety. These findings align with the nonparametric results and underscore a specific vulnerability among non-heterosexual men in this sample. The dummy-coded variable allowed comparisons across three groups, with heterosexual men serving as the reference category. Only participants with complete data on sex and sexual orientation were included in the analyses.

Discussion

The aim of this study was to assess the frequency and severity of symptoms of depression, anxiety, and stress among people living with HIV, as well as to examine potential differences in psychological distress by gender and sexual orientation. In terms of median scores, stress symptoms were more prominent than depression and anxiety. However, when symptom severity was considered, anxiety emerged as the most prevalent, with 46.2% of the sample presenting moderate to severe symptoms. No significant differences were found between men and women, whereas non-heterosexual individuals reported a higher frequency of symptoms compared with heterosexuals. When the sample was stratified by gender and sexual orientation, gay and bisexual men continued to show the highest scores.

Frequency and Severity of Psychological Distress among PLHIV

Research has shown that PLHIV are more likely to experience mental health disorders than the general population (Cherevko & Mudrenko, 2024; McKinnon et al., 2021). In our study, 29.35% of participants presented depressive symptoms ranging from moderate to severe. In comparison, a Brazilian survey estimated a depression prevalence of 10.2% in the general population, reaching

15.2% in the southern region (Brito et al., 2022). Consistently higher rates have been reported among PLHIV, such as 29.2% in Fortaleza (Pinho et al., 2022), 25.8% among women living with HIV in São Paulo (Mello et al., 2010), 42.3% in São Paulo (Reis et al., 2017), and 61% among newly diagnosed individuals in Dourados (Nomoto et al., 2015). Research in northeastern Brazil also found that 42% of PLHIV had depressive symptoms and 19% had moderate to severe anxiety (Silva et al., 2021). These variations likely reflect differences in study populations, instruments, and stages of HIV diagnosis.

We found a higher frequency of anxiety compared to stress and depression, a pattern also observed in other Brazilian studies. For example, generalized anxiety disorder was reported in 21.3% of PLHIV in outpatient clinics (Santana et al., 2019), and anxiety symptoms were observed in 25.2% of participants in Northeast Brazil (Cunha et al., 2024). The higher frequency of anxiety in this population may be explained by factors identified in national studies: (1) HIV-related stigma and fear of discrimination, which generate constant anticipatory stress and concern about social rejection (Cunha et al., 2024); (2) uncertainty regarding disease progression and treatment side effects, which can heighten anxiety, particularly in patients initiating ART (Campos et al., 2006); (3) overlapping social vulnerabilities, such as low income and unemployment (Santana et al., 2019), and (4) the psychological impact of receiving an HIV diagnosis, especially in the early years, when acute anxiety responses are more common (Campos et al., 2010). Anxiety may manifest more prominently than depression in some contexts because it reflects ongoing hypervigilance and perceived threat, whereas depression often develops as a longer-term emotional response to chronic challenges.

International studies also show marked variability, such as more than 60% depression and over 40% anxiety among Chinese PLHIV between 1998 and 2014 (Niu et al., 2016), and 51.7% and 41.4% for depression and anxiety, respectively, in the Philippines (Bernabe Jr et al., 2022). These discrepancies may be linked to population differences and assessment tools, underscoring the need for standardized methods to allow better comparisons across settings.

Research on stress among PLHIV remains limited. In Malaysia, a retrospective study of 329 patients using the DASS-21 found that 22% experienced significant symptoms of depression, anxiety, and stress, with 37.89% showing moderate to severe stress (Meng Li et al., 2020). In contrast, Agyemang et al. (2022) reported 10.6% stress among 395 patients, suggesting wide variation across settings and measurement approaches.

The Role of Gender and Sexual Orientation in the Mental Health of PLHIV

Contrary to our hypothesis, there were no significant differences between men and women in symptoms of depression, anxiety, and stress. Although Garriga et al. (2020) found greater psychological distress among women living with HIV, the authors emphasized that social conditions must be considered, as similar contexts may lead to comparable levels of distress across genders. Evidence suggests that men and women experience distress through distinct mechanisms (Zungu et al., 2023; Moges et al., 2021): in men, unemployment and alcohol

consumption are often linked to worse mental health outcomes, whereas in women, reduced social support and multiple caregiving responsibilities exert greater influence (Garriga et al., 2020; Fumaz et al., 2019). HIV-related stigma can further exacerbate emotional distress and hinder access to treatment and psychological support (Brandelli Costa et al., 2024). In our study, the fact that participants were already receiving treatment and had access to adequate healthcare may have attenuated potential gender differences.

Gender norms may also discourage men from reporting symptoms, potentially leading to an underestimation of depression, anxiety, and stress (Mommersteeg et al., 2023). Thus, the absence of statistical significance should be interpreted cautiously, as men and women may still experience mental health challenges differently depending on contextual factors.

Regarding sexual orientation, our hypothesis was confirmed: gay or bisexual men living with HIV showed higher psychological distress than heterosexual men and women, and were more likely to report greater levels of depression and stress. These findings align with recent evidence showing that sexual minorities living with HIV are more vulnerable to mental health problems due to social marginalization, discrimination, and stigma (Alckmin-Carvalho et al., 2024; Krueger et al., 2020; Berlin et al., 2024). HIV-related stigma has a particularly strong negative impact, increasing depression, anxiety, and distress levels even among treatment-adherent individuals (Alckmin-Carvalho et al., 2024; Akyrem et al., 2024). This relationship can be understood through Meyer's Minority Stress Theory (2003), which proposes that chronic exposure to prejudice and discrimination generates persistent stress, heightening vulnerability to mental health disorders.

Limitations and future directions

Although we believe we have met our objectives, we must acknowledge the limitations of this study. Its cross-sectional design precludes establishing causal relationships between gender, sexual orientation, and other sociodemographic variables and psychological distress among PLHIV. While no significant differences were observed between men and women, the sample size may have limited our ability to detect more subtle gender-related effects. In contrast, we did observe significant differences according to sexual orientation, but these findings should be interpreted cautiously given the relatively small convenience sample, recruited from a single public healthcare unit specializing in HIV care, which limits external validity. Therefore, generalizations to other populations should be made with caution. Additionally, given the number of statistical comparisons, residual Type I error inflation cannot be ruled out; although post-hoc tests used Bonferroni adjustment, results should still be interpreted carefully.

The use of a self-report instrument to assess symptoms of depression, anxiety, and stress may have introduced response bias, including potential underreporting, particularly among men due to gender norms around emotional expression. We recommend replication studies with larger and more diverse samples across different regions of Brazil. Longitudinal designs would be essential to clarify temporal relationships between gender, sexual orientation, HIV-related

stigma, and mental health outcomes. Future research should also examine potential associations between mental health indicators, adherence to antiretroviral treatment, and viral load, as well as employ qualitative approaches to explore how individual and social factors shape mental health experiences among PLHIV in the Brazilian context.

Final Considerations

This study found a high frequency of depression, anxiety, and stress symptoms among people living with HIV (PLHIV) in Brazil. While no significant differences emerged between men and women, gay or bisexual men showed markedly higher levels of psychological distress. These findings are consistent with previous evidence on the influence of stigma, social vulnerability, and the emotional impact of recent HIV diagnosis, underscoring the need for targeted actions for these groups.

The results suggest that public health policies addressing HIV in Brazil must go beyond the biomedical control of the infection. Mental health care should be systematically integrated into specialized HIV services, ensuring screening, prevention, and treatment for depression and anxiety. This includes training healthcare teams to provide sensitive, stigma-free care, expanding access to psychologists and psychiatrists within the public health network, and implementing robust anti-stigma initiatives.

Given the high frequency of psychological distress, especially among socially vulnerable groups, promoting mental health must be seen as an essential part of comprehensive HIV care. Investing in this area not only improves adherence to antiretroviral therapy and enhances quality of life but also strengthens the Unified Health System's commitment to human rights and the dignity of PLHIV.

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