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Assessing the Relationship between Antiretroviral Therapy (ART) Adherence and Quality of Life among HIV Patients

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ABSTRACT

While Antiretroviral Therapy (ART) has transformed HIV into a manageable chronic condition, achieving optimal patient outcomes depends on both sustained adherence and a good quality of life (QoL). Understanding the complex psychosocial and socioeconomic determinants of these two key outcomes is crucial for overall patient care. A cross-sectional study was conducted among 206 adult HIV-positive patients at the University of Abuja Teaching Hospital (UATH), Gwagwalada, Abuja, Nigeria. Data on ART adherence, quality of life, financial well-being, social support, and physical and psychological well-being were collected using structured questionnaires. The hypothesized relationships were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to simultaneously test the direct and indirect effects of psychosocial and socioeconomic factors on both ART adherence and QoL. The study population demonstrated exceptionally high ART adherence, with 73.3% reporting perfect adherence over the previous month. The SEM model revealed a clear distinction in the determinants of the two primary outcomes. The model had a moderate explanatory power for QoL (R^2 = 49.3%), identifying Financial Well-being ($\beta = 0.419$, $p < 0.001$) and Social Support ($\beta = 0.364$, $p < 0.001$) as the most significant direct predictors. The same model had negligible explanatory power for ART adherence (R^2 = 1.7%), and none of the psychosocial or socioeconomic paths to adherence were significant. For long-term HIV patients in this population, medication adherence appears to be a well-established habit, driven by factors beyond the measured psychosocial and socioeconomic constructs. However, a patient's quality of life is profoundly influenced by their financial security and social support network. It is recommended that interventions take a dual-focused care approach that supports the mechanics of adherence while integrating economic empowerment and social support programs to significantly improve the overall well-being of HIV patients.

Keywords: Antiretroviral Therapy Adherence, Quality of Life, Structural Equation Modelling, Nigeria.

Introduction

Although various studies have evaluated how antiretroviral therapy (ART) improves clinical outcomes such as viral suppression and immune recovery, a few of them have examined the correlations between drug adherence and quality of life (QoL). Even when these two biomarkers are examined in conjunction, many studies like those of Adeoti *et al*. (2019) and Okwuonu *et al*. (2023) have independently examined them or used simple statistical methods like frequency counts, percentages, and basic regression. These types of analysis are useful for identifying surface-level trends. Still, they aren't investigative enough to explore the effects of internal (latent) variables, such as anxiety, emotional distress, and

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mental well-being, which are not directly measured but have a strong impact on patients' adherence behavior and perceived quality of life. In the Sub-Saharan African context, exploring psychological and socioeconomic variables is especially relevant where factors like financial wellbeing and social support greatly impact patient well-being (Wouters *et al*., 2009; Bajunirwe *et al*., 2009). This study uses SEM to specifically model the influence of these constructs alongside psychological factors on ART adherence and Quality of Life.

This study seeks to utilize Structural Equation Modeling (SEM), which gets beneath the surface of relationships and helps to uncover how different factors function below the surface, even though some earlier studies. For example, while Wouters *et al*. (2009) used SEM to model outcomes associated with ART in their study, they did not model internal psychological variables as central to adherence or QoL. This study takes a different approach by using SEM to explore the way psychosocial issues like depression and anxiety influence treatment adherence to ART and patients' perceived quality of life (QoL). Instead of analyzing each variable independently, the model allows us to look at the way the variables influence one another at the same time. This will aid in developing a new understanding of the psychological and behavioral determinants of ART treatment and provide applicable knowledge to be utilized in everyday patient management.

2.0 Materials and Method

Study Population and Setting

The target population for this study consisted of adult HIV-positive individuals (aged 18 years and above) who were actively receiving antiretroviral therapy (ART) at the University of Abuja Teaching Hospital (UATH). To ensure participants had adequate exposure to the treatment regimen for adherence patterns to stabilize and influence clinical and quality of life outcomes, the inclusion criteria required that all participants must have been on ART for a minimum of six months. Individuals with severe cognitive impairments or co-existing conditions that would prevent them from providing informed consent or completing the interview were excluded from the study.

Sampling Technique and Data Collection Procedure

A random sampling technique was employed to select participants from the study population. This method provided each member of the population with an equal chance of being selected, supporting the generalizability of the findings to the wider population from which the sample was drawn. Data collection was conducted through interviewer-administered structured questionnaires to ensure clarity, minimize missing data, and cater to different literacy levels. The instruments were adapted from certified scales, including the WHOQOL-HIV BREF for quality of life and targeted modules for ART adherence and psychosocial factors. Before commencement, ethical approval was obtained from the institutional review board. Every participant provided written informed consent after the study's purpose, procedures, risks, and benefits were thoroughly explained; emphasis was also made on their confidentiality and their right to withdraw at any time.

Sample Size Calculation

The sample size was calculated using Cochran formula below:

$$n = \frac{Z^2 \times p(1\text{-}p)}{e^2} = \frac{(1.96^2) \times 0.5(1\text{-}0.5)}{(0.0683)^2} = 205.8 \cong 206$$

Where n = required sample size

Z = z-score for confidence level

p = estimated proportion of key outcome

e = margin of errors

Variable Description

The latent constructs in the study (i.e., Financial Wellbeing, Psychological Wellbeing, Physical Health, and Social Support) were measured as composite variables. The composite score for each construct was calculated using the formula.

$$Composite\ score = \frac{(Sum\ of\ Item\ Responses)}{(Number\ of\ Items)} \quad (1)$$

This transformed the questionnaire responses into a single, continuous variable for each construct. The composite scores were used as the observed indicators for the latent variables in the PLS-SEM analysis. Multiple survey items (indicators) for the latent constructs (e.g., financial worry) were negatively worded. These items were reverse coded during the analysis. This means a code of '1', 2', was changed to '5', '4', and so on. This guarantees that for every question, a higher code always indicates a more positive outcome, making the composite score for the constructs easier to interpret. The study variables, categories, and their codes are summarized in the table below.

Table 1: Variable names and their codes

Variable Category	Variable Name	Type / Levels	Codes	Description
Endogenous Variable	ART Adherence	Quantitative	Number of Pills	Number of pills missed in the last 30 days.
Dependent Variable	Quality of Life	Scale (1-4)	1 = Very Poor 2 = Poor 3 = Good 4 = Excellent	Overall rating of life satisfaction. Example: "How would you rate your quality of life?"
Latent Constructs	Financial Wellbeing	Composite	Composite score (Mean of items on a 1-5 scale)	Perception of financial security and stability.
	Psychological Wellbeing	Composite	Composite score (Mean of items on a 1-5 scale)	Frequency of positive mental states and absence of distress.
	Physical Health	Composite	Composite score (Mean of items on a 1-5 scale)	Level of physical comfort and ability to perform daily activities
	Social Support	Composite	Composite score (Mean of items on a 1-5 scale)	Perceived level of support from family, friends, and community.
Control Variables	Age	Quantitative	Quantitative	Age in completed years from last birthday.
	Gender	2	0 = Female 1 = Male	Self-reported gender of the participant.
	ART duration	Quantitative	Quantitative	Number of days on ART.
	Substance use	Likert Scale (1-5)	1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Almost Always	

Ethical Approval

Before commencing the data collection, formal ethical approval was obtained from the Health Research Ethics Committee of the University of Abuja Teaching Hospital with number UATH/HREC/PR/624. All participants were also provided with a comprehensive explanation of the research before enrollment. This involved a detailed breakdown of the study's purpose, procedures, possible risks and benefits, and the voluntary nature of their participation. Written consent was obtained from each participant confirming their understanding and willingness to participate. To protect the patient's confidentiality, all data was made anonymous at the point of collection. Identifying information was removed and replaced with a unique code, ensuring that privacy was maintained at all stages of the research process.

Model Specification

Structural Equation Modeling is a multivariate statistical technique that tests hypothesized relationships between observed and latent variables. The general mathematical expression for an SEM is represented through two sub-models: the measurement model, which relates observed variables to latent constructs, and the structural model, which specifies causal relationships between latent constructs. The basic equations are:

Measurement Model

$$X = \Lambda_x \xi + \delta \quad (2)$$

$$Y = \Lambda_y \eta + \varepsilon \quad (3)$$

Structural Model

$$\eta = B\eta + \Gamma\xi + \zeta \quad (4)$$

where:

x = vector of indicators for exogenous latent variables

y = vector of indicators for endogenous latent variables

ξ (xi) = vector of exogenous latent variables (independent constructs)

η (eta) = vector of endogenous latent variables (dependent constructs)

Λ_x (Lambda-x) = matrix of factor loadings for x variables

Λ_y (Lambda-y) = matrix of factor loadings for y variables

δ (delta) = measurement errors for x variables

ε (epsilon) = measurement errors for y variables

B = matrix of path coefficients between endogenous variables

Γ (Gamma) = matrix of path coefficients from exogenous to endogenous variables

ζ (zeta) = structural disturbances (errors in equations)

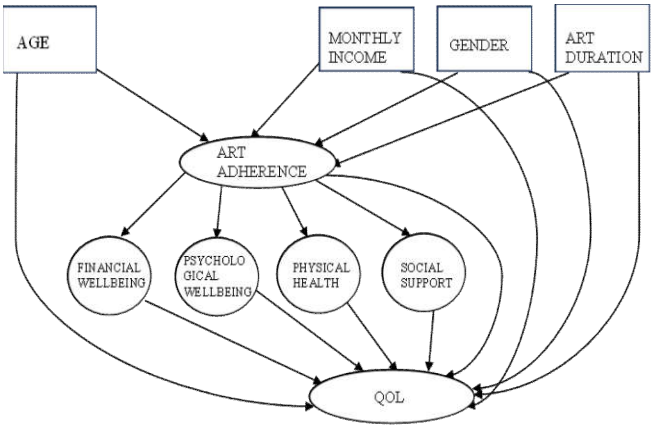

Figure 1: Conceptual framework and model specification

The measurement model

The measurement model specifies how latent constructs are measured by their observed indicators. It establishes the relationship between the questionnaire items and the underlying concepts they represent.

General Form:

For exogenous constructs: $x = \Lambda_x \xi + \delta$

For endogenous constructs: $y = \Lambda_y \eta + \varepsilon$

The measurement model for this study specifies the following relationships:

ξ (latent exogenous variables): These are your independent constructs that are not caused by others in the model.

ξ_1 = ART Adherence

ξ_2 = Financial Wellbeing

ξ_3 = Psychological Wellbeing

ξ_4 = Physical Health

ξ_5 = Social Support

η (latent endogenous variable): This is your dependent construct that is influenced by others.

η = Quality of Life

x (observed indicators for exogenous ξ): The survey questions that measure your independent constructs e.g., finance worry, etc., for their respective ξ

y (observed indicators for endogenous η): The survey questions measuring Quality of Life.

Λ (Lambda) is the matrix of factor loadings.

δ (delta) is the vector of measurement errors for the indicators.

ε (epsilon) is the vector of measurement errors for the QoL indicators.

The structural model

The structural model specifies the hypothesized causal relationships between the latent constructs. It tests how independent variables influence the dependent variable both directly and indirectly.

General Form:

$$\eta = B\eta + \Gamma\xi + \zeta$$

In this research, the structural model tests the direct effects of five exogenous constructs on quality of life. Since there is only one endogenous variable (Quality of Life), the B matrix is zero, and the model simplifies to:

$$\eta = \gamma_1\xi_1 + \gamma_2\xi_2 + \gamma_3\xi_3 + \gamma_4\xi_4 + \gamma \quad (5)$$

where:

η = Quality of Life (dependent latent variable)

ξ_1 = ART Adherence

ξ_2 = Financial Wellbeing

ξ_3 = Psychological Wellbeing

ξ_4 = Physical Health

ξ_5 = Social Support

γ_1 to γ_5 = path coefficients representing the direct effects

ζ = disturbance term for Quality of Life

SEM Estimation Technique

Partial Least Squares SEM (PLS-SEM) was employed for model estimation in this study. PLS-SEM, as a variance-based technique, is optimal for predictions and complex models. It does not require data that is normally distributed and is much more effective with smaller sample sizes compared to Co-Variance Based SEM (CB-SEM). The estimation is done in a systematic and iterative process. The first step is the measurement model (outer model) estimation, where each latent variable is calculated as a weighted sum of its indicators:

$$\xi_j = \sum_i w_{ij}\, x_i \quad (6)$$

These weights are iteratively updated using the rule:

$$w^{(t+1)} = \text{normalize}\,(X^T Y) \quad (7)$$

until convergence is achieved. Then, the structural model (inner model) is estimated by regressing the endogenous variable 'η' (Quality of Life) on the exogenous latent variables (ξ_1 to ξ_5) to derive the path coefficients. Since PLS-SEM is non-parametric, bootstrapping was effectively used to assess the statistical significance of the path coefficients and loadings. This process (bootstrapping) generates thousands of subsamples to create empirical confidence intervals, which allow for hypothesis testing without if the data follows any specific distribution. This analysis was performed using SmartPLS software, version 4.

Model Evaluation and Metrics

The PLS-SEM model was assessed through a systematic two-step process, first by evaluating the measurement model and then the structural model. The measurement model was evaluated for reliability and validity, and the Internal consistency reliability was assessed using Composite Reliability, calculated as:

$$\rho_c = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + \sum (1-\lambda_i^2)} \quad (8)$$

where $\rho_c > 0.7 \rho_c > 0.7$ indicates adequate reliability. Convergent validity was assessed through the Average Variance Extracted (AVE), computed as:

$$AVE = \frac{\sum \lambda_i^2}{n} \quad (9)$$

where values above 0.5 confirm that a construct explains more than half of the variance of its indicators. Discriminant validity was assessed using the Fornell-Larcker criterion, requiring that $\sqrt{AVE} > r_{ij}$ for all constructs i ≠ j. It is important to note that these assessments were only applied to reflective multi-item constructs. This implies that the single-item ART adherence construct was exempt from this evaluation.

The quality of the structural model was also evaluated through several metrics. First, the explanatory power of the model was determined by the coefficient of determination:

$$R^2 = 1 - \frac{SS_{residual}}{SS_{total}} \quad (10)$$

where SSresidual represents the sum of squares of residuals and SStotal represents the total sum of squares. The effect size (f^2) of each predictor was calculated as:

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}} \quad (11)$$

with values of 0.02 indicating small effects, 0.15 indicating medium effects, and 0.35 indicating large effects. Predictive relevance was evaluated using Stone-Geisser's Q^2 statistic:

$$Q^2 = 1 - \frac{SS_{PRESS}}{SS_{SSO}} \quad (12)$$

where SS_{PRESS} is the sum of squares of prediction errors and SS_{SSO} is the sum of squares of observations. A Q^2 value higher than zero confirms the model's predictive capacity. The significance of path coefficients was tested by bootstrapping with 5,000 subsamples. This comprehensive evaluation ensured both the reliability of the measurement instrument and the strength and stability of the theoretical relationships proposed in the structural model.

Results

Data Screening and Preparation

The dataset comprised responses from 206 participants with 90 variables collected through structured questionnaires. The initial step involved cleaning the raw data and coding the variables for analysis. A crucial step was the composite variable construction used to represent key psychosocial and socioeconomic constructs. It ensured the data was structured and optimized for the upcoming statistical modeling.

Composite Variable Construction

To measure key psychosocial constructs, multi-item scales were combined into four composite variables. These composites, Financial Wellbeing, Psychological Wellbeing, Social Support, and Quality of Life, each integrate several related indicators to provide a more stable and reliable measure. All composites demonstrated acceptable to good internal consistency, as indicated by their Cronbach's alpha values, confirming that the items within each variable collectively represent the intended construct.

Table 2: Composite Variables and Their Components

Composite Variable	Cronbach's Alpha (α)	Component Measures
Financial Wellbeing	0.78	Financial stress (reverse-coded), economic security
Psychological Wellbeing	0.82	Depression symptoms (reverse-coded), anxiety (reverse-coded)
Social Support	0.75	Emotional support, family support, and social integration
Quality of Life	0.80	Life satisfaction, functional status, perceived health

ART Adherence Distribution

The analysis of adherence data indicates a strong positive pattern across the study population. A

great majority of participants (73.3%) demonstrated perfect adherence by reporting 0 (zero) missed pills. An additional (24.8%) maintained good to fair adherence, missing between (1-9) pills. Only a minute subset (1.9%) showed poor adherence, missing ten or more pills. This distribution highlights that exemplary ART adherence is the norm within this patient dataset, indicating highly successful treatment adherence overall.

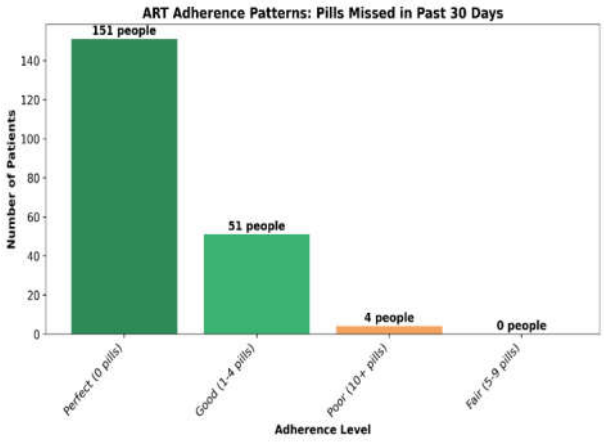

Figure 2: ART Adherence Patterns

Wellbeing Scores Overview

An analysis of the participants reported generally positive well-being across key domains. Physical Health was rated highest, with a mean score of 4.74 out of 5, indicating an excellent overall status. Psychological Wellbeing followed with a mean of 4.42 out of 5, indicating very positive mental health. Social Support was reported as good, with a mean score of 3.69 out of 5. And Financial Wellbeing was moderate, with a mean of 3.01 out of 5. All the varying results lead to an overall score on Quality of Life, which was found to be 2.65 on a 4-point scale, implying a moderate quality of life. This pattern suggests that while physical and psychological health are robust, perceptions of financial stability and overall life satisfaction show more disparity within the data.

Correlation Analysis

The bivariate relationships analysis displays a distinct pattern of connections among key variables. A particularly strong and compelling relationship was observed between Psychological Wellbeing and Physical Health ($r = 0.605$, $p < .001$), highlighting a close connection between mental and physical health status in this population. Financial Wellbeing emerged as a key link, indicating a strong positive relationship with Monthly Income ($r = 0.580$, $p < .001$) and a moderate relationship with Quality of Life ($r = 0.505$, $p < .001$). This demonstrates the role of economic stability in overall life satisfaction. Alternatively, ART adherence showed only weak correlations with all well-being and socioeconomic variables (ranging from -0.11 to -0.04), indicating that ART adherence operates independently of these psychosocial factors within this sample. Quality of Life was moderately associated with multiple domains, including Social Support ($r = 0.437$, $p < .001$) and Psychological Wellbeing ($r = 0.39$), expressing it as a multifaceted outcome. Some weaker but significant relationships were also noted, such as between Social Support and Monthly Income ($r = 0.277$, $p < .001$) and Age and Monthly Income ($r = 0.200$, $p = .004$). Collectively, these findings indicate that well-being in this dataset is coined by a network of interconnected factors, specifically financial, psychological, and social resources, while ART adherence remains a specific behavioral outcome.

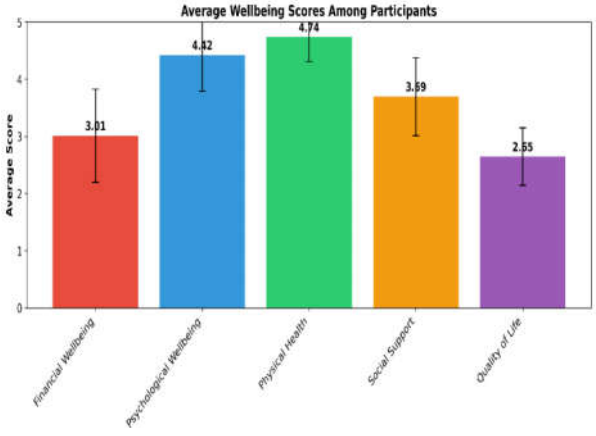

Figure 3: Average Wellbeing Scores

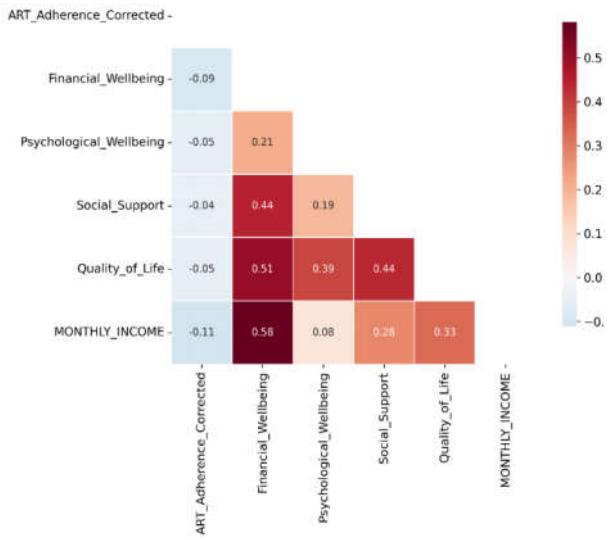

Figure 4: Correlation Matrix of Variables

Structural Equation Modeling (SEM)

This study utilized a two-stage analytical approach to identify the factors influencing ART adherence and quality of life (QoL) among HIV-positive patients. The preliminary analysis recognized key bivariate relationships, while the Structural Equation Modeling (SEM) provided a robust, multivariate test of the model. The overall findings reveal a clear contrast between the determinants of these two outcomes. The analysis illustrates that the psychosocial and economic factors driving Quality of Life are essentially different from those responsible for ART Adherence. The theorized Structural Equation Model was tested to evaluate the direct and indirect relationships among the constructs. The model with normalized path coefficients is displayed in Figure 5. The results of the hypothesis testing are presented below. It is important to note that the PLS-SEM approach is mainly assessed in terms of its explanatory power, measured by the coefficient of determination (R^2), and the significance of the path coefficients. For that reason, the validation of the model focuses on the significance and strength of the hypothesized relationships, as reported in the results. The Structural Equation Model provides a comprehensive analysis of the factors influencing Quality of Life (QoL) among patients with HIV. With an R^2 value of 0.493 for quality of life, the model indicates a strong predictive power for the main outcome, highlighting that the included constructs effectively explain a substantial portion of its variance.

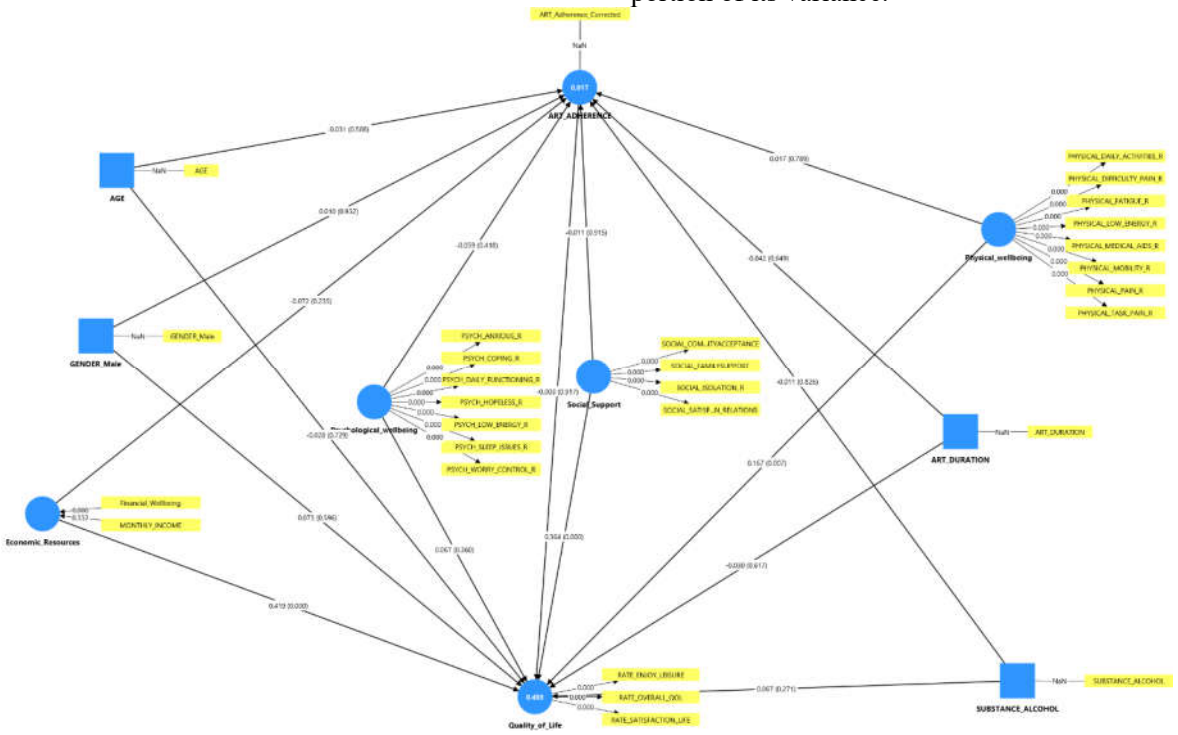

Figure 5: Path analysis of Structural Equation Model

Financial Wellbeing was the strongest predictor of Quality of Life ($\beta = 0.419$, $p < 0.001$; $f^2 = 0.263$), consistent with its strong bivariate association ($r = 0.505$). Psychological Wellbeing ($\beta = 0.364$, $p < 0.001$) and Social Support ($\beta = 0.364$, $p < 0.001$; $r = 0.437$) also showed substantial independent effects, highlighting the central role of mental health and social connections. Physical Wellbeing had a smaller but significant direct effect ($\beta = 0.167$, $p = 0.007$), with attenuation from its strong correlation with Psychological Wellbeing ($r = 0.605$), suggesting partial mediation through mental health.

ART Adherence showed minimal explanatory power ($R^2 = 0.017$) and no direct association with Quality of Life ($\beta = -0.003$, $p = 0.917$). In contrast, ART Duration had a small but significant positive effect ($\beta = 0.167$, $p < 0.01$), indicating benefits of long-term treatment adaptation. Overall, Quality of Life was primarily shaped by financial, psychological, and social factors. The weak adherence–Quality of Life relationship in this experienced cohort (mean ART duration = 13.4 years) suggests adherence is a normalized behaviour. Interventions should therefore prioritize mental health, economic stability, and social support alongside clinical care.

Assessment of the Measurement Model

The results confirm that all reflective constructs demonstrate strong reliability and convergent validity, meeting and exceeding the recommended thresholds. Internal consistency reliability, which measures the degree to which items indicate the same underlying construct, was evaluated using Cronbach's Alpha and Composite Reliability (rho_a and rho_c). All values significantly surpassed the 0.70 threshold. The Physical Wellbeing ($\alpha = 0.874$, rho_c = 0.898) and Quality of Life ($\alpha = 0.866$, rho_c = 0.918) exhibited excellent internal consistency.

Convergent validity, which assesses the extent to which a construct's indicators converge in measuring the same concept, was evaluated using the Average Variance Extracted (AVE). All constructs successfully exceeded the 0.50 benchmark. The quality-of-Life construct demonstrated exceptional convergent validity, with an AVE of 0.789, indicating that its indicators are highly representative of the latent construct. The Social Support (AVE = 0.568) and Physical Wellbeing (AVE = 0.526) constructs also showed strong convergent validity. The Psychological Wellbeing construct, with an AVE of 0.502, meets the minimum requirement, confirming that it is a valid measure, although with slightly more diverse indicators.

Table 3: Reliability and Validity of Reflective Constructs

Construct	Cronbach's Alpha (α)	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Physical Wellbeing	0.874	0.889	0.898	0.526
Psychological Wellbeing	0.841	0.872	0.876	0.502
Quality of Life	0.866	0.869	0.918	0.789
Social Support	0.748	0.812	0.838	0.568

Assessment of Collinearity

A Variance Inflation Factor (VIF) value above 5 indicates problematic multicollinearity that can distort results, while a value above 3 suggests a need for caution. The analysis confirmed that multicollinearity is not a concern in this study. All VIF values for both the inner model and the outer model were well within acceptable limits.

The analysis displays a clear pattern of predictors for Quality of Life. The strongest and most significant direct predictors were Financial Wellbeing ($\beta = 0.419$, $p < 0.001$) and Social Support ($\beta = 0.364$, $p < 0.001$), which highlighted the necessity of financial stability and social networks for a patient's life satisfaction. Physical Wellbeing also displayed a significant, though more modest, positive effect ($\beta = 0.167$, $p = 0.007$).

Explanatory Power of the Model (R^2)

The accuracy of the model's prediction was evaluated using the coefficient of determination (R^2), which measures the proportion of variance in the dependent constructs that is explained by the model. The results are presented in Table 5.

Table 4: Assessment of Path Relationships

Path	B	T Statistics	P Value
Financial Wellbeing → Quality of Life	0.419	7.234	< 0.001
Social Support → Quality of Life	0.364	5.289	< 0.001
Physical Wellbeing → Quality of Life	0.167	2.705	0.007
Psychological Wellbeing → Quality of Life	0.067	0.915	0.360
ART Adherence → Quality of Life	-0.003	0.104	0.917

Table 5: Explanatory Power of the Structural Model (R^2 Values)

Construct	R^2	R^2 Adjusted
ART Adherence	0.017	-0.023
Quality of Life	0.493	0.469

The model demonstrates substantial explanatory power for the Quality-of-Life construct, with an R^2 value of 0.493. This indicates that nearly half (49.3%) of the variance in patients' quality of life is accounted for by the combined influence of Financial Wellbeing, Social Support, and Physical Wellbeing. On the other hand, the model reveals an insignificant explanatory power for ART Adherence, with an R^2 of just 0.017. The negative adjusted R^2 value further indicates that the model provides no meaningful explanation for adherence behavior beyond what would occur by chance. This clear contrast points to a central conclusion of this study: the same socioeconomic and psychosocial factors that are essential to understanding patients' quality of life provide little insight into the determinants of ART adherence, which are likely to be driven by other, unmeasured variables.

Effect Size Analysis (f-square)

Beyond establishing statistical significance, the practical relevance of the predictor constructs was assessed using f-square effect sizes. This metric evaluates the impact of a specific independent construct on a dependent construct by measuring the change in the R^2 value when that predictor is omitted from the model. The results are presented in Table 6.

Table 6: Effect Sizes (f-square) of Predictor Constructs

Path	f-square	Effect Size
Financial Wellbeing -> Quality of Life	0.263	Large
Social Support -> Quality of Life	0.197	Medium
Physical Wellbeing -> Quality of Life	0.034	Small
All other paths	< 0.020	Negligible

The analysis of effect sizes provides an in-depth insight into the model's significant relationships, differentiating their statistical significance from their practical impact. The results indicate that Financial Wellbeing ($f^2 = 0.263$) has a large effect on Quality of Life, confirming the role it plays as the leading predictor in the model. Similarly, Social Support ($f^2 = 0.197$) demonstrates a medium to large effect, indicating its significant contribution to patient well-being. While also statistically significant, Physical Wellbeing ($f^2 = 0.034$) has a small effect on Quality of Life, suggesting that while physical health is an important factor, initiatives targeting financial stability and social support networks would likely yield a greater improvement in overall quality of life for this population. In line with previous results, all paths leading to ART Adherence and the other non-significant relationships showed minimal effect sizes ($f^2 < 0.02$), reinforcing the conclusion that they hold no significant explanatory power within this model.

Discussion

This study examined the complex relationships between antiretroviral therapy (ART) adherence, psychosocial factors, and quality of life (QoL) among HIV-positive adults attending the University of Abuja Teaching Hospital. The findings revealed a clear distinction between the determinants of QoL and those of ART adherence. While financial well-being, psychological well-being, and social support significantly influenced QoL, none of these factors showed a statistically significant relationship with ART adherence. These findings are consistent with emerging global and regional literature emphasizing the multidimensional nature of HIV care outcomes.

The study found that financial well-being had the strongest direct effect on QoL ($\beta = 0.419$, $p < 0.001$), confirming that economic stability is fundamental to patient satisfaction and perceived well-being. This aligns with the work of Wouters *et al*., (2009), who reported that income stability and employment were strongly associated with improved QoL among South African patients on long-term ART. Similarly, Bajunirwe *et al*. (2009) found that better financial conditions facilitated access to health care and reduced treatment-related stress, leading to higher life satisfaction. These results also reflect findings by Han *et al*. (2013), whose structural model in Uganda demonstrated that economic empowerment interventions enhanced both ART adherence and psychological well-being.

Social support emerged as another major predictor of QoL ($\beta = 0.364$, $p < 0.001$). This corroborates evidence from Balaji *et al*. (2024) and Mrus *et al*. (2006), who found that family support and social integration significantly improved mental and emotional health among HIV patients. The protective role of social networks may be due to emotional reassurance, practical assistance with medication routines, and reduced stigma all contributing to better coping and self-perceived health. These findings suggest that community- and family-based interventions remain vital for sustaining QoL among people living with HIV in Nigeria.

Although psychological well-being showed a moderate correlation with QoL, its direct path was not statistically significant when other variables were controlled. This indicates that its effect may be partially mediated through financial and social factors. Nevertheless, several studies, including Adeoti *et al*. (2019) and Sari *et al*. (2022), have documented the influence of depression and anxiety on both ART adherence and QoL. Psychological distress can diminish motivation and self-care capacity, but when economic and social needs are met, its negative impact may be attenuated a possible explanation for the nonsignificant direct path observed in this study.

Interestingly, ART adherence did not show any significant association with QoL ($\beta = -0.003$, $p = 0.917$), and its explanatory power ($R^2 = 0.017$) was negligible. This contrasts with the findings of Balaji *et al*. (2024) and Mina *et al*., 2025, who reported positive correlations between adherence and QoL. The difference may be attributed to the sample characteristics in the present study: most participants (73.3%) had perfect adherence and had been on treatment for an average of 13.4 years, indicating a mature cohort where adherence has become a normalized, habitual behavior rather than a variable influenced by daily psychosocial fluctuations. Thus, the marginal variance in adherence behavior limits its correlation with other constructs a pattern also noted by Okwuonu *et al*., (2023) in a similar Nigerian population.

The model's moderate explanatory power for QoL ($R^2 = 49.3\%$) underscores the importance of addressing patients' socioeconomic and social contexts alongside biomedical management. As Tegegne *et al*. (2022) and Wouters *et al*. (2009) emphasized, health outcomes among people living with HIV are best understood through integrated frameworks that combine clinical, psychological, and social dimensions. The findings here reinforce that long-term success in ART programs requires not only pharmacologic adherence but also improved financial security and sustained social support.

In summary, this study contributes to the growing body of evidence that while ART adherence ensures biological survival, quality of life is determined by broader psychosocial well-being. For policymakers and program implementers, interventions that combine economic

empowerment, psychosocial counselling, and community engagement are likely to yield greater holistic benefits for HIV patients in Nigeria and similar contexts.

Limitations

The limitations of this study should be considered. ART adherence was measured as a single and self-reported item and although it is a standard clinical metric, it prevents the assessment of internal consistency reliability and is vulnerable to bias. This potentially leads to an over-reported adherence and a restricted variance. The approach may have also influenced the findings that psychosocial factors had negligible explanatory power for ART adherence. Also, the cross-sectional design limits us from establishing cause and effect.

Conclusion

This study underscores that while antiretroviral therapy (ART) adherence remains essential for viral suppression and long-term survival, the true measure of well-being among people living with HIV lies beyond medication compliance. The findings reveal that financial stability, social support, and psychological wellness are the strongest determinants of quality of life, whereas adherence has become a normalized routine behavior among long-term patients. Thus, improving patients' lives requires an integrated approach, the one that sustains medical adherence while focusing on the economic, emotional, and social dimensions of care. Strengthening financial empowerment programs, enhancing social networks, and embedding psychosocial support into HIV treatment services will not only sustain adherence but also elevate the holistic quality of life for individuals living with HIV.

Conflict of Interest

Authors declare no conflict of interest.

References

Adeoti, A. O., Dada, M., Elebiyo, T., Fadare, J., and Ojo, O. (2019). Survey of antiretroviral therapy adherence and predictors of poor adherence among HIV patients in a tertiary institution in Nigeria. *Pan African Medical Journal, 33*(1).

Bajunirwe, F., Tisch, D. J., King, C. H., Arts, E. J., Debanne, S. M., and Sethi, A. K. (2009). Quality of life and social support among patients receiving antiretroviral therapy in Western Uganda. *AIDS Care, 21*(3), 271–279. https:// DOI: 10.1080/09540120802241863

Balaji R. A, Kamath P, Rathi P, and Madi D. (2024). Adherence to Antiretroviral Therapy, and Quality of Life in People Living with HIV: A Prospective Study. Biomed Pharmacol J 2024;17(1). **DOI :** https://dx.doi.org/10.13005/bpj/2869

Han, C. K., Ssewamala, F. M., and Wang, J. S. (2013). Family economic empowerment and mental health among AIDS-affected children living in AIDS-impacted communities: evidence from a randomised evaluation in southwestern Uganda. *Journal of epidemiology and community health*, *67*(3), 225–230. https://doi.org/10.1136/jech-2012-201601

Mina, B., Sanaa, S. A., and Abdelhafid, B. (2025). Assessment of adherence to antiretroviral therapy and its related factors among people living with HIV in the region of Beni-Mellal-Khenifra, Morocco. *Clinical Epidemiology and Global Health*, *31*(December2024),101872. https://doi.org/10.1016/j.cegh.2024.101872

Mrus, J. M., Leonard, A. C., Yi, M. S., Sherman, S. N., Fultz, S. L., Justice, A. C., and Tsevat, J. (2006). Health-related quality of life in veterans and nonveterans with HIV/AIDS. *Journal of general internal medicine*, *21 Suppl 5* (Suppl 5), S39–S47. https://doi.org/10.1111/j.1525-1497.2006.00644.x

Okwuonu, L. O., Ibidabo, A., and Ifere, J. E. (2023). Medication Adherence and Health-Related Quality of Life amongst

HIV Patients Receiving Care at Umuebule Cottage Hospital, Etche, Rivers State. *Nigerian Health Journal*, *23*(3), 765–771. https://doi.org/10.60787/tnhj.v23i3.728

Sari, H., Galbusera, R., Bonnier, G., Lin, Y., Alshelh, Z., Torrado-Carvajal, A., Mukerji, S. S., Ratai, E. M., Gandhi, R. T., Chu, J. T., Akeju, O., Orhurhu, V., Salvatore, A. N., Sherman, J., Kwon, D. S., Walker, B., Rosen, B., Price, J. C., Pollak, L. E., Loggia, M. L., and Granziera, C. (2022). Multimodal Investigation of Neuroinflammation in Aviremic Patients With HIV on Antiretroviral Therapy and HIV Elite Controllers. *Neurology(R) Neuroimmunology & Neuroinflammation, 9*(2), e1144. https://doi.org/10.1212/NXI.0000000000001144

Tegegne, D., Mamo, G., Negash, B., Habte, S., Gobena, T., and Letta, S. (2022). Poor adherence to highly active antiretroviral therapy and associated factors among people living with HIV in Eastern Ethiopia. *SAGE open medicine*, *10*, 20503121221104429. https://doi.org/10.1177/20503121221104429

Wouters, E., Heunis, C., Van Rensburg, D., and Meulemans, H. (2009). Physical and emotional health outcomes after 12 months of public-sector antiretroviral treatment in the Free State Province of South Africa: A longitudinal study using structural equation modelling. *BMC Public Health*, *9*(May 2014). https://doi.org/10.1186/1471-2458-9-103.