International Journal of Science and Research Archive
eISSN: 2582-8185
Cross Ref DOI: 10.30574/ijsra
Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

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FACTORS ASSOCIATED WITH ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG THE YOUTH RECEIVING LONG-TERM ART IN SELECTED HEALTH CENTRE IVS IN ISINGIRO DISTRICT, UGANDA

Kalega William *, Otwine Tweheyo Anne and Jordan Amanyire

Department of Public Health, Bishop Stuart University, P. O. Box 09, Mbarara, Uganda
* Corresponding Author: kalegawilliam@gmail.com

ORCID Details
Kalega William : https://orcid.org/0009-0008-6632-6712
Tweheyo Anne: https://orcid.org/0000-0001-7382-3743
Jordan Amanyire: https://orcid.org/0009-0006-2301-9902

International Journal of Science and Research Archive, 2026, 20(02), 744–753

Publication history: Received on 18 July 2026; revised on 25 August 2026; accepted on 27 August 2026

Article DOI: https://doi.org/10.30574/ijsra.2026.20.2.1690

ABSTRACT

Introduction: Optimal adherence to antiretroviral therapy (ART) is essential for viral suppression, yet the factors driving adherence among youth in rural Ugandan settings remain incompletely documented. This article, drawn from a wider study, examined the factors associated with ART adherence among youth receiving long-term ART in selected Health Centre IVs in Isingiro District, Uganda.

Methods: A cross-sectional design employing a mixed-methods approach was used. Quantitative data were collected from 243 youths aged 18–30 years on ART using a structured questionnaire, while qualitative data were obtained from three counsellors and three peer educators through in-depth interviews. Bivariate ordinal logistic regression screened variables at $p<0.10$ within four factor domains (social support, individual, drug-related, and health facility), and significant variables were entered into domain-specific multivariate binary logistic regression models. Qualitative data were analysed thematically.

Results: Active peer co-engagement in HIV services and open medication communication were the strongest social predictors of adherence. Absence of a family drug/pill companion (AOR=0.22, 95%CI=0.11–0.47, p=0.001) and alcohol consumption were the leading individual-level predictors. Treatment fatigue, operationalised as second thoughts about continuing ART, was the dominant drug-related predictor (AOR=3.58, 95%CI=1.71–7.50, p=0.001). Delayed attendance at the health facility was the only significant health-system predictor (AOR=4.32, 95%CI=1.29–14.41, p=0.017).

Conclusion: ART adherence among youth is shaped by an interacting web of family support, treatment fatigue, and health-system efficiency, rather than by any single dominant factor.

Recommendation: Programmes should formalise family pill-companion support, integrate motivational counselling to address treatment fatigue, and prioritise appointment-system reforms to reduce facility delays.

Keywords: ART adherence, Youth, Peer influence, Treatment fatigue, Health facility factors, Isingiro District

1 INTRODUCTION

Antiretroviral therapy (ART) has transformed HIV infection from a fatal illness into a manageable chronic condition, but its clinical benefit depends on sustained adherence of at least 95% (Shrestha et al., 2023). Globally, adolescents and youth living with HIV consistently report lower adherence and viral suppression than adults, with only 40% of adolescents on ART achieving suppressed viral load compared with 67% of adults (van Heuvel et al., 2022; Babatunde et al., 2023). In Uganda, ART adherence among people living with HIV, including youth, remains below the 95% global target, with national estimates placing adherence among youth at approximately 62.3% (Kamau et al., 2024; Ssemakula et al., 2025).

Isingiro District, like much of rural south-western Uganda, has invested considerably in scaling up ART adherence among youth through HIV counselling and testing, community and facility-based education, and the Ministry of Health's Young People and Adolescent Peer Supporters (YAPS) model, which uses peer support to improve retention in care (Ministry of Health, 2022, 2023). Despite these efforts, youth adherence to ART in the district has remained persistently low, and attendance for ARV refills has been reported as irregular (Ministry of Health, 2022). To design interventions that are properly targeted, it is necessary to understand which factors, beyond general programmatic effort, are actually associated with adherence behaviour among youth in this setting. The wider study from which this article is drawn therefore pursued two objectives: first, to examine the level of ART adherence among youth in selected Health Centre IVs in Isingiro District, and second, to establish the other factors associated with that adherence. The first objective has been reported elsewhere; this article addresses the second objective, namely, to establish the factors associated with adherence to ART among youth with HIV/AIDS receiving long-term ART in selected Health Centre IVs in Isingiro District.

The study was guided by the Health Belief Model (HBM), originally developed by Rosenstock, Hochbaum, Kegeles, and Leventhal to explain health-related behaviour change (Champion & Skinner, 2008, as cited in the parent study). The HBM proposes that behaviour such as ART adherence is shaped by perceived susceptibility to the consequences of non-adherence, perceived severity of those consequences, the perceived benefits of adherence relative to the perceived barriers to it, and the presence of cues to action. Within this framework, the four factor domains examined in this study, namely peer and social support, individual and socio-economic characteristics, drug-related factors, and health facility factors, correspond to the perceived barriers and enabling conditions that the HBM identifies as central to sustaining health behaviour over time.

Empirically, prior studies conducted mainly in urban and peri-urban Ugandan settings have linked ART adherence among youth to social networks and peer support (Ajuna et al., 2021), family cohesion and social support (Damulira et al., 2019; Nabunya et al., 2020), the presence of treatment supporters (Nakamanya et al., 2019), and structural and psychosocial barriers including stigma, disclosure fears, and orphanhood-related hardship (MacCarthy et al., 2018; Jjumba et al., 2022). However, these studies have not been conducted exhaustively in rural districts, and specifically not in Isingiro District, even though youth there live alongside peers accessing ART from the same facilities, a factor that could plausibly influence adherence but whose contribution has remained undocumented locally (Murray et al., 2017). This gap in locally grounded evidence on the social, individual, drug-related, and health-system determinants of ART adherence among rural Ugandan youth motivated the present study.

2 METHODOLOGY

2.1 Study Design

This article is drawn from a wider study that examined the factors associated with adherence to ART among youth receiving long-term ART in selected Health Centre IVs in Isingiro District, Uganda. The specific analyses reported here relate to the second objective of that study. A cross-sectional research design, correlational in nature, was adopted because data were collected at a single point in time to establish whether significant associations existed between the study variables and ART adherence. The design was nested within a mixed-methods approach, combining structured questionnaires administered to youth on ART with in-depth interviews of HIV/AIDS counsellors and peer educators, in order to generate a more comprehensive and nuanced understanding of the factors associated with adherence.

2.2 Study Area and Population

The study was conducted in four government Health Centre IVs in Isingiro District, south-western Uganda, namely Rugaaga, Rwekubo, Kabuyanda, and Nyamuyanja. These facilities were selected because, as Health Centre IVs, they offer a higher level of HIV care, including comprehensive services and the capacity to manage more complex cases referred from lower-level facilities. The study population comprised approximately 3,000 youths aged 18–30 years receiving ART from the selected facilities, together with the HIV/AIDS counsellors and peer educators working within them.

2.3 Sample Size and Sampling Techniques

The sample size for youth was determined using Cochran's (1963) formula for cross-sectional studies, applying a 95% confidence level, a 5% margin of error, and an estimated 40% proportion of youth willing to provide information on this sensitive subject, yielding a minimum requirement that was rounded up to 369 respondents. Data were collected from 361 youths on ART, in addition to all 4 counsellors and 4 peer educators serving the selected facilities. Stratified random sampling was used to select youth respondents, with each of the four Health Centre IVs treated as a stratum; within each facility, official ART clinic days were used to identify eligible youth, who were then selected by simple random (lottery) sampling until the required number per stratum was reached. All counsellors and peer educators at the four facilities were purposively selected because they represented the entire population of health workers directly engaged in ART adherence support at these sites.

2.4 Data Collection Methods and Instruments

Quantitative data were collected using a structured, largely self-administered questionnaire adapted from Uganda's Ministry of Health (2020) consolidated guidelines for the prevention and treatment of HIV/AIDS, covering socio-demographic characteristics, ART adherence, and the four factor domains of peer/social support, individual and socio-economic characteristics, drug-related factors, and health facility factors, using Likert-type and closed-ended items. Qualitative data were collected through in-depth, semi-structured interviews with counsellors and peer educators, lasting between 30 minutes and one hour, exploring how ART adherence is practised, monitored, and influenced by these same factor domains.

2.5 Validity and Reliability

Content validity of the questionnaire was established through expert judgement, yielding an average Content Validity Index (CVI) of 0.86 across all variable scales, above the recommended threshold of 0.70 (Dean, 2021). Qualitative validity was established by pre-testing the interview guides with HIV/AIDS counsellors in public health facilities in neighbouring Mbarara District, a setting with comparable demographic and clinical characteristics. Reliability of the quantitative instrument was assessed through a pilot study with 10 respondents from a non-study facility, yielding an overall Cronbach's alpha of 0.82, with subscale alphas ranging from 0.78 to 0.85, all above the 0.70 benchmark for internal consistency (Dean, 2021). Reliability of the qualitative guides was supported through consistent interviewer probing techniques and full audio-recording and verbatim transcription of interviews (Cypress, 2017).

2.6 Data Analysis

Quantitative data were analysed using Stata version 17. Descriptive statistics summarised response rates and demographic characteristics. A two-stage inferential procedure was then applied separately within each of the four factor domains. First, bivariate ordinal logistic regression was run for each independent variable against the three-level ordinal adherence outcome (good ≥95%, fair 85–94%, poor <85%) to screen variables associated with adherence at $p<0.10$. Second, variables meeting this threshold within each domain were entered together into a multivariate binary logistic regression model, with adherence dichotomised as good versus suboptimal (fair and poor combined), to obtain adjusted odds ratios (AOR), 95% confidence intervals, and p-values, identifying which variables remained independently significant after mutual adjustment. This procedure was repeated for the social support, individual, drug-related, and health facility domains. Qualitative data from interviews were audio-recorded, transcribed verbatim, and analysed using thematic-content analysis, involving concentration of sentences into shorter statements, coding, and grouping into themes and sub-themes corresponding to the four factor domains (Brinkmann & Kvale, 2017).

2.7 Ethics Approval and Consent to Participate

Ethical clearance was obtained from the Bishop Stuart University Research Ethics Committee, and permission was subsequently obtained from the Isingiro District Health Office prior to data collection at the four Health Centre IVs. Written and verbal informed consent was obtained from all participants after explaining the study's purpose, procedures, and voluntary nature. The data collection tools did not require respondents' names or other identifying information, and confidentiality was maintained throughout data collection, analysis, and reporting.

3 FINDINGS

The study targeted 369 respondents: 361 youths aged 18–30 years receiving ART, four counsellors, and four peer educators. A total of 249 participated, comprising 243 youths, three counsellors, and three peer educators, giving a quantitative response rate of 67.3% and a qualitative response rate of 75%, both of which exceed the 60% threshold generally considered adequate for reliable findings in social science and health research (Babbie, 2016; Fincham, 2008). Females slightly outnumbered males (56.8% versus 43.2%), and the majority of respondents (54.7%) were aged 26–30 years. This section presents findings on the factors associated with ART adherence across four domains: social support, individual, drug-related, and health facility factors.

3.1 Social Support Factors Associated with ART Adherence

Bivariate ordinal logistic regression showed that among social support variables, having friends who accessed HIV/AIDS services at the same health facility (OR=2.61, 95%CI=1.17–5.86, p=0.020) and holding free conversations about HIV/AIDS medication with friends (OR=2.43, 95%CI=1.09–5.45, p=0.031) were significantly associated with worse adherence when the answer was "No" rather than "Yes." Having friends on ART and having reliable friends in times of need showed borderline associations (p=0.054 and p=0.089, respectively). All remaining social support variables, including having workmates or family members on ART, and perceived trustworthiness or confidentiality of friends, were non-significant (p>0.10).

Table 1 presents the multivariate model for social support factors, restricted to variables with univariate p<0.10.

Table 1: Multivariate Analysis of Social Support Factors Associated with ART Adherence

Variable	Category	High Adherence n (%)	Low Adherence n (%)	AOR	95% CI	p-value
Friends reliable in times of need	No	28 (75.7)	9 (24.3)	1.00		
	Yes	168 (86.2)	27 (13.8)	0.45	0.18–1.12	0.085
Friends on ART	No	21 (72.4)	1 (3.5)	1.00		
	Yes	182 (86.3)	2 (0.9)	0.27	0.01–12.98	0.507
Friends receiving services at same facility	No	27 (71.1)	1 (2.6)	1.00		
	Yes	173 (86.5)	2 (1.0)	0.52	0.01–45.39	0.670
Free conversations about HIV medication with friends	No	30 (73.2)	1 (2.4)	1.00		
	Yes	166 (86.9)	2 (1.1)	1.46	0.01–162.28	0.875

AOR = Adjusted Odds Ratio; CI = Confidence Interval. Source: Primary Data (2026).

After mutual adjustment, none of the social support variables retained statistical significance in the multivariate model, although the direction of effect for friendship reliability and facility co-engagement remained consistent with the bivariate results. This pattern suggests that peer service co-engagement and open HIV communication are the more robust bivariate predictors of adherence, while broader friendship qualities such as trustworthiness or confidentiality alone are insufficient without active, treatment-related engagement.

Qualitatively, counsellors and peer educators described peer relationships as highly influential. A peer educator at Health Centre IV 1 explained that peer support works by "sharing experiences that reduce…stigma…[and] strengthen their relationship," while a counsellor at Health Centre IV 2 noted that peer relationships reduce isolation "by providing emotional and informative support and offering instrumental help for challenges like food, security and transportation." Respondents at Health Centre IV 4 further emphasised the motivational role of visible peer recovery, with a counsellor observing that "when stories are shared among peers, it gives hope…which has motivated youth to take drugs, thus good adherence." However, a counsellor at Health Centre IV 3 also identified a darker side to peer influence, recounting circulating narratives such as "that once you're positive you will never reach old age," illustrating how misinformation among peers can undermine confidence in treatment. Taken together, the qualitative evidence indicates that peer influence operates as a double-edged force, capable of promoting adherence through shared experience and support, while also undermining it where misinformation and stigma go unaddressed.

3.2 Individual Factors Influencing ART Adherence

Bivariate analysis showed that among individual-level factors, the absence of a family drug or pill companion was the strongest predictor of worse adherence (OR=4.40, 95%CI=2.11–9.17, p<0.001). Alcohol consumption was also strongly associated with worse adherence (OR=0.26, 95%CI=0.13–0.53, p=0.001 for non-drinkers versus drinkers), as were single marital status (OR=2.31, 95%CI=1.01–5.27, p=0.046), household decision-making by the husband rather than the wife (OR=0.42, 95%CI=0.18–0.98, p=0.046), and unemployment (OR=0.44, 95%CI=0.21–0.93, p=0.031). Monthly income and number of children were not significantly associated with adherence (p>0.10).

Table 2: Multivariate Analysis of Individual Factors Associated with ART Adherence

Variable	Category	High Adherence n (%)	Low Adherence n (%)	AOR	95% CI	p-value
Family drug/pill companion	No	34 (65.4)	18 (34.6)	1.00		
	Yes	184 (89.3)	20 (10.7)	0.22	0.11–0.47	0.001
Alcohol consumption	No	165 (88.7)	21 (11.3)	1.00		
	Yes	36 (66.7)	18 (33.3)	1.73	0.79–3.79	0.170
Employment status	Employed	46 (75.4)	15 (24.6)	1.00		
	Unemployed	145 (87.3)	21 (12.7)	1.01	0.44–2.36	0.974

AOR = Adjusted Odds Ratio; CI = Confidence Interval. Source: Primary Data (2026).

After adjustment, the absence of a family drug/pill companion remained the strongest independent predictor of worse adherence (AOR=0.22, 95%CI=0.11–0.47, p=0.001, for having a companion versus not), while alcohol consumption showed a borderline independent association (AOR=1.73, 95%CI=0.79–3.79, p=0.170), and employment status lost significance after adjustment (AOR=1.01, 95%CI=0.44–2.36, p=0.974), suggesting its bivariate association may have been confounded by companion status or alcohol use.

Qualitative accounts reinforced these patterns. A peer educator at Health Centre IV 1 described overlapping individual-level challenges, including "lack of disclosure at school, discrimination/stigma…orphanage (lack of basic needs, food)…and long distances to facilities." A counsellor at Health Centre IV 2 similarly reported that "most youth have a fear to disclose their status to family and friends in order to avoid stigma and discrimination…[and] have economic challenges because some lost their parents." The counsellor at Health Centre IV 3 further identified "psychosocial issues: forgetfulness, substance abuse, stigma and disclosure, side effects of drugs, distance, treatment literacy" as recurring behavioural barriers, corroborating the quantitative finding that family support and abstention from alcohol are central to sustaining adherence.

3.3 Drug-Related Factors Influencing ART Adherence

Table 3: Multivariate Analysis of Drug-Related Factors Associated with ART Adherence

Variable	Category	High Adherence n (%)	Low Adherence n (%)	AOR	95% CI	p-value
Second thoughts about continuing ART	No	128 (90.8)	13 (9.2)	1.00		
	Yes	64 (72.7)	24 (27.3)	3.58	1.71–7.50	0.001
Side effects discourage ARV intake	No	161 (88.5)	21 (11.5)	1.00		
	Yes	14 (73.7)	5 (26.3)	0.60	0.13–2.84	0.524
Missed ARV doses in past month	No	128 (86.5)	20 (13.5)	1.00		
	Yes	56 (76.7)	17 (23.3)	0.68	0.29–1.55	0.355

AOR = Adjusted Odds Ratio; CI = Confidence Interval. Source: Primary Data (2026).

Only one drug-related variable was significantly associated with adherence in the bivariate analysis: having second thoughts about continuing ART due to treatment duration (OR=0.28, 95%CI=0.13–0.58, p=0.001 for no second thoughts versus having them), underscoring that treatment fatigue was the strongest drug-related determinant of non-adherence. Borderline associations were found for side effects discouraging ARV intake (p=0.151) and missed doses in the preceding month (p=0.039). Viral load suppression status, concurrent medication use, and perceived treatment duration were not significantly associated with adherence (p>0.10 in each case).

In the multivariate model, having second thoughts about continuing ART remained the dominant, statistically significant, independent predictor of worse adherence (AOR=3.58, 95%CI=1.71–7.50, p=0.001), while side effects discouraging intake and missed doses lost independent significance after adjustment, suggesting that these factors may be mediated by underlying treatment fatigue rather than acting as independent barriers.

Qualitatively, respondents described a spectrum of drug-related challenges. A peer educator at Health Centre IV 2 reported side effects including "fatigue, digestive issues like diarrhoea, dizziness, mood change and rashes," while responses varied across facilities, with Health Centre IV 4 respondents reporting far fewer side effects. Pill burden was highlighted especially among youth co-infected with tuberculosis, with a counsellor at Health Centre IV 4 noting that "patients on Anti-TBs have been very challenged with pill burden." The counsellor at Health Centre IV 3 also confirmed that negative perceptions about drug toxicity sometimes lead youth to discontinue treatment altogether: "yes, yes, and some stop taking it, which affects adherence." These accounts illustrate that drug-related barriers range from manageable side effects to outright treatment discontinuation driven by fear or fatigue.

3.4 Health Facility Factors Affecting ART Adherence

Among health facility factors, experiencing delays in being attended to at the health facility was the only variable significantly associated with adherence in the bivariate analysis (OR=0.23 for no delay versus delay, 95%CI=0.07–0.76, p=0.016). Payment for HIV/AIDS counselling services showed a borderline association (p=0.051), though this estimate was unstable given the very small number of fee-payers (n=3). Other health facility variables, including prior non-attendance, waiting time, missing drugs, health-worker attitude, and client-load perceptions, were not statistically significant (p>0.10).

Table 4: Multivariate Analysis of Health Facility Factors Associated with ART Adherence

Variable	Category	High Adherence n (%)	Low Adherence n (%)	AOR	95% CI	p-value
Delayed to be attended to	No	194 (85.1)	34 (14.9)	1.00		
	Yes	7 (58.3)	5 (41.7)	4.32	1.29–14.41	0.017
Pay for medical/counselling services	No	199 (84.3)	37 (15.7)	1.00		
	Yes	1 (33.3)	2 (66.7)			

Source: Primary Data (2026).

In the multivariate model, delayed attendance remained the only statistically significant predictor, with youth who experienced delays showing over four times higher odds of being in a worse adherence category compared with those who experienced no delay (AOR=4.32, 95%CI=1.29–14.41, p=0.017).

Qualitative accounts corroborated the centrality of service delays and access barriers. Respondents reported facility waiting times ranging from under an hour to as long as three hours, with a peer educator at Health Centre IV 2 stating that "the waiting time can be 128 minutes to 193 minutes, which is around 1 to 3 hours." Transport costs and distance were also cited as major access barriers, with a counsellor at Health Centre IV 4 noting that "some patients have to incur transport of almost 10,000 shillings, which is a challenge to most patients." At the same time, the counsellor at Health Centre IV 3 reported that the facility was "well equipped with medication," though it lacked a dedicated counselling room, potentially compromising the privacy of adherence counselling. Together, these findings indicate that health system factors shape adherence primarily through service efficiency and physical accessibility rather than through commodity availability.

4 DISCUSSION

4.1 Social Factors Associated with ART Adherence

The most significant social finding is that active peer engagement in HIV/AIDS services, specifically having friends who access services at the same facility and holding open conversations about medication, emerged as the most important bivariate peer-level correlates of adherence, even though these associations attenuated after multivariate adjustment. This finding refines the broader framing of peer influence as a generalised social support phenomenon by identifying two precise behavioural mechanisms, service co-engagement and open communication, through which peers appear to shape treatment behaviour. This is consistent with evidence from Uganda showing that social networks and family

cohesion are linked to ART adherence among young people (Ajuna et al., 2021; Damulira et al., 2019). At the same time, the finding that broader friendship qualities, such as perceived trustworthiness or reliability, were not independently significant tempers the assumption that social support is uniformly beneficial; rather, it appears that the specific content of peer interaction, not its mere presence, drives adherence outcomes. Qualitatively, this was reinforced by accounts of peer-driven misinformation, echoing evidence that stigma and misinformation within social networks can act as barriers to adherence even where peer relationships are otherwise supportive (Jjumba et al., 2022).

4.2 Individual Factors Influencing ART Adherence

The dominance of family drug/pill companionship as the strongest individual-level predictor of adherence, both in bivariate and multivariate analysis, establishes the family, rather than the individual alone, as the primary unit of treatment responsibility for youth in this setting. This is consistent with evidence that treatment supporters assist with medication reminders, clinic attendance, and psychosocial coping, and that their presence is associated with improved adherence self-efficacy among adolescents and youth living with HIV (Nakamanya et al., 2019; Nabunya et al., 2020). Alcohol consumption emerged as the second most important individual-level factor; because alcohol use is a modifiable behavioural risk factor, this finding suggests that routine substance-use screening and counselling should be integrated into youth ART care rather than treated as a peripheral concern. Marital status and household decision-making patterns were also significant in the bivariate analysis, suggesting that stable, supportive family and household structures reinforce adherence, plausibly through shared routines and reduced social isolation. Qualitatively, counsellors and peer educators consistently linked individual-level adherence risk to stigma, fear of disclosure, and orphanhood-related economic hardship, echoing prior qualitative work with adolescents and youth living with HIV in Uganda that grouped adherence barriers into themes of poverty, family support, and psychosocial burden (MacCarthy et al., 2018).

4.3 Drug-Related Factors Influencing ART Adherence

Treatment fatigue, captured through youths' second thoughts about continuing lifelong ART, was the single most important and statistically robust drug-related predictor of adherence in both the bivariate and multivariate analyses. Unlike structural barriers, treatment fatigue is an internally driven phenomenon that cannot be resolved through infrastructure improvements alone; it requires sustained motivational and psychosocial engagement with youth who must continually recommit to a lifelong regimen, often in the absence of the acute illness cues that motivate adherence among the newly diagnosed. That the effect of side-effect discouragement and missed doses attenuated after adjusting for treatment fatigue suggests these are interconnected phenomena, with fatigue potentially representing the more fundamental underlying construct. This pattern points to a practical implication: counselling addressing side effects and counselling addressing long-term treatment commitment should be delivered together rather than as separate, siloed interventions. Qualitatively, the observation that fixed-dose combination therapy has reduced pill burden compared with earlier regimens is an encouraging signal that treatment simplification may be contributing to the generally high adherence levels observed in this setting, consistent with the broader literature on ART regimen simplification and adherence (Twekambe et al., 2023).

4.4 Health System Factors Affecting ART Adherence

The finding that delayed attendance at the health facility was independently associated with more than four times the odds of worse adherence demonstrates that institutional inefficiency is not a neutral background condition but an active driver of non-adherence. This has a direct and encouraging implication for health administrators: because clinic operational efficiency, unlike drug availability or health worker attitudes in this sample, was significant even after adjustment, targeted appointment-system reforms and streamlined client flow could plausibly improve adherence outcomes without requiring new drugs or additional health workforce. That most other health facility variables, including drug stock-outs and health worker attitude, were not significant may reflect the effectiveness of Uganda's free ART policy and relatively stable supply chains in the study facilities (Ministry of Health, 2022), suggesting that the remaining health system challenge in this setting is one of service delivery efficiency rather than service availability. Qualitatively, respondents consistently identified waiting times and transport costs as the most tangible barriers to regular attendance, corroborating evidence that structural and financial access barriers, rather than commodity shortages, are the more consequential health system determinants of adherence among youth in resource-limited settings (Murray et al., 2017).

Taken together, the findings across the four domains indicate that ART adherence among youth in Isingiro District is not determined by any single dominant factor but by an interacting set of family, psychological, and structural conditions. Family companionship anchors individual-level adherence, treatment fatigue represents the central internal drug-related barrier, and facility delays represent the central external structural barrier, while peer influence exerts an important but more context-dependent effect. This pattern is broadly consistent with the perceived-barriers component of the Health Belief Model, which frames adherence as contingent on the balance between the benefits of treatment and the practical, psychological, and social obstacles youth must overcome to sustain it.

5 CONCLUSION

The study concludes that ART adherence among youth receiving long-term treatment in selected Health Centre IVs in Isingiro District is shaped by an interacting web of social, individual, drug-related, and health system factors rather than by any single overriding determinant. Active peer co-engagement in HIV services and open medication communication were the most relevant bivariate social predictors, although their effect did not persist after multivariate adjustment, underscoring that the quality and specificity of peer interaction matters more than peer presence alone. The absence of a family drug/pill companion and alcohol consumption were the dominant individual-level predictors, establishing the family, rather than the individual, as the central unit of adherence support. Treatment fatigue, reflected in youths' second thoughts about continuing lifelong therapy, was the most robust drug-related predictor, while facility delays were the most robust health system predictor, each remaining significant after adjustment for other variables within its domain. Collectively, these findings confirm that sustaining high ART adherence among youth in this rural district requires parallel attention to family-based support systems, psychological engagement around long-term treatment commitment, and health facility operational efficiency.

Recommendations

Based on the findings and conclusions, the following recommendations are made to health facility managers, the Isingiro District Health Office, and the Ministry of Health:

Health facilities should formalise family pill-companion support by identifying, training, and integrating family treatment supporters into routine ART clinic protocols for youth, given that the absence of such a companion was the strongest independent predictor of worse adherence. Alcohol screening and brief counselling should also be incorporated as a standard component of youth ART initiation and follow-up care.

Programme designers should restructure peer support interventions, including the Ministry of Health's YAPS model, to prioritise structured co-engagement in HIV services and facilitated, accurate medication conversations between peers, rather than relying on generic peer contact, since these specific behaviours, and not peer relationships in general, were most strongly associated with adherence in this study.

Healthcare providers should integrate regular motivational counselling into ART follow-up schedules for youth to address treatment fatigue directly, with particular attention to periods when fatigue is likely to intensify, such as the transition from adolescence into adulthood. Continued investment in simplified, fixed-dose combination regimens should also be sustained, as this appears to be easing pill burden and supporting adherence.

Health facility managers should prioritise appointment-system reforms and improvements to client flow as an immediate, low-cost intervention to reduce waiting times, given that delayed attendance was the strongest independent health-system predictor of worse adherence. The Isingiro District Health Office should conduct facility-level assessments to identify the specific sources of delay at each site, while district and national authorities should scale up differentiated service delivery models, including community-based ART refill points and multi-month dispensing for stable youth clients, to reduce the transport and distance burden identified qualitatively.

Future studies should adopt longitudinal designs to examine how ART adherence trajectories, and the relative influence of family, peer, drug-related, and health system factors, evolve over time among youth, and should further investigate the influence of stigma, depression, and mental health on adherence in Isingiro District and comparable rural settings using approaches capable of capturing the depth of individual experience that a cross-sectional design cannot provide.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Acknowledgments

The authors thank the youth, counsellors, and peer educators at Rugaaga, Rwekubo, Kabuyanda, and Nyamuyanja Health Centre IVs for their time and willingness to participate in this study. Appreciation is also extended to the Isingiro District Health Office and Bishop Stuart University for their support during the conduct of this research.

Disclosure of conflict of interest

The authors declare no competing interests.

Consent for Publication

All authors consented and approved the manuscript to be submitted for publication.

Availability of Data and Materials

The data supporting the findings of this article are available from the corresponding author upon reasonable request.

Authors' Contributions

Kalega William conceptualised the study, collected and analysed the data, and prepared the original draft of the manuscript. Anne Otwine Tweheyo and Jordan Amanyire supervised the study and reviewed and edited the manuscript. All authors read and approved the final manuscript.

Statement of informed consent

Informed consent was obtained from all youth participants and key informants after explaining the study's purpose, confidentiality, and voluntary participation.

REFERENCES

[1] Ajuna, N., Tumusiime, B., Amanya, J., Awori, S., Rukundo, G. Z., & Asiimwe, J. B. (2021). Social networks and barriers to ART adherence among young adults (18–24 years) living with HIV at selected primary health facilities of South-Western Uganda: A qualitative study. HIV/AIDS-Research and Palliative Care, 13, 939–958.

[2] Babatunde, A. O., Akin-Ajani, O. D., Abdullateef, R. O., Togunwa, T. O., & Isah, H. O. (2023). Review of antiretroviral therapy coverage in 10 highest burden HIV countries in Africa: 2015–2020. Journal of Medical Virology, 95(1), e28320.

[3] Babbie, E. (2016). The practice of social research (14th ed.). Cengage Learning.

[4] Brinkmann, S., & Kvale, S. (2017). Ethics in qualitative psychological research. In The Sage handbook of qualitative research in psychology (pp. 259–273). Sage.

[5] Cypress, B. S. (2017). Rigor or reliability and validity in qualitative research: Perspectives, strategies, reconceptualization, and recommendations. Dimensions of Critical Care Nursing, 36(4), 253–263.

[6] Damulira, C., Mukasa, M. N., Byansi, W., Nabunya, P., Kivumbi, A., Namatovu, P., Namuwonge, F., Dvalishvili, D., Sensoy Bahar, O., & Ssewamala, F. M. (2019). Examining the relationship of social support and family cohesion on ART adherence among HIV-positive adolescents in southern Uganda: Baseline findings. Vulnerable Children and Youth Studies, 14(2), 181–190.

[7] Dean, D. J. (2021). Clearly communicating conceptions of validity and reliability. In Handbook of research on advancements in organizational data collection and measurements: Strategies for addressing attitudes, beliefs, and behaviors (pp. 27–42). IGI Global.

[8] Fincham, J. E. (2008). Response rates and responsiveness for surveys, standards, and the Journal. American Journal of Pharmaceutical Education, 72(2), 43.

[9] Jjumba, I., Kanyesigye, M., Ndagijimana, G., Wattira, J., Olong, C., Olok, R. A., Beebwa, E., & Muzoora, C. (2022). Perceived barriers and facilitators to antiretroviral therapy adherence among youth aged 15–24 years at a regional HIV clinic in South-Western Uganda: A qualitative study. African Health Sciences, 22(2), 54–62.

[10] Kamau, S. G., Akatusasira, R., Namatovu, A., Kibet, E., Ssekitto, J. M., Mamun, M. A., & Kaggwa, M. M. (2024). The level of antiretroviral therapy (ART) adherence among orphan children and adolescents living with HIV/AIDS: A systematic review and meta-analysis. PLOS ONE, 19(2), e0295227.

[11] MacCarthy, S., Saya, U., Samba, C., Birungi, J., Okoboi, S., & Linnemayr, S. (2018). How am I going to live?: Exploring barriers to ART adherence among adolescents and young adults living with HIV in Uganda. BMC Public Health, 18, 1–11.

[12] Ministry of Health. (2022). Scaling up ART adherence: Progress and challenges. Ministry of Health.

[13] Ministry of Health. (2023). The YAPS model. Ministry of Health.

[14] Ministry of Health Uganda. (2020). Consolidated guidelines for prevention and treatment of HIV and AIDS in Uganda. Ministry of Health.

[15] Murray, K. R., Dulli, L. S., Ridgeway, K., Dal Santo, L., Darrow de Mora, D., Olsen, P., Silverstein, H., & McCarraher, D. R. (2017). Improving retention in HIV care among adolescents and adults in low- and middle-income countries: A systematic review of the literature. PLOS ONE, 12(9), e0184879.

[16] Nabunya, P., Bahar, O. S., Chen, B., Dvalishvili, D., Damulira, C., & Ssewamala, F. M. (2020). The role of family factors in antiretroviral therapy (ART) adherence self-efficacy among HIV-infected adolescents in southern Uganda. BMC Public Health, 20, 1–9.

[17] Nakamanya, S., Mayanja, B. N., Muhumuza, R., Bukenya, D., & Seeley, J. (2019). Are treatment supporters relevant in long-term Antiretroviral Therapy (ART) adherence? Experiences from a long-term ART cohort in Uganda. Global Public Health, 14(3), 469–480.

[18] Shrestha, S., Chataut, S., Kc, B., Acharya, K., Pradhan, S. K., & Shrestha, S. (2023). Knowledge, attitude, practice, and adherence to antiretroviral therapy among people living with HIV in Nepal. AIDS Research and Treatment, 2023.

[19] Ssemakula, D. M., Balinda, S. N., Mayanja, Y., Kamacooko, O., Abaasa, A., & Seeley, J. (2025). Adherence to antiretroviral therapy among female sex workers in Kampala Uganda. medRxiv. https://doi.org/10.1101/2025.03.19.25324247

[20] Twekambe, E., Epuitai, J., Kawala, E. K., Namanya, V., Ayikobua, E. T., Obakiro, S. B., Napyo, A., & Kiyimba, K. (2023). A qualitative exploration of the psychosocial factors affecting antiretroviral therapy adherence among HIV infected young adults in Eastern Uganda. medRxiv. https://doi.org/10.1101/2023.02.04.23285423

[21] van Heuvel, Y., Schatz, S., Rosengarten, J. F., & Stitz, J. (2022). Infectious RNA: Human immunodeficiency virus (HIV) biology, therapeutic intervention, and the quest for a vaccine. Toxins, 14(2), 138.