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Anxiety and Social Functioning among People Living with HIV/AIDS (PLWHA) in Pakistan: A Cross-Sectional Study

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Abstract

Background: Anxiety is a prevalent psychological comorbidity among people living with HIV/AIDS (PLWHA), contributing to impair social functioning and reduced quality of life. In resource-limited settings like Pakistan, stigma, discrimination, and inadequate mental health support further exacerbate these challenges. This study examines the impact of anxiety on social functioning in PLWHA compared to HIV-negative individuals and explores anxiety as a potential mediator in this relationship.

Method: A cross-sectional design was employed, recruiting 200 participants (100 PLWHA, 100 HIV-negative) aged 20–50 years using convenience sampling. Demographic and clinical data, including CD4 count, disclosure status, HIV transmission category, and emotional disturbances, were collected through structured clinical interviews. Anxiety was assessed using the Institute for Personality and Ability Testing (IPAT) Anxiety Scale, and social functioning was measured using the Global Assessment of Functioning (GAF) Scale.

Results: HIV-positive individuals exhibited significantly higher anxiety levels than their HIV-negative counterparts ($p < .001$), with women showing greater anxiety than men ($p < .01$). Mediation analysis revealed that anxiety significantly mediated the relationship between HIV status and social functioning, indicating that HIV-negative individuals had lower anxiety and better social functioning. Higher anxiety levels were associated with impaired social skills, fewer social interactions, and difficulties in interpersonal relationships.

Conclusion: This study highlights the critical need for mental health interventions to enhance psychological well-being and social functioning among PLWHA. Addressing HIV-related stigma, strengthening social support networks, and integrating mental health care into HIV treatment programs are essential for improving outcomes. These findings underscore the importance of comprehensive, culturally tailored interventions, particularly in low- and middle-income countries like Pakistan, where stigma and limited mental health resources exacerbate social and psychological challenges.

Keywords: Anxiety, HIV/AIDS, social functioning, symptomatic stage, psychological distress.

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Background

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) continue to pose significant public health challenges worldwide. According to recent estimates, approximately 39 million people globally were living with HIV/AIDS by the end of 2022 (UNAIDS, 2023). Despite advancements in antiretroviral therapy (ART) and preventive measures, the psychosocial burden of the disease remains substantial, particularly in developing countries such as Pakistan. The intersection of HIV/AIDS with mental health concerns, including anxiety and social functioning, is increasingly recognized as a critical area for research and intervention (Allel et al., 2022; Ji et al., 2024; Madiba et al., 2021; National Institute of Mental Health, 2023; Parcesepe et al., 2018; Samarasekera, 2022; Twinomugisha et al., 2020; Varni et al., 2012; Zhang et al., 2023; Shehzad et al., 2023; Bint-e-Saif & Shahzad, 2023).

The prevalence of HIV/AIDS in Pakistan has witnessed an alarming rise in the last two decades, with an estimated 210,000 people currently living with the disease (Ahmed et al., 2021; Elsfoury et al., 2024). The majority of cases are reported in Punjab and Sindh provinces, with key populations such as injecting drug users, sex workers, and transgender individuals being disproportionately affected (Ahmad et al., 2024; Ji et al., 2024). A study conducted at the Pakistan Institute of Medical Sciences (PIMS) found that anxiety and depression were highly prevalent among people living with HIV/AIDS (PLWHA), with anxiety affecting 80.3% of the sample (Ahmed et al., 2021). Psychological distress among PLWHA is often exacerbated by stigma, social isolation, and inadequate social support systems, further compromising adherence to ART and overall health outcomes (Ji et al., 2024; Oti et al., 2024; Zhang et al., 2023).

Anxiety disorders are among the most common psychiatric comorbidities in PLWHA, with global estimates ranging from 15.5% to as high as 68.2% (Ji et al., 2024; Ahmed et al., 2021). In Pakistan, limited mental health services and societal stigma surrounding both HIV and psychological disorders contribute to an underestimation of these issues. Low levels of social support, particularly from friends and extended family, have been associated with increased psychological distress and poorer quality of life (Oti et al., 2024; Ji et al., 2024; Shehzad et al., 2023). Studies indicate that PLWHA who receive adequate social support are more likely to adhere to ART, experience lower levels of anxiety, and report better overall well-being (Ahmad et al., 2024; Ji et al., 2024; Bint-e-Saif & Shahzad, 2023).

The Biopsychosocial Model (BPSM) offers such a framework by explaining the dynamic interplay among biological, psychological, and social factors in the development of mental health issues. From a biological perspective, the progression of HIV/AIDS, its opportunistic infections, and the side effects of antiretroviral therapy contribute directly to physical deterioration and indirectly to psychological distress (World Health Organization, 2022). Psychologically, the diagnosis and management of HIV/AIDS often trigger cognitive and emotional responses, with anxiety emerging as a common and impactful response that undermines relationships and overall quality of life (Zhang et al., 2023). Socially, factors such as stigma, discrimination, social isolation, and inadequate access to healthcare critically shape the mental health outcomes of PLWHA.

Social Support Theory (SST) further underscores the protective role of robust social networks in mitigating the negative impacts of HIV/AIDS (Cohen & Groman, 2008).Within the Pakistani cultural context, where traditional and Islamic values predominate, misconceptions about HIV/AIDS and its etiology persist. A dearth of knowledge and awareness fuels the widespread belief that immoral sexual behaviors are the sole means of transmission. This misconception not only exacerbates the psychological complexities associated with HIV/AIDS but also leads to fragmented social connections and disrupted supportive networks.

Despite increasing recognition of mental health concerns among PLWHA in Pakistan, research on the relationship between anxiety and social functioning remains limited. Given the rising prevalence of HIV/AIDS and its psychological impact on treatment adherence and quality of life, it is crucial to examine the psychosocial determinants of well-being in this population. This study explores the association between anxiety and social functioning, emphasizing anxiety's mediating role in this relationship. It is hypothesized that HIV-positive individuals will exhibit higher anxiety levels than HIV-negative individuals, with newly diagnosed PLWHA experiencing greater anxiety than those in the late symptomatic stage (AIDS). Additionally, HIV-positive women are expected to report higher anxiety than HIV-positive men**.** HIV-positive individuals are also expected to have lower social functioning scores on the Global Assessment of Functioning (GAF) Scale compared to HIV-negative individuals. This study aims to provide a comprehensive framework for understanding the interplay of biological, psychological, and social factors in shaping mental health outcomes among PLWHA by integrating epidemiological data with the Biopsychosocial Model (BPSM). Findings will inform targeted interventions to mitigate anxiety, enhance social support, and improve overall psychosocial well-being in resource-limited settings like Pakistan.

Method

Research Design

This study employs a cross-sectional research design using a convenience sampling technique to examine the impact of anxiety on social functioning among PLWHA compared to HIV-negative individuals. It further investigates anxiety as a potential mediator in this relationship. The study hypothesizes that HIV-positive individuals will exhibit higher anxiety levels than HIV-negative individuals, with newly diagnosed PLWHA experiencing greater anxiety than those in the late symptomatic stage (AIDS). Additionally, HIV-positive women are expected to report higher anxiety levels than HIV-positive men**.** Furthermore, HIV-positive individuals are anticipated to demonstrate lower social functioning on the Global Assessment of Functioning (GAF) Scale compared to their HIV-negative counterparts**.**

Sampling and Participants

This cross-sectional study recruited a total of 200 adults aged 20–50 years from Peshawar and Islamabad, Pakistan. Participants were divided into two groups: 100 HIV-positive individuals (50 males, 50 females) and 100 HIV-negative individuals (50 males, 50 females). The sample was selected using a convenience sampling method. Inclusion criteria required that participants be clinically diagnosed as either HIV-positive or HIV-negative, aged 20–50 years, and able to provide informed consent. Exclusion criteria included individuals with severe psychiatric disorders, neurological impairments, or any comorbid chronic illnesses that could influence anxiety levels or social functioning.The sample size was determined using G*Power 3.1.9.7 software, with an effect size (f^2) of 0.15, $\alpha = 0.05$, and power $(1-\beta) = 0.80$, ensuring sufficient statistical power for detecting significant differences and mediation effects in the study.

Instruments

In-Depth Structured Clinical Interview

A structured clinical interview was conducted to obtain comprehensive demographic, medical, and psychosocial information from both HIV-positive and HIV-negative participants**.** The interview included key domains such as educational background, personal and medical history, sexual behavior placing individuals at risk, work history, social support networks, trauma history, and substance use history**.** A mental status examination was also performed to assess behavior, appearance, mood, affect, speech, thought processes, perception, motivation, insight, judgment, impulse control, cognition, attention, and memory. This approach ensured a thorough psychological and clinical assessment, allowing for a standardized evaluation of participants' overall mental health status.

Institute for Personality and Ability Testing (IPAT) Anxiety Scale Questionnaire

The IPAT Anxiety Scale (Cattell & Scheier, 1963) is a widely validated psychological assessment tool designed to measure overt and covert anxiety across diverse populations. This 40-item questionnaire evaluates five core anxiety subcomponents**,** including low self-control, emotional instability, suspicion, apprehension, and tension**.** The scale is applicable to individuals aged 14 years and above and is particularly suitable for mass screening in populations with varying education levels. It demonstrates strong psychometric properties**,** with a reliability coefficient of .93 and construct validity ranging from .85 to .90**.** The IPAT Anxiety Scale has been validated for use in the Pakistani population (Ahmed et al., 2021; Sultan et al., 2021) and is commonly employed in clinical and research settings to assess anxiety levels in individuals with and without HIV/AIDS**.** Its standardized format enhances the reliability and consistency of anxiety assessments in this study.

Global Assessment of Functioning (GAF) Scale

The Global Assessment of Functioning (GAF) Scale (Jones et al., 1995) was utilized to assess social, psychological, and occupational functioning among participants. This 100-point scale categorizes functioning into 10-point intervals, with scores ranging from 91–100 (indicating no psychological or social impairment) to 1–10 (reflecting severe impairment in psychological, social, and occupational domains). Scores above 65 indicate mild dysfunction, while scores below 50 denote significant impairment. The GAF scale enables a quantitative assessment of overall social functioning, facilitating a systematic exploration of the relationship between anxiety and social impairment among PLWHA. Its structured scoring system ensures a reliable and valid evaluation of participants' ability to engage in daily social interactions and occupational roles.

Procedure and Ethical Considerations

Participants were selected based on demographic characteristics to maintain homogeneity within the study groups. Individuals were approached individually in hospital settings for recruitment. Data collection was conducted following ethical guidelines, with approval obtained from the Institutional Review Board (IRB) and formal authorization from relevant government organizations, including the National AIDS Control Programme, National Institute of Health Islamabad, and the Provincial AIDS Control Programme Headquarters.

Before participation, written informed consent was obtained from all participants and institutional directors. The consent process included a detailed explanation of the study objectives, data confidentiality, participant rights, potential risks and benefits, and the right to withdraw at any stage without consequences. To ensure ethical compliance, participants' identities and medical information were kept strictly confidential, and all data were anonymized before analysis. A comprehensive physical and mental-status examination was conducted through an in-depth clinical interview, assessing the history, duration, intensity, and possible causes of anxiety symptoms. Relevant medical and psychosocial information related to the participants' HIV status was documented. Following this, the IPAT Anxiety Scale and Global Assessment of Functioning (GAF) Scale were administered individually to each HIV-positive participant in hospital settings. The same assessment protocol was followed for HIV-negative participants in similar settings to maintain standardization and comparability in data collection.

Results

Data Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 27**.** The results are presented in the following tables and discussed in relation to the study's hypotheses.

Participant Characteristics

The analysis revealed that the mean age of HIV-positive participants was 35.81 years**, i**ndicating a relatively young sample population. In terms of marital status, the majority of participants were married (66.5%), while 21.3% were single, 11% were widowed, and 1% were separated**.** Regarding HIV transmission categories**,** heterosexual contact was identified as the most prevalent mode of transmission, accounting for 65.7% of cases, followed by unknown transmission routes (20.1%)**,** intravenous drug use (8.1%)**,** blood transfusion (5.1%)**,** and homosexual contact (1%)**.**Clinically, 67% of participants exhibited symptomatic HIV infection**,** while 33% were asymptomatic**.** Analysis of CD4 counts indicated that 52.5% of participants had CD4 levels between 200 and 499/mm^3**,** 33.3% had levels of 500/mm^3 or higher**,** and 14.1% had CD4 counts below

200/mm³, suggesting advanced immunosuppression in a subset of the population. Additionally, only 36% of participants had disclosed their HIV status, while the majority **(**64%**)** remained undisclosed. These findings are summarized in Table 1**.**

Anxiety among HIV-positive people and HIV-negative people

The study's findings indicate that individuals diagnosed as HIV-positive exhibit significantly higher levels of anxiety, as measured by the IPAT-Anxiety Scale Questionnaire, compared to HIV-negative individuals. Statistical analysis revealed that the mean anxiety score for the HIV-positive group (M = 8.49, SD = 1.46) was substantially greater than that of the HIV-negative group (M = 6.79, SD = 1.97). This difference was statistically significant, t(198) = 6.84, p < .001, with a large effect size (Cohen's d = 0.97), suggesting a robust association between HIV status and anxiety levels. These findings highlight the elevated prevalence of anxiety symptoms among individuals living with HIV. A detailed summary of the mean differences and t-test results is presented in Table 2.

Anxiety among Newly Diagnosed HIV-positive people and HIV-positive with Symptomatic Stage (AIDS)

The analysis yielded non-significant results when comparing anxiety levels between newly diagnosed HIV-positive individuals and those in the symptomatic stage (AIDS). These findings suggest that individuals in both stages experience anxiety symptoms at comparable levels, indicating that anxiety may be a common psychological response across different stages of HIV progression.

Gender Difference in the Experience of Anxiety among HIV-positive Sample

The study findings indicate a significant gender difference in anxiety levels among HIV-positive individuals. Specifically, HIV-positive women reported significantly higher levels of anxiety compared to HIV-positive men, as detailed in Table 3.

Differences in Social Functioning Between HIV-Positive and HIV-Negative Individuals

The study findings indicate that individuals living with HIV (PLWHA) exhibit significantly lower levels of social functioning compared to their HIV-negative counterparts. As presented in Table 4, the HIV-positive group demonstrated a lower mean Global Assessment of Functioning (GAF) score (M = 6.25), suggesting moderate to severe impairment in social and occupational activities. In contrast, the HIV-negative group had a higher mean GAF score (M = 7.78), indicating better overall functioning. This difference was statistically significant (**p** < .001) and was associated with a large effect size (Cohen's *d* = -1.29), highlighting the substantial negative impact of HIV on social functioning.

Sociodemographic and Clinical Predictors of Global Assessment of Functioning (GAF)

A stepwise multiple regression analysis was conducted to identify significant predictors of Global Assessment of Functioning (GAF) scores. In the first step, HIV status was entered as a predictor and was found to significantly predict GAF scores (B = 1.600, p < .001), accounting for 29.7% of the variance (R^2 = .297). Participants who were HIV-negative demonstrated significantly higher GAF scores, indicating better overall functioning. In the second step, anxiety was added to the model, significantly improving its predictive capacity. Both HIV status (B = 1.168, p < .001) and anxiety (B = −0.038, p < .001) emerged as significant predictors, collectively explaining 37.9% of the variance (R^2 = .379). Higher levels of anxiety were associated with lower GAF scores, reflecting poorer social and occupational functioning. In the final step, gender and age were included in the model. While HIV status (B = 1.181, p < .001) and anxiety (B = −0.038, p < .001) remained significant predictors, neither gender (B = 0.026, p = .878) nor age (B = 0.007, p = .550) significantly contributed to the model. The addition of these variables resulted in only a marginal increase in the explained variance to 38.0% (R^2 = .380).These findings suggest that HIV status and anxiety are key determinants of social and occupational functioning, while gender and age do not significantly influence GAF scores.

A mediation analysis was conducted to examine whether anxiety (measured by the IPAT total score) mediates the relationship between HIV status and Global Assessment of Functioning (GAF), controlling for age and gender. Using PROCESS Model 4 (Hayes, 2018) with 5,000 bootstrap samples and a 95% confidence interval, results indicated a significant total effect of HIV status on GAF (b = 1.62, t(196) = 9.13, p < .001), with HIV-negative individuals exhibiting higher functional outcomes. After adjusting for anxiety, the direct effect of HIV status on GAF remained significant (b = 1.18, SE = 0.19, t(195) = 6.24, p < .001), suggesting that HIV-negative status independently predicts better social and occupational functioning. The indirect effect of HIV status on GAF via anxiety was also significant (b = 0.44, 95% CI [0.23, 0.67]), as the confidence interval did not include zero. Specifically, HIV-negative status was associated with significantly lower anxiety levels (b = −11.65, t(196) = −7.37, p < .001), and lower anxiety levels correlated with higher GAF scores (b = −0.04, t(195) = −4.98, p < .001). These findings indicate partial mediation, suggesting that while HIV-negative status directly contributes to better functioning, its positive impact is partially explained by reduced anxiety levels.

In figure 1, these findings indicate that while HIV-negative status directly predicts improved functional outcomes, its effect is partially mediated by reduced anxiety, further strengthening this relationship. The mediation model explained 24.97% of the variance in anxiety and 38.02% of the variance in Global Assessment of Functioning (GAF) scores.

Table 1

Demographic and Clinical Characteristics of HIV-positive people (N = 100)

Variable	f	%	M
Age (Mean)			35.81
Marital Status (%)			
Single		21.3	
Married		66.5	
Widowed		11	
Separated		1	
HIV Transmission Category			
Heterosexual	65	65.7	
Homosexual	1	1	
IVDUs	8	8.1	
Blood Transfusion	5	5.1	
Unknown Transmission	20	20.1	
Clinical Category			
Asymptomatic		33	
Symptomatic		67	
CD4 Counts (/mm³)			
< 200		14.1	
200-499		52.5	
500 and above		33.3	
HIV status Disclosure			
Disclosed		36	
Not Disclosed		64	

Note. f = Frequency, M = Mean

Table 2

Mean differences of HIV-positive people and HIV-negative people on IPAT anxiety scale (N = 200)

Group	N	M	SD	t	Cohen's d
HIV-positive	100	8.49	1.46	6.84***	.97
HIV-negative	100	6.79	1.97		

Note. N = sample size; M = mean; SD = standard deviation; Cohen's d = effect size. *** *p<.001, ***p< .001*

Table 3

Mean Differences in Anxiety Scores between HIV-Positive Women and Men on the IPAT Anxiety Scale (N = 100)

Group	*N*	*M*	*SD*	*t*	*Cohen's d*
HIV-positive men	50	8.00	1.61	3.52	-
HIV-positive women	50	8.98	1.11		

Note. N = sample size; M = mean; SD = standard deviation; Cohen's d = effect size. *** *p<.001*.

Table 4

Mean differences of HIV-positive and HIV-negative people on the GAF scale (N = 200)

Group	*N*	*M*	*SD*	*t*	*Cohen's d*
HIV-positive	100	6.25	1.17	9.09***	-1.29
HIV-negative	100	7.78	1.20		

Note. N = sample size; M = mean; SD = standard deviation; Cohen's d = effect size. *** *p<.001*.

Table 5

Hierarchal Regression Analysis Predicting Global Assessment Functioning (GAF) (N = 200).

Predictor	B	S. E	t	95% confidence interval		p-value
				Lower	Upper	
Model 1						
HIV status	1.60	.17	9.13	1.25	1.94	.001
Model 2						
HIV status	1.16	.18	6.30	.80	1.53	.001
Anxiety (IPAT total)	-.03	.00	-5.11	-.05	-.02	.001
Model 3						
HIV status	1.18	.18	6.23	.80	1.55	.001
Anxiety (IPAT total)	-.03	.01	-4.97	-.05	-.03	.001
Gender	.02	.17	.15	-.31	.36	.87
Age	.01	.01	.59	-.01	.02	.55

Note. R^2 = 29.7% for Model 1; R^2 = 37.9% for Model 2; R^2 = 38.0% for Model 3. CI = Confidence Interval, $p < .001$.

Table 6

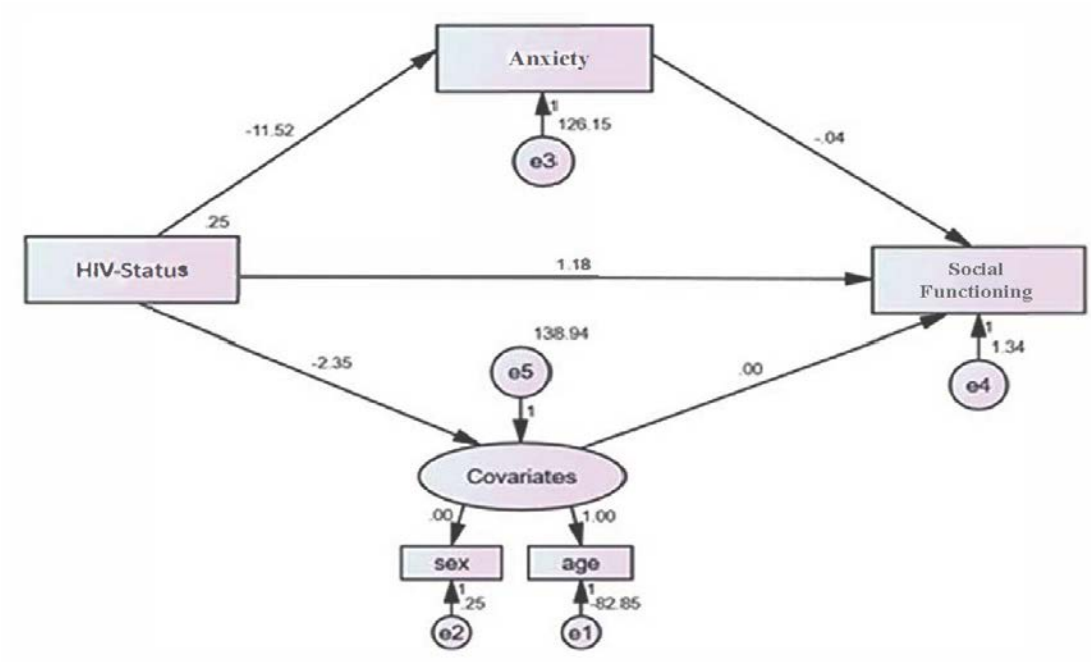
Mediating Role of Anxiety in the Relationship between HIV Status and Global Assessment of Functioning (GAF) (N = 200).

	Anxiety (Mediator)				GAF (DV)			
	B	SE	p	95% CI LL to UL	B	SE	p	95% CI LL to UL
HIV (IV)	-11.65	1.58	.001	-14.76 to -8.53	1.18	0.18	.001	.80 to 1.55
Anxiety (M)					-.03	.01	.001	-.05 to -.02
Gender	5.12	1.56	.001	2.03 to 8.20	.02	.17	.87	-.30 to .36
Age	-.054	.10	.60	-.25 to .15	.01	.01	.54	-.01 to .02
	R^2 = 24.97%				R^2 = 38.02%			

Note. CI = confidence interval; LL = lower limit; UL = upper limit; IV = independent variable (HIV status); DV = dependent variable (GAF); M = mediator (Anxiety, IPAT Total). ***p* < *.001*.

Figure 1

Structural Equation Model Depicting the Mediating Role of Anxiety in the Relationship between HIV Status and Global Assessment of Functioning (GAF)



Discussion

The present study examined the association between anxiety and social functioning among people living with HIV/AIDS (PLWHA) in Pakistan, with a specific focus on the mediating role of anxiety in the relationship between HIV status and social functioning. Additionally, it explored variations in anxiety and social functioning between newly diagnosed HIV-positive individuals and those in the symptomatic stage (AIDS).

Statistical analyses indicated that PLWHA experienced significantly higher levels of anxiety compared to HIV-negative individuals ($t = 6.849$, $df = 198$, $p < .001$; Table 2), supporting the first hypothesis. These findings align with previous research demonstrating elevated anxiety levels among HIV-positive individuals relative to control groups (Cai et al., 2020; Demirel et al., 2018). The heightened anxiety observed in PLWHA can be attributed to multiple factors, including psychosocial stressors, disease severity, and comorbid medical conditions. Literature suggests that individuals diagnosed with life-threatening illnesses often experience anxiety, coupled with apprehension and shame regarding their condition (Dolezal, 2022). Newly diagnosed individuals, in particular, may experience distress related to disclosing their status to family and friends, leading to social withdrawal due to the pervasive stigma associated with HIV/AIDS. This social isolation, occurring at a time when individuals require support and care, exacerbates psychological distress (Dolezal, 2022; Hult et al., 2012).

The progression of HIV/AIDS further contributes to increased anxiety levels. The chronic and potentially fatal nature of the disease fosters heightened anxiety, which may lead to avoidance of medical consultations and nonadherence to treatment regimens (Ji et al., 2024; Cohen & Gorman, 2008). Fear of disease progression, irrational beliefs about mortality, and general anxiety concerning death are frequently reported among PLWHA. The uncertainty surrounding HIV/AIDS and its treatment often results in persistent psychological distress, with several studies identifying death anxiety as a major contributor to reduced coping abilities in this population (Miller et al., 2012; King et al., 2021). Additionally, physical deterioration due to opportunistic infections, CD4 count depletion, and concerns about disclosure further intensify anxiety symptoms (Chandra et al., 2003; Cohen & Gorman, 2008). Collectively, these factors—including HIV-related stigma, fear of disclosure, disease progression, and medical complications interact to elevate anxiety levels, which in turn impair overall social functioning.

The study also examined differences in anxiety levels between newly diagnosed HIV-positive individuals and those in the symptomatic stage (AIDS). Although higher anxiety levels were observed among newly diagnosed individuals, the difference was not statistically significant ($t = -1.335$, $df = 98$, $p > .05$; Table 2). While previous research suggests that anxiety persists throughout the course of HIV infection (Blalock et al., 2005b), studies present mixed findings regarding its trajectory over time. For instance, Huang et al. (2020) reported that psychological distress among PLWHA tends to decrease longitudinally, whereas Yousuf et al. (2020) found that women in the advanced clinical stage of HIV exhibited heightened anxiety symptoms. These discrepancies underscore the complexity of anxiety progression in PLWHA and suggest that individual differences and contextual factors may play a role.

The study further hypothesized a gender-based disparity in anxiety levels among PLWHA. Consistent with this hypothesis, women exhibited significantly higher anxiety levels than men ($t = -3.529$, $df = 98$, $p < .01$; Table 3). This disparity may stem from sociocultural and structural inequalities, including caregiving responsibilities, pregnancy-related concerns, and widowhood due to an infected spouse. These findings are consistent with prior research indicating that HIV-positive women experience greater psychological distress than their male counterparts (Hafeez, 2018).

Another key finding of the study was the significant difference in social functioning between PLWHA and HIV-negative individuals, as measured by the Global Assessment of Functioning (GAF) scale ($t = -9.099$, $df = 198$, $p < .001$; Table 4). HIV-positive individuals exhibited lower levels of social functioning, consistent with previous studies (Peltzer et al., 2015; Fleishman et al., 2000). The decline in social functioning among PLWHA is influenced by HIV-related stigma, discrimination (Parcesepe et al., 2019), and inadequate social support (Armoon et al., 2022b). Furthermore, self-avoidance strategies such as social withdrawal and behavioral disengagement—often employed to mitigate rejection—may contribute to diminish social functioning. Prior research has demonstrated that these coping mechanisms are significant predictors of both poor social functioning and elevated anxiety in PLWHA (Ahmed et al., 2021).

Regression and mediation analyses further confirmed the mediating role of anxiety in the relationship between HIV status and social functioning (Tables 5 & 6). Stepwise multiple regression analysis revealed that both HIV status and anxiety were significant predictors of social functioning, with HIV-negative individuals demonstrating better social functioning. Notably, gender and age did not significantly enhance the predictive model, suggesting that these variables may not exert substantial influence on social functioning outcomes in this context. These findings align with previous research highlighting anxiety as a key determinant of social functioning in PLWHA (Ji et al., 2024). Additional studies have emphasized the importance of psychological resilience and social support in mitigating anxiety and improving social outcomes in this population (Sun et al., 2023; Zhang et al., 2023). These findings underscore the potential benefits of targeted interventions aimed at reducing anxiety and fostering supportive social environments for PLWHA.

Limitations

Several limitations of the study should be acknowledged. First, the sample size was relatively small and may not fully represent the broader HIV-infected population of Pakistan, limiting the generalizability of findings. Additionally, the study relied on convenience sampling, selecting participants from registered hospitals in Peshawar and Islamabad due to logistical constraints. This recruitment approach may have introduced selection bias and restricted external validity. Furthermore, while the study incorporated qualitative data through structured interviews, its primary reliance on quantitative methods may have limited a comprehensive understanding of participants' lived experiences. Lastly, the sensitivity surrounding HIV/AIDS stigma led to participant reluctance, which may have influenced self-report measures and study participation rates.

Implications

The findings of this study have important implications for mental health interventions targeting PLWHA in Pakistan. Specifically, the results highlight the need for psychosocial interventions that address HIV-related stigma, enhance social support systems, and alleviate distress linked to self-blame and internalized shame. Mental health professionals and policymakers should prioritize comprehensive support systems that integrate psychological, social, and medical care to improve the well-being and social functioning of PLWHA.

Conclusion

This study provides critical insights into the interplay between HIV/AIDS, anxiety, and social functioning. Findings indicate that PLWHA experience significantly higher levels of anxiety, with women reporting greater distress than men. The study underscores the detrimental impact of stigma, discrimination, and inadequate social support on both anxiety and social functioning among HIV-positive individuals. The mediation analysis further emphasizes the role of anxiety as a key mechanism through which HIV status influences social outcomes. Given these findings, there is an urgent need for culturally tailored interventions that address the mental health needs of PLWHA, particularly in low- and middle-income countries (LMICs). These interventions should focus on reducing social stigma, strengthening support networks, and providing accessible mental health services. Despite its limitations, this study makes a valuable contribution to the existing literature by elucidating the complex relationship between HIV/AIDS, anxiety, and social functioning, emphasizing the need for holistic and integrated approaches to HIV care.

Ethical Considerations

The study was reviewed and approved by the Ethics Review Committee of the relevant government organizations, including the National AIDS Control Programme, National Institute of Health Islamabad, and the Provincial AIDS Control Programme Headquarters. Written informed consent was obtained from all participants before data collection, ensuring voluntary participation. Participants were informed of their right to withdraw from the study at any stage without any consequences. The study adhered to the ethical principles outlined in the Declaration of Helsinki (2013) and followed the ethical guidelines established by the American Psychological Association (APA, 2017). All collected data were anonymized and kept confidential, ensuring compliance with data protection regulations.

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Availability of Data and Materials

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request, ensuring compliance with data-sharing policies.

Authors' Contributions

Dr. Ishrat Yousaf and all other authors conducted the research and they were responsible for data collection and analysis, while other team members provided guidance in conceptualization, methodology, and manuscript preparation. All authors contributed to the final manuscript and approved its submission.

Competing Interests Statement

The authors declare no conflicts of interest regarding the publication of this article.

COPE Compliance Statement

This study complies with the ethical standards outlined by the Committee on Publication Ethics (COPE). The authors affirm that the work is original, free from fabrication, falsification, and plagiarism. All necessary permissions for data collection and participant inclusion were obtained, and the study does not involve any unethical practices.

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