

The Relationships Between Internalized Stigma, Depression, and Health-Related Quality of Life in Individuals Living with HIV



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ABSTRACT

Objective: This study aims to examine the relationship between internalized stigma (IS) and depression, and treatment adherence and health-related quality of life (HRQL) in people living with HIV.

Method: This cross-sectional study included 75 consecutive individuals living with HIV who had been diagnosed at least three months prior and volunteered to participate. Participants completed a sociodemographic data form, the Berger HIV Stigma Scale, the Beck Depression Inventory (BDI), the Modified Morisky Treatment Adherence Scale, and the Short Form-36/HRQL Scale. Relationships between variables were evaluated using correlation analyses. Variables affecting the HRQL subscales were examined using multiple linear regression analyses. Statistical significance was considered achieved when $p < 0.05$.

Results: IS showed significant positive correlations with depressive symptoms ($p = 0.003$), and significant negative correlations with social functioning and pain. The BDI score was found to be significantly and negatively associated with all subscales of HRQL ($p < 0.001$). In multiple regression analyses, the BDI was identified as a significant predictor of all quality of life subscales ($p \leq 0.01$), while IS was not a direct significant predictor ($p > 0.05$). Further analysis using the bootstrap method revealed that the relationships between the IS and HRQL subscales were statistically significant, along with the level of depression.

Conclusion: This study demonstrated a strong and consistent association between depression levels and HRQL in individuals living with HIV. Although IS was not directly related to quality of life, it showed a significant pattern when considered in conjunction with depression levels. The findings highlight the importance of considering psychological symptoms and stigma experiences in the clinical follow-up of individuals living with HIV.

Keywords: depression, HIV, internalized stigma, quality of life, treatment adherence

INTRODUCTION

The Human Immunodeficiency Virus (HIV) is a major global public health issue and remains one of the leading causes of illness and death worldwide (Frank et al. 2019). According to the 2023 report by the Joint United Nations Programme on HIV/AIDS (UNAIDS), an estimated 39 million people worldwide were living with HIV in 2022, and 1.3 million new cases were reported that same year. Although a definitive cure for HIV infection has not yet been found, the disease can be effectively managed with antiretroviral therapy (ART),

enabling people living with HIV to lead long and healthy lives. UNAIDS aims to reach more people living with HIV to increase access to diagnosis and treatment and contribute to the global fight against HIV (JUNPo 2023). Previous studies have shown that adherence to ART among people living with HIV is associated with various factors, including gender, route of transmission, self-sufficiency, social support, depression, and HIV-related stigma (Wang and Wu 2007, Jiang et al. 2019, Lai et al. 2022). These psychosocial factors often co-occur and interact in ways that influence adherence

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to ART. The literature indicates that factors such as stigma—while present in all cultures—may pose greater challenges in developing countries with predominantly Muslim populations and may prevent at-risk individuals in these countries from seeking counseling, getting tested, or accessing treatment services (Hasnain 2005).

Meta-analyses indicate that individuals who are more exposed to HIV-related stigma tend to experience higher viral loads, impaired mental well-being, lower quality of life, reduced treatment adherence, and limited access to healthcare services (Katz et al. 2013, Rueda et al. 2016). HIV-related stigma can manifest in various forms (internalized stigma (IS), anticipated stigma, experienced stigma, and perceived stigma) (McHenry et al. 2017, Crowley et al. 2021). Internalized stigma (the process by which individuals adopt negative beliefs and incorporate them into their self-concept) has been shown to be closely associated with cognitive and psychological challenges such as depression, and in some cases even synonymous with them (Pantelic et al. 2019), which can negatively impact overall health outcomes (Tian et al. 2021).

Health-related quality of life (HRQoL) among individuals living with HIV remains significantly lower than that of the general population, even among those who have achieved viral suppression (Drewes et al. 2013). HRQoL is a multidimensional construct encompassing physical, cognitive, emotional, and social functioning (Clayson et al. 2006). The primary factors affecting quality of life in people living with HIV include: employment status of the individual, advanced age, immune status, the level of HIV-related symptoms, adherence to treatment, the presence of social support, and exposure to depression and stigma (Ballester-Arnal et al. 2016). This aligns with the syndemic theory, which posits that multiple health or social problems arise simultaneously, negatively influence one another, and further deteriorate the individual's health (Singer et al. 2017, Satyanarayana et al. 2021). However, studies have mostly focused on the cumulative effects of syndemic factors; the relationship between these factors and HRQoL has not been sufficiently examined (Tsai and Venkataramani 2016, Mustanski et al. 2017). The association between ART adherence, internalized stigma, and depression with health-related quality of life highlights the need to address these areas together in clinical assessment and follow-up processes.

This study aims to examine the relationships between internalized stigma (IS), depression, treatment motivation, and HRQoL in individuals living with HIV. The following hypotheses were tested in the study: Internalized stigma will be positively associated with higher levels of depressive symptoms. Depression will negatively predict the subdimensions of HRQoL. Treatment motivation will be positively associated with both physical and psychological

quality of life. When controlling for internalized stigma, depression level, and sociodemographic variables, treatment motivation will significantly predict the subdimensions of quality of life. By testing these hypotheses, the study aims to better understand the relationships between stigma, depression, and quality of life among individuals living with HIV and to contribute to psychosocial support interventions based on these findings.

METHOD

Participants

The study was reviewed and approved by the Ordu University Ethics Committee for Non-Interventional Scientific Research under Decision No. 2024/206. Informed consent was obtained from all participants prior to their inclusion in the study. All phases of the research were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. This cross-sectional study was conducted on consecutive patients who presented to the Infectious Diseases and Clinical Microbiology Outpatient Clinic between January and June 2025.

In line with our hypothesis that internalized stigma significantly predicts the subdimensions of quality of life when controlling for depression levels and sociodemographic variables, the sample size for this study was determined using an a priori power analysis for multiple regression-based correlational analyses. The power analysis was conducted using G*Power 3.1.9.6 software for a multiple linear regression model based on the significance of R^2 in the fixed model. Under the assumptions of a medium effect size ($f^2=0.25$), a 5% significance level ($\alpha=0.05$), and 90% statistical power ($1-\beta=0.90$), the minimum sample size was calculated to be 63. The study included adults aged 18 and older who were under follow-up for a confirmed HIV infection for at least three months and who voluntarily agreed to participate. Individuals under the age of 18, those who were illiterate, and those who had been diagnosed with HIV less than three months prior were excluded from the study.

Study Design

A total of 83 individuals who met the inclusion criteria and provided written informed consent were included in the study. Face-to-face interviews were conducted with all participants, and they were provided with both verbal and written information about the study's purpose, content, and procedures. Participants were asked to complete the Sociodemographic Data Form, the Modified Morisky Medication Adherence Scale (MMAS), the Berger HIV-Related Stigma Scale (Berger-HRSS), the Beck Depression Inventory (BDI), and the Short Form-36 Health-Related

Quality of Life Scale (SF-36/HRQOL). After excluding those with incomplete responses, 75 participants who had fully completed all scales were included in the final analysis.

Measurement Tools

Sociodemographic Data Form

The research team developed a sociodemographic data form to collect detailed information about the participants. The form included questions regarding age, gender, marital status, educational level, employment status, history of alcohol use, the presence or absence of perceived emotional or physical social support, the time elapsed since the HIV diagnosis, history of previous psychiatric treatment, and history of comorbid medical conditions.

Berger HIV-Related Stigma Scale (Berger-HRSS)

The HIV Stigma Scale, developed by Berger and colleagues, is designed to assess the level of HIV-related stigma perceived by individuals living with HIV (Berger et al. 2001). It is one of the most frequently used tools in HIV/AIDS-related stigma research. It is a 4-point Likert-type scale ranging from “strongly disagree” to “strongly agree.” The Turkish version of the scale consists of 39 items. This self-report scale includes four subscales: Internalized Stigma, Concerns About Social Attitudes, Negative Self-Image, and Concerns About Disclosure. Scoring these subscales separately was deemed appropriate, and higher scores were associated with higher levels of stigma. Scores on the Internalized Stigma subscale range from 16 to 64, on the Concerns About Social Attitudes subscale from 12 to 48, on the Negative Self-Perception subscale from 9 to 36, and on the Concerns About Coming Out subscale from 8 to 32. The Turkish version of the scale has demonstrated acceptable levels of validity and reliability (Yıldız et al. 2021).

Modified Morisky Medication Adherence Scale

The original Morisky scale was developed by Morisky and colleagues to help family physicians assess adherence to antihypertensive medications (Morisky et al. 1986). A study on the validity and reliability of the Turkish version of the Modified Morisky Medication Adherence Scale which was developed by adding two additional items to assess patients' knowledge and motivation regarding chronic medication use has been conducted (Vural et al. 2012). The scale consists of 6 items answered in a binary (Yes/No) format. Items 2 and 5 are scored as 1 for “Yes” and 0 for “No,” while the remaining items are scored as 1 for ‘No’ and 0 for “Yes.” Motivation is assessed using items 1, 2, and 6: a total score of 0–1 indicates low motivation, while a score of 2–3 indicates high motivation. Knowledge is assessed using items 3, 4, and 5: a score of 0–1 indicates low knowledge, while a score of 2–3

indicates high knowledge. In our study, treatment motivation and level of treatment knowledge were treated as two separate variables and were categorized based on the scores obtained, specifically, as having or lacking treatment motivation and having or lacking treatment knowledge, and included in the statistical analysis.

Beck Depression Inventory (BDI)

The Beck Depression Inventory, developed by Aaron T. Beck, is a widely used self-report instrument designed to measure the severity of depressive symptoms (Beck et al. 1961). It consists of 21 multiple-choice questions, each scored on a scale of 0 to 3, with total scores ranging from 0 to 63. Scores of 0–9 indicate minimal depressive symptoms, 10–16 indicate mild depressive symptoms, 17–29 indicate moderate depressive symptoms, and 30–63 indicate severe depressive symptoms. The scale has been validated and found to be reliable in Turkish, and it is frequently used in both clinical and field studies in Türkiye (Hisli 1989).

Short Form-36 Health-Related Quality of Life Scale (SF-36/HRQOL)

The Short Form-36 Health-Related Quality of Life Scale (SF-36/HRQOL) was used to assess HRQoL. Developed by Ware and Sherbourne, the SF-36 is a widely used self-report scale designed to assess health-related quality of life in both clinical practice and research, including public health surveys and health policy evaluations. The scale consists of eight subscales: physical functioning, physical role difficulty, emotional role difficulty, energy/vitality, social functioning, pain, mental health, and overall health. Each domain is scored on a scale of 0 to 100, with higher scores reflecting better quality of life (Ware Jr and Sherbourne 1992). The Turkish version of the SF-36 was validated by Koçyigit and colleagues and has been widely used in clinical and epidemiological studies in Türkiye (Kocuyigit 1999).

Statistical Analysis

Statistical analyses were performed using IBM Statistical Package for Social Sciences (SPSS) program version 23 and R software. Descriptive statistics for continuous variables are presented as the mean $\pm$ standard deviation or the median (min–max), while those for categorical variables are presented as frequency and percentage (n, %).

The normality of the continuous variables was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. In comparisons involving two independent groups, the independent samples t-test was used for variables that show a normal distribution, and the Mann-Whitney U test was used for data that did not follow a normal distribution.

In comparisons involving three or more groups, one-way analysis of variance (ANOVA) was used for variables that followed a normal distribution, and post-hoc comparisons were performed using the Tukey test. For variables that did not show a normal distribution, the Kruskal-Wallis H test was used, and the Dunn test was used for multiple comparisons. Relationships between categorical variables were assessed using Fisher's exact test and the Monte Carlo-corrected Fisher's exact test, taking into account cases where expected cell frequencies were low.

Relationships between continuous variables were analyzed using appropriate correlation coefficients based on the measurement scale and distribution characteristics of the variables. The relationship between two continuous variables that show a normal distribution was assessed using the Pearson correlation coefficient, while the Spearman's rho correlation coefficient was used when at least one variable did not show a normal distribution. The point-biserial correlation coefficient was used to assess the relationships between a continuous variable and a dichotomous variable. The tetrachoric correlation coefficient was calculated based on the assumption that the relationship between the two dichotomous variables reflects the underlying continuous and normally distributed latent structures of these variables.

Since the variables related to treatment motivation and level of treatment knowledge showed high levels and limited variability (ceiling effect) in the sample, they were not included in further analyses.

Multiple linear regression analyses were conducted to identify the variables that predict the quality of life subscales. The significance of the models was assessed using the F-test, and the level of explanatory power was evaluated using the adjusted R^2 coefficient. In addition, a mediation analysis was conducted to assess the indirect relationships between internalized stigma and quality of life. Indirect relationships were calculated using the bootstrap method (5,000 samples) with 95% confidence intervals.

A p-value of less than 0.05 was considered statistically significant.

RESULTS

Sociodemographic and Clinical Characteristics of the Participants

Descriptive statistics for the variables are presented in Table 1. The majority of participants were men and currently employed. None of the participants reported substance use. All participants reported that they had been informed about HIV by healthcare professionals and were regularly taking ART.

Table 1. Descriptive statistics of the variables

	Mean $\pm$ SD	Median (min-max)
Age	44.31 $\pm$ 11.31	44 (24–65)
Age at HIV diagnosis	40.99 $\pm$ 10.89	41 (21–63)
	Frequency	Percent
Gender		
Female	12	16
Male	63	84
Marital status		
Married	35	46.7
Single	26	34.7
Divorced/widowed	14	18.7
Lives with		
Alone	12	16
Family	59	78.7
Friend	4	5.3
Educational Level		
Primary school	26	34.7
Secondary school	12	16
High school	18	24
Higher education/bachelor's degree or higher	19	25.3
Employment status		
Employed	45	60
Not employed	14	18.7
Retired	14	18.7
Student	2	2.7
Cigarette Smoking		
None	42	56
Yes	33	44
Alcohol consumption		
None	64	85.3
Yes	11	14.7
Duration of treatment		
3–6 months	17	22.7
6–12 months	18	24
12–36 months	19	25.3
More than 36 months	21	28
Social support		
None	20	26.7
Yes	55	73.3
Psychiatric support		
None	57	76
Yes	18	24
Complaint regarding HIV		
None	23	30.7
Yes	52	69.3
Mode of transmission		
Sexually transmitted	35	46.7
Blood/treatment	5	6.7
Unknown	35	46.7
Chronic disease		
None	47	62.7
Yes	28	37.3

Table 2. Descriptive statistics for scale scores

Variable	mean $\pm$ SD	Median (min-max)
Berger-HRSS		
Internalized stigma	34.45 $\pm$ 11.54	36 (16–58)
Concerns regarding social attitudes	31.99 $\pm$ 7.69	32 (13–45)
Negative self-perception	20.93 $\pm$ 5.7	21 (10–32)
Concerns about disclosure	20.45 $\pm$ 4.78	20 (11–30)
Beck Depression Inventory (BDI)	16.41 $\pm$ 12.11	15 (0–45)
SF-36/HRQOL		
Physical functioning	76.53 $\pm$ 23.65	80 (0–100)
Physical role difficulty	65.2 $\pm$ 38.95	75 (0–100)
Emotional role difficulty	58.25 $\pm$ 35.21	67 (0–100)
Energy/vitality	56.71 $\pm$ 20.64	60 (5–95)
Mental health	64.64 $\pm$ 18.21	68 (8–96)
Social functioning	72.57 $\pm$ 23.59	75 (13–100)
Pain	73.87 $\pm$ 29.66	80 (0–100)
Overall health	54.6 $\pm$ 21.53	55 (5–95)

Berger-HRSS: Berger HIV Related Stigma Scale; SF-36/HRQOL: Short Form-36 Health-Related Quality of Life Scale; SD: standard deviation.

Descriptive Statistics for Scale Scores

The mean $\pm$ SD and median (min–max) scores for the Berger-HRSS subscales, BDI, and SF-36/HRQOL subscales of the 75 participants are presented in Table 2.

Comparison of Internalized Stigma Scores by Sociodemographic Variables

A comparison of internalized stigma scores by categorical variables is presented in Table 3.

Correlations Between Scale Scores

The relationships between the IS score, the Beck Depression Inventory (BDI) score, the other subscales of the Berger-HRSS, and the SF-36/HRQOL subscales were examined using correlation analyses. The relationships between scale scores (correlation coefficients) are presented in Table 4.

Multiple Regression Analyses

Multiple regression analyses were conducted to assess the relationships between SF-36/HRQOL subscale scores and IS, depression, gender, and marital status. The models established for each subscale were found to be statistically significant ($F(6,68)=2.94-8.05$, all $p < 0.05$), and the models' explanatory power ranged from $R^2=0.21$ to 0.42 .

Beck Depression Inventory served as a negative and statistically significant predictor across all SF-36/HRQOL subscales (β ranging from -0.35 to -0.56 ; $p \leq 0.01$). In contrast, internalized stigma was not identified as a direct significant predictor in any of the models ($p > 0.05$). The

Table 3. Comparison of internalized stigma scores by categorical variables

	mean ± SD	Median (min-max)	Test Statistics	p
Gender			181.500	0.005 ^x
Female	25.67±10.17	20 (16–42)		
Male	36.13±11.08	38 (16–58)		
Marital status			3.230	0.045 ^y
Married	32.57±10.52 ^b	33 (16–54)		
Single	33.31±10.5 ^{ab}	34.5 (16–52)		
Divorced/Widowed	41.29±13.94 ^a	43.5 (16–58)		
Educational level			1.143	0.338 ^y
Primary School	36.46±13.68	38.5 (16–58)		
Secondary School	30.83±10.74	32 (17–48)		
High School	31.89±9.09	34 (16–44)		
Higher education/ bachelor's degree or higher	36.42±10.68	38 (17–54)		
Duration of treatment			1.684	0.178 ^y
3–6 months	35.71±11.88	38 (17–58)		
6–12 months	38.56±10.47	39 (16–55)		
12–36 months	30.42±11.11	32 (16–54)		
More than 36 months	33.57±11.95	36 (16–54)		
Social support			2.154	0.035 ^z
None	39.1±11.15	40.5 (16–58)		
Yes	32.76±11.31	33 (16–54)		
Psychiatric support			-0.697	0.488 ^z
None	33.93±11.69	34 (16–58)		
Yes	36.11±11.21	37.5 (18–54)		
Complaints related to HIV			-1.385	0.170 ^z
None	31.7±10	32 (16–52)		
Yes	35.67±12.05	38 (16–58)		

^x Mann-Whitney U test; ^y One-way analysis of variance; ^z Independent two-sample t-test;
^{a-b} no significant difference between groups sharing the same letter.

^x Mann-Whitney U test; ^y One-way analysis of variance; ^z Independent two-sample t-test; ^{a-b} no significant difference between groups sharing the same letter.

results of the regression analysis regarding the SF-36/HRQOL subdimensions are presented in Table 5.

Mediation Analysis of the Relationship Between Internalized Stigma, Depression, and Quality of Life

Since IS was not a directly significant variable in any regression model, the relationships between stigma and health-related quality of life were examined while taking depression levels into account. Accordingly, a bootstrap-based mediation analysis was conducted. The analysis considered internalized stigma, depression level, and the eight subscales of the SF-36/HRQOL together. Ninety-five percent confidence intervals for indirect relationships were calculated using the bootstrap method ($n=5000$).

The analysis results indicated that the relationships between internalized stigma and all subscales of the SF-36/HRQOL were consistent with a mediational pattern mediated by depression levels. It was observed that none of the bootstrap confidence intervals for the mediational effects included zero. The highest indirect effects were observed in the physical role

Table 4. Examination of the relationship between scale scores (correlation coefficients)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Berger-HRSS															
1-Internalized Stigma Score															
2-Concerns regarding society's attitude	0.526***														
3-Negative self-perception	0.511***	0.579***													
4-Concerns about disclosure	0.650***	0.750***	0.598***												
5-Beck Depression Inventory (BDI)	0.315***	0.198*	0.475***	0.304**											
SF-36/HRQOL															
6-Physical functioning	-0.175 ^y	0.035 ^y	-0.059 ^y	-0.049 ^y	-0.493***										
7-Physical role difficulty	-0.217 ^y	-0.168 ^y	-0.313***	-0.207 ^y	-0.647***	0.592***									
8-Emotional Role Difficulty	-0.155 ^y	-0.104 ^y	-0.310**	-0.179 ^y	-0.617***	0.515***	0.748***								
9-Energy/Vitality	-0.167 ^a	-0.164 ^a	-0.240*	-0.264**	-0.568***	0.486***	0.608***	0.586***							
10-Mental Health	-0.221 ^y	-0.155 ^y	-0.301***	-0.297**	-0.602***	0.385***	0.486***	0.516***	0.703***						
11-Social functioning	-0.269**	-0.101 ^y	-0.292*	-0.108 ^y	-0.396***	0.554***	0.541***	0.455***	0.402***	0.363***					
12-Pain	-0.301***	-0.168 ^y	-0.328***	-0.162 ^y	-0.493***	0.481***	0.577***	0.527***	0.480***	0.394***	0.527***				
13-Overall Health	-0.131 ^a	0.040 ^a	-0.142 ^a	-0.128 ^a	-0.431***	0.404***	0.527***	0.511***	0.635***	0.462***	0.410***	0.552***			
14-Treatment Motivation	0.106 ^z	0.097 ^z	0.135 ^z	0.049 ^z	0.031 ^z	0.064 ^z	0.148 ^z	0.025 ^z	0.001 ^z	0.010 ^z	0.150 ^z	0.017 ^z	0.063 ^z		
15-Treatment Knowledge Level	0.091 ^z	0.071 ^z	0.106 ^z	0.009 ^z	0.118 ^z	0.086 ^z	0.080 ^z	0.081 ^z	0.049 ^z	0.113 ^z	0.086 ^z	0.026 ^z	0.020 ^z	0.641 ^t	

x Pearson correlation; y Spearman rho correlation; z Point bi-serial correlation; t Tetrachoric correlation, *: p<0.05; **: p<0.01; ***: p<0.001; Berger-HRSS: Berger HIV-Related Stigma Scale, SF-36/HRQOL: Short Form-36 Health-Related Quality of Life Scale

Table 5. Results of the regression analysis regarding the sub-dimensions of the SF-36 HRQOL

	Physical functioning	Physical role difficulty	Emotional role difficulty	Energy	Mental health	Social functioning	Pain	Overall health
IS	-0.10(0.21)	-0.00(-0.00)	-0.09(0.28)	0.01(0.02)	0.02(0.03)	-0.16(-0.32)	-0.20(-0.52)	-0.06(-0.11)
BDI	-0.36**(-0.70)	-0.56***(-1.81)	-0.55***(-1.61)	-0.55***(-0.94)	-0.56***(-0.85)	-0.35**(-0.69)	-0.36**(-0.89)	-0.47***(-0.84)
Gender (male-female ^a)	0.35(8.30)	-0.12(-4.77)	-0.08(-2.78)	0.10(1.99)	-0.29(-5.24)	0.17(4.10)	0.79*(23.28)	0.23(4.94)
Marital status (single-married ^a)	0.65** (15.35)	0.21(8.27)	-0.10(-3.66)	0.03(0.70)	0.15(2.75)	0.04(0.88)	-0.36(-10.58)	0.44(9.56)
Social support (Yes/No ^a)	0.07(1.60)	0.03(1.26)	0.21(7.31)	0.15(3.09)	0.44(7.96)	0.4(0.91)	-0.21(-6.24)	-0.03(-0.64)
R ²	0.29	0.36	0.39	0.32	0.42	0.21	0.30	0.25
F (6,68)	4.70	6.27	7.25	5.42	8.05	2.94	4.91	3.82
p (model)	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001	p=0.013	p<0.001	p=0.002

The values given in the table for the variables are standardized regression coefficients (b), unstandardized regression coefficients (B) are presented in parentheses. *p<0.05, **p<0.01, ***p<0.001; a: The reference category in binary variables; SF-36/HRQOL: Short Form-36 Health-Related Quality of Life Scale; IS: Internalized Stigma; BDI: Beck Depression Inventory.

difficulty (b=-0.63; 95% CI [-1.14, -0.19]) and emotional role difficulty (b=-0.60; 95% CI [-1.07, -0.19]) subscales. The indirect relationships between the IS, BDI, and SF-36/HRQOL subscales are presented in Table 6.

DISCUSSION

This study aimed to examine the relationships between internalized stigma, depression, treatment motivation, and health-related quality of life (HRQoL) in people living with HIV using a cross-sectional design. The findings reveal that

Table 6. Indirect relationships among the IS, BDI, and SF-36/HRQOL subscales

Dependent variable	Indirect effect (b)	95% CI	p
Physical functioning	-0.27	-0.52, -0.07	0.022
Physical role difficulty	-0.63	-1.14, -0.19	0.008
Emotional role difficulty	-0.60	-1.07, -0.19	0.009
Energy	-0.34	-0.64, -0.10	0.014
Mental health	-0.30	-0.53, -0.11	0.005
Social functioning	-0.25	-0.52, -0.05	0.040
Pain	-0.34	-0.69, -0.07	0.034
Overall health	-0.28	-0.56, -0.08	0.021

Indirect effects were calculated using the bootstrap method (5,000 samples); CI: confidence interval; SF-36/HRQOL: Short Form-36 Health-Related Quality of Life Scale; IS: internalized stigma; BDI: Beck Depression Inventory.

levels of internalized stigma are significantly and positively associated with depressive symptoms; meanwhile, levels of depressive symptoms show strong and significant negative associations with all subscales of HRQoL. Furthermore, it was observed that the relationship between internalized stigma and HRQoL was not direct but exhibited an indirect pattern when evaluated in conjunction with levels of depressive symptoms. These findings suggest that depressive symptoms should be evaluated in conjunction with the relationships between internalized stigma and quality of life. In this context, while hypotheses suggesting that IS is associated with depression and that depression is associated with quality of life are supported, hypotheses suggesting that stigma has a direct relationship with quality of life are not supported.

Our findings are consistent with previous literature indicating a positive relationship between stigma and depression. Previous studies have reported significant and positive associations between these two variables; however, the strength of this association varies across studies (Amiya et al. 2014, Li et al. 2018, Thai et al. 2018, Zeng et al. 2018, Scofield et al. 2025, Thai et al. 2025). In particular, internalized stigma has been shown to be closely associated with various cognitive and mental health challenges, particularly depression (Pantelic et al. 2019, Masa et al. 2022, Norcini Pala and Turan 2025). It has also been shown that this type of stigmatization negatively affects individuals' perceptions of their overall health (Tian et al. 2021, Nguyen et al. 2025).

Studies have consistently shown that people living with HIV who experience higher levels of stigma generally demonstrate lower adherence to ART (Dako-Gyeke et al. 2020, Onu 2021, Aung et al. 2022, Fosu et al. 2022, Masa et al. 2022, Perger et al. 2025). Meanwhile, in a cross-sectional study examining the relationships between HIV-related stigma, depressive symptoms, and ART adherence, it was found that depression had a direct effect on ART adherence; however, when both variables were included in the model simultaneously, the effect of stigma was not statistically significant (Rao et al. 2012). The "Test and Treat" approach recommended by the World Health Organization aims to ensure that testing is widely available and accessible so that people living with HIV can receive an early diagnosis, and to ensure that antiretroviral treatment is initiated without delay. Some studies conducted under this model have reported treatment adherence rates of over 90% (Betancur et al. 2017, Liu et al. 2024). Similarly, although our study found a positive correlation between internalized stigma and the level of depressive symptoms, the participants demonstrated high levels of treatment motivation and knowledge, at 92% and 96%, respectively. No significant correlation was found between IS and treatment motivation or treatment knowledge (Table 4). Some researchers, taking into account the "fear" component of stigma, have suggested that it may function as a protective factor by increasing individuals'

motivation to protect their health rather than hindering ART adherence (Ouner et al. 2025). These findings underscore the importance of considering the complex interplay of psychosocial factors in determining ART adherence.

It has been reported that ART adherence is associated with higher HRQoL, whereas poor adherence is associated with poorer outcomes (Tadese et al. 2024). The high treatment adherence among the individuals in our sample may be related to psychosocial characteristics. Our participants reported a high level of social support, hence, it is possible that their increased awareness of their illness has led them to develop a stronger sense of responsibility and greater adherence to treatment. However, the high rates of treatment adherence observed may have led to reduced variability in the relevant variables. This may have created a ceiling effect that prevented the detection of statistical significance in the analyses. This effect may have limited the power of the analyses, making it difficult to statistically demonstrate true relationships. Our results should be interpreted with caution in this regard.

Our findings indicate that internalized stigma is negatively associated with the "social functioning" and "pain" subdimensions of quality of life; however, these associations did not reach statistical significance in the regression analysis. A study conducted with male participants living with HIV reported negative associations between stigma and health-related quality of life subscales, including social functioning and pain (Kaya et al. 2020). In this study, which used a different scale for HIV-related stigma, the HRQoL subscales were found to be most negatively associated with the stigma scale subscale of negative self-perception. In our study, the stigmatization subscale was found to have the strongest negative correlation with the HRQoL subscales, specifically with negative self-perception image. It has been demonstrated that IS has complex effects on quality of life, alongside psychological symptoms (Turan et al. 2017, Van der Kooij et al. 2021).

In our sample, depressive symptoms showed consistent and significant negative correlations with the SF-36/HRQOL subscales; this indicates that depression is strongly associated with both physical and mental well-being. These relationships have also been confirmed by regression analysis. The results indicate that depression is significantly associated with both the physical and mental health perceptions of individuals living with HIV, as well as their overall levels of functioning. The current literature indicates that depressive symptoms significantly reduce quality of life in people living with HIV (Tate et al. 2003, Ronel et al. 2018, Cai et al. 2020, Vo et al. 2025) and indicates that this effect may stem directly from depression (Shrestha et al. 2017) or may arise indirectly through negative self-perceptions triggered by stigma (Charles et al. 2012). In this study, no direct association between internalized stigma and HRQoL was found; however, when evaluated in

conjunction with depression levels, an indirect association was observed. This finding provides a framework that may help interpret the inconsistent results reported in the literature (Ekstrand et al. 2018, Nobre et al. 2018, Hoang et al. 2024).

Limitations

This study has several limitations. First, the cross-sectional design does not allow for causal inferences. The results should be interpreted solely at the level of association. Second, the sample size is limited and was obtained from a single university hospital that provides comprehensive clinical care. This may reduce the generalizability of the findings to other settings or different populations. The fact that most of our participants were male is another factor that reduces the generalizability of the results, although this appears consistent with the literature. On the other hand, the fact that treatment adherence was found to be quite high may have led to a ceiling effect in the statistical analyses, resulting in some relationships not being found to be statistically significant. Another limitation is that the data were collected using self-report scales, which may have increased the risk of response errors such as social desirability bias or recall bias. Finally, the study focused solely on specific psychosocial variables (internalized stigma, depression, and treatment motivation) and did not include other potentially important factors such as anxiety or past trauma. Future research evaluating additional psychosocial dimensions using broader models will contribute to a more comprehensive understanding of the factors associated with quality of life among individuals living with HIV.

CONCLUSION

This study examined the relationships between internalized stigma, depression, and health-related quality of life among individuals living with HIV. The findings indicate that depression is strongly and consistently associated with the subdimensions of quality of life, while internalized stigma is not directly associated with quality of life but exhibits a significant pattern when evaluated in conjunction with depression levels. Interventions that support mental health, reduce stigma, and strengthen social support need to be developed and integrated into the comprehensive care of individuals living with HIV. Future research in this area would benefit from using larger samples and longitudinal designs to better elucidate the complex relationships of psychosocial factors over time.

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