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Review article

# Peer-Led Models for Improving HIV Treatment and Care Outcomes Among Adolescents and Young People Living with HIV in Eastern and Southern Africa: A Rapid Review

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A B S T R A C T

Adolescents and Young People Living with HIV have poor levels of adherence to treatment and retention in care. Previous reviews highlighted the need for high-quality evidence on peer-led interventions for improving HIV treatment outcomes among Adolescents and Young People Living with HIV aged 10–24 years. We conducted a rapid review of such interventions in Eastern and Southern Africa, searching Google Scholar, PubMed, Scopus, and ProQuest for articles published between January 2017 and December 2024. The search yielded 1,642 articles; 13 met the inclusion criteria. Studies were conducted in nine countries (Ethiopia, Kenya, Lesotho, Malawi, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe). Interventions were primarily facility-based (7), with others being community-based (3), digital/remote (2), or hybrid (1). Four studies were randomized controlled trials, indicating stronger evaluation designs than previous reviews. Despite variations in design and outcomes, most studies demonstrated that peer-led models improved ART adherence, retention in care, and/or viral suppression. Most effective models focus on psychosocial support, frequent contact with adolescents, parenting/caregiver support, home visits, and supervision for peer supporters. Facility-based programs succeeded when offering fast-track services, weekend hours, youth-friendly approaches, and psychosocial support. While mobile health interventions showed initial promise, their long-term effectiveness remains unproven.


**IMPLICATIONS AND CONTRIBUTIONS**

Adolescents and young people with HIV face significant challenges staying in treatment without adequate support. This review identifies effective peer-led intervention models that improve treatment adherence and retention, providing health-care providers and policymakers with evidence-based approaches to enhance HIV outcomes among this vulnerable population.

**Conflict of Interest:** The authors have no conflicts of interest to declare.

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While antiretroviral (ARV) treatment has led to a decrease in HIV-related deaths among adults, adolescents aged 13–24 years are an exception [1]. In 2015, the world witnessed more than 100 adolescents dying from AIDS every day, with global mortality rates among those aged 10–19 years more than doubling from 18,000 to 41,000 deaths [2]. This devastating trend is likely because adolescents are more prone to not adhere to treatment regimes, miss appointments, and become lost to follow-up from care programs [3]. The current situation demands an urgent focus on designing, implementing, and testing innovative interventions and service models to improve treatment retention and continuity of care for young people [3]. TheResilient and Empowered Adolescents and Young People (READY +) intervention, currently being implemented in some six countries in Southern Africa, is one such intervention [4]. The READY + intervention addresses these challenges through a multi-level approach. At the health facility level, they provide adolescent-friendly services, including HIV testing, antiretroviral treatment (ART) provision, viral load monitoring, and comprehensive sexual and reproductive health and rights services. At the community level, Community Adolescent Treatment Supporters (CATS) create safe spaces through support groups and youth clubs, conduct home visits, provide sexual and reproductive health and rights counseling, and facilitate referrals to health facilities. At the facility, CATS provide treatment literacy, adherence counseling, and navigation support [4].

In 2019, Casale et al. conducted a literature review examining 10 studies from 2016 to 2018 that focused on interventions to keep adolescents and youth engaged in HIV care, primarily in sub-Saharan Africa [3]. The review identified interventions in the following categories: youth-friendly clinic services, community- and household-based interventions, an mHealth intervention, and a placebo pill trial. While not all interventions were strictly peer-led, some included peer components. Youth-friendly clinic interventions, which sometimes incorporated peer counseling or support groups, showed mixed results. Community-based interventions, including some with peer education elements, showed promise. The mHealth (Short Message Service [SMS] reminder) and placebo pill interventions, which did not involve peer components, did not show significant effects. Moreover, the review found that there were few studies for each intervention type and that the quality was inconsistent. As a result, they recommended more high-quality studies on adolescents and youth, focusing on multifaceted interventions that address broader barriers to adherence.

Given the identified need for additional studies with stronger evidence and for updating the Casale review, we conducted a rapid literature review of publications from 2017 to 2024. The purpose of this review was to capture the most recent evidence on peer-led support interventions for adolescents and young people living with HIV in Eastern and Southern Africa. In addition to assessing the outcomes of peer-led programs for Adolescents and Young People Living with HIV (AYPLHIV), we were interested in understanding the role of community involvement in interventions that go beyond the individual.

The specific objectives were to:

1. Assess the evidence for the effectiveness of peer-led interventions for AYPLHIV in Eastern and Southern Africa (ESA) published since 2017.
2. Determine which intervention characteristics (e.g., specific activities, delivery methods) were associated with greater effectiveness, including whether multi-level interventions were more effective than single-level interventions focused solely on peer support.
3. Identify implementation factors (e.g., resources, training) that enhanced or hindered the effectiveness of these interventions.

## Methods

A search was conducted to identify relevant studies. The search strategy was developed based on the PICO framework (Population, Intervention, Comparison/Context, and Outcome) (Table 1). The search encompassed studies published in English between January 1, 2017, and December 31, 2024.

### *Study selection*

Studies were eligible if they met the following criteria: conducted in Eastern and Southern Africa; included HIV-positive participants aged 10–24 years enrolled in treatment and care programs; reported on at least one outcome of interest (viral suppression, ART adherence, or retention in care); used quantitative or mixed-methods research designs; and were published in English from January 2017 onwards. For age-specific terminology, we defined adolescents as aged 10–19 years and youth as aged 15–24 years, using 'young people' when referring to the entire 10–24-year age group. If the same intervention was evaluated in different studies, these were included if the outcomes or study designs differed. Reasons for exclusion of studies included location outside of Eastern and Southern Africa, use of solely qualitative methods, a sample size of less than 50 participants ($n < 50$), failure to focus on young people living with HIV or provide separate data for this age group, publication type (e.g., editorials, commentaries, reviews, and conference abstracts), and publication in a language other than English.

Two authors (NPM and RW) conducted a broad screening of titles and abstracts. Then, all the identified articles were divided in half, with each author screening one half to remove clearly irrelevant studies. Next, the remaining list of potentially eligible articles underwent a more detailed, independent review by two authors (CBF and NPM). Working independently, they assessed each article and recorded their decision to include or exclude it, providing reasons for each, on a standardized spreadsheet. Finally, the two reviewers (CBF and NPM) met to compare their decisions. For any articles where there was a disagreement on the title and abstract, a third author (RW) acted as an arbiter to make the final decision. The same independent review and arbitration process were then applied to the full-text assessment of all remaining articles to determine inclusion in the study. The study selection process was documented using apreferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram (Figure 1).

### *Data abstraction and analysis*

One reviewer [NPM] extracted data from all included studies using a predefined data extraction form. A second reviewer

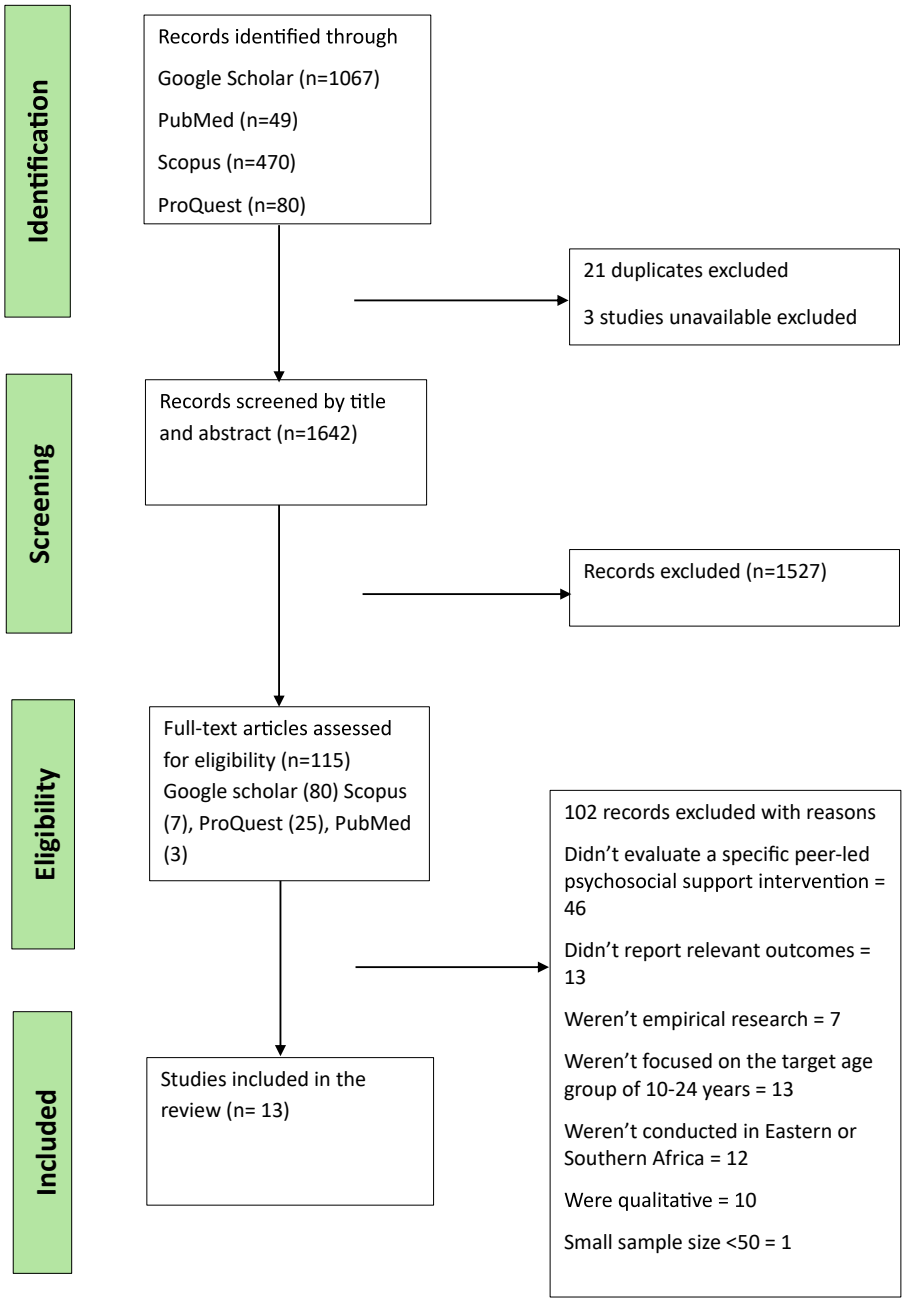


**Figure 1.** PRISMA diagram.

[RW] checked the extracted data for accuracy and completeness. Any discrepancies were resolved through discussion. The form captured the following variables: author(s), publication year, intervention description, study design, study location, data collection, outcome measures, population characteristics, and key findings. Due to the rapid nature of this review, a narrative synthesis of the findings was conducted. This involved summarizing the characteristics of included studies and presenting the findings related to the effectiveness of peer-led interventions on the predefined outcomes. Interventions were categorized as either facility-based, community-based, hybrid (facility-community–based) or digital/remote, indicating where the focus of the intervention was located. Where possible, data were presented in tables to compare across studies.

## Results

### *Studies included*

The initial search on Google Scholar, PubMed, Scopus, and ProQuest yielded 1,666 records. After removing duplicates, 1,642 articles were screened by title and abstract. Of those, 115 articles

were selected for full-text review. Following full-text assessment, 102 articles were excluded for the following reasons: not evaluating a specific peer-led support intervention (n = 46), not reporting relevant outcomes (viral suppression, ART adherence) (n = 13), not representing empirical research (e.g., reviews, protocols) (n = 7), not focusing on the target age group of 10–24 years (n = 13), not conducted in Eastern or Southern Africa (n = 12), using solely a qualitative design (n = 10), and a small sample size of<50 (n = 1). A total of 13 studies met all inclusion criteria and were included in the final review (Figure 1).

### *Characteristics of included studies*

A summary of the included studies, including intervention type and key characteristics, is presented in Table 2. The 13 included studies were conducted across nine countries in Eastern and Southern Africa: Ethiopia [5], Kenya [6,7], Lesotho [7], Malawi [8–10], South Africa [11], Tanzania [12], Uganda [13], Zambia [14], and Zimbabwe [15,16]. Two studies were digital/remote interventions: one mHealth intervention and one eHealth/web-based intervention [7,11]. Six studies were facility-based interventions [5,8–10,12,14], three were community-based [17,15,16], and two were hybrid (facility-community–based) [6,13]. The studies targeted different age groups within the adolescent and youth population: seven focused on adolescents aged 10–19 years [5,8–10,12,15,16], five targeted youth aged 15–24 years [6,7,17,13,14], and one included both adolescents and youth (10–24 years) [10]. Regarding the study design, four studies used randomized controlled trials [17,14–16], three employed a pre-post design [6,7,13], two were case-control studies [8,11], three were cross-sectional studies [5,9,12], and one was a retrospective cohort study [10]. Sample sizes ranged from 81 to 952 participants. Tables 2 and 3 describe the interventions and their effectiveness in achieving the desired outcomes, respectively.

### *Effectiveness of peer-led interventions*

The evidence from the 13 included studies demonstrates that peer-led models are effective at improving key HIV treatment outcomes for AYPLHIV. Despite variations in research design and outcomes measured, most interventions reported positive effects on viral suppression, retention in care, and/or ART adherence. Several interventions led to significantly higher rates of viral suppression. For instance, the Operation Triple Zero (OTZ) program in Ethiopia found that participants had 26 times higher odds of viral suppression compared to those in standard care [5]. Similarly, the Teen Club model in Malawi [10], Project YES! in Zambia [14], and the Zvandiri CATS intervention in Zimbabwe [16] all showed significantly improved viral suppression rates.

These interventions also improved retention in care. The Red Carpet Program in Kenya increased retention at 6 months from 54.4% to 98.6% [6], while participants in Teen Clubs in Malawi were 3.7 times more likely to remain in care [8]. The CATS intervention also showed significantly higher retention rates at 95.1% compared to 36.2% in the control group [15]. Finally, improved ART adherence was a common finding. The CATS program demonstrated that its participants were nearly four times more likely to report adherence [15]. The Teen Club model and the Adolescent Support Club in Tanzania also found that consistent participation in the clubs was associated with better adherence [9,12].

### *Intervention characteristics associated with greater effectiveness*

The most effective interventions were often multi-component, involving frequent and sustained engagement with participants. The CATS intervention, for example, exemplified this approach by combining weekly home visits, support groups, and counseling for both adolescents and their caregivers, resulting in significant improvements in adherence, retention, and viral suppression [15,16]. A key feature of this and other successful models was the formal integration of caregiver and parental support. For instance, the CATS program, Project YES!, and OTZ all incorporated dedicated components for caregivers [5,15,16].

Beyond caregiver support, successful models made services more accessible and youth-friendly. The OTZ program, for example, used “very important persons (VIP) express” cards and dedicated youth spaces to reduce wait times and stigma [5]. Similarly, the Red Carpet Program (hybrid) in Kenya combined facility-based peer navigation with school-based support in boarding schools, leading to dramatic improvements in retention [6]. In contrast, interventions with less intense contact showed limited effects. The Peer Educator-Based Refill of ART (PEBRA) model in Lesotho, where contact was less frequent and psychosocial support was optional, found no significant difference in viral suppression compared to standard care [17]. Likewise, digital-only interventions did not demonstrate sustained long-term effectiveness when used in isolation [7,11].

### *Implementation factors enhancing or hindering effectiveness*

The quality of implementation, particularly the supervision of peer supporters, emerged as a key factor enhancing

**Table 1**
Search strategy

| | |
|---|---|
| Search criteria based on the PICO framework | *Population:* Adolescents (10–19) and youth (15–24) living with HIV and enrolled in an HIV treatment and care program<br>*Intervention of interest:* Peer-led support interventions<br>*Location:* Eastern and Southern Africa<br>*Study design:* Quantitative or mixed methods studies<br>*Outcomes:* Viral suppression OR adherence to ART OR retention in care OR linkage to care |
| Search terms used | "HIV" AND “adolescents” OR “young people” AND ("peer models" OR "peer support" OR "peer led") AND "ART" AND "adherence" AND "Southern and Eastern Africa" |
| Databases searched | Google Scholar, PubMed, Scopus, and ProQuest |
| Limiters | Published between January 1, 2017, and September 30, 2024 |
| Language | English |

PICO = Population, Intervention, Comparison/Context, and Outcome.

**Table 2**
Study characteristics

| Type of intervention | Number of studies | Author | Country | Method | Study period | Total sample | Participants | Intervention |
|---|---|---|---|---|---|---|---|---|
| *Digital/remote interventions* | 2 | Hacking et al. 2019 | South Africa | Matched case-control with in-depth interviews | March 2015 to May 2016 | 105 | 12–25 years | **The Virtual Mentors program** is a youth peer-led mHealth intervention supporting newly diagnosed HIV-positive youths. The intervention includes one-on-one mobile phone-based communication (calls, SMS, and WhatsApp) for 2–8 weeks, providing encouragement, answering questions, and inviting mentees to HIV youth-adherence clubs. |
| | | Ivanova et al. 2019 | Kenya | Pre-post test design | End of 2014 to end of 2015 | 81 | 15–24 years | **ELIMIKA**, a web-based peer support platform for HIV-positive youth aged 15–24 years, implemented by peer volunteers and health-care providers. The intervention featured an interactive website with blogs, discussion forums, Q&A sessions with health-care providers, and private messaging, accessible via clinic computers or personal devices over a 3-month period to support ART adherence and HIV knowledge. |
| *Community-based health service delivery* | 3 | Willis et al. 2019 | Zimbabwe | Randomized control trial | December 2014 to November 2015 | 94 | 10–15 years | **Community Adolescent Treatment Supporters (CATS)** is a peer-led community-based intervention which provides support to adolescents living with HIV (ALHIV) aged 10–24 years. The intervention includes weekly home visits by trained HIV-positive peer counselors aged 18–24 years for individual counseling, adherence monitoring, and psychosocial support, complemented by optional support groups and clinic-based mentorship. Parents attended monthly 2-hour sessions where they received information and counseling. |
| | | Mavhu et al. 2020 | Zimbabwe | Cluster randomized controlled trial | August 2016 to March 2017. | 496 | 13–19 years | **Community Adolescent Treatment Supporters (CATS)** is a peer-led community-based intervention which provides support to ALHIV aged 10–24 years. The intervention includes weekly home visits by trained HIV-positive peer counselors aged 18–24 years for individual counseling, adherence monitoring, and psychosocial support, complemented by optional support groups and clinic-based mentorship. Parents attended monthly 2-hour sessions where they received information and counseling. |
| | | Kopo et al. 2023 | Lesotho | Cluster randomized trial | November 2019 to April 2021 | 307 | 15–24 years | **PEBRA**, a peer educator-led and nurse-supported model of care for young people living with HIV aged 15–24 years. The intervention involved regular individual preference assessments for medication pick-up, SMS notifications, and psychosocial support, with services delivered accordingly. Utilizes an eHealth application (PEBRApp) for coordination, with preference reassessments conducted monthly or quarterly based on viral load status. |

(*continued on next page*)

**Table 2**
Continued

| Type of intervention | Number of studies | Author | Country | Method | Study period | Total sample | Participants | Intervention |
|---|---|---|---|---|---|---|---|---|
| *Hybrid (facility-community–based) intervention* | 1 | Vu et al. 2017 | Uganda | Pre-post cohort | January to September 2015 | 473 | 15–24 years | **Link Up** is Peer-led HIV and SRH intervention for young people living with HIV (YLHIV) aged 15–24 years, supporting groups of about 13 youth (473 YLHIV in 37 groups). The intervention includes monthly community-based peer support group meetings, held 1–2 times per month, five peer education sessions over 9 months, referrals to youth-friendly health facilities (average five visits over 9 months), and distribution of vouchers for integrated HIV and SRH services. |
| *Facility-based youth-friendly services* | 7 | Ruria et al. 2017 | Kenya | Pre-post design | July 2015 to December 2016 | 952 | 15–21 years | **Red Carpet Program (RCP)** is a peer-led fast-track program designed to support newly diagnosed HIV-positive adolescents and youth (15–21 years). RCP includes VIP express services at 50 health-care facilities, peer counseling, psychosocial support, and school-based services in 25 boarding schools, with flexible hours and a support hotline. |
| | | Tafere et al. 2023 | Ethiopia | Comparative cross-sectional study | 1-30 July 2021 | 446 | 10–19 years | **OTZ** is a hospital-based program that supports ALHIV aged 10–19 years. The program includes monthly peer support sessions, weekend services, and integrated health services for HIV care, sexual and reproductive health, and adherence support. Aims to achieve zero missed appointments, medications, and viral loads through youth-friendly activities and counseling. |
| | | MacKenzie et al. 2017 | Malawi | Nested case- control | March 2010 to December 2015 | 540 | 10–19 years | **Teen Club** is an adolescent-centered psychosocial support intervention led by trained health-care workers and peer mentors supporting ALHIV aged 10–19 years in a clinical setting. The intervention includes monthly dedicated weekend clinic time (Saturdays), sexual and reproductive health education, peer mentorship, ART refill and adherence support, facilitated sports, arts, and games for positive peer interaction, small group sessions (age-stratified) for health education and adherence support, individualized clinical assessment and counselingas needed. |
| | | McBride, 2019 | Malawi | Retrospective cross-sectional study | January to June 2017 | 589 | 10–19 years | **Teen Club** is a facility-based ART delivery model supported by the Malawi Ministry of Health for HIV-positive adolescents aged 10–19 years. The intervention consists of monthly ART clinics exclusively for adolescents that combine clinical services with peer psychosocial support. The program includes routine ART medication distribution, adherence counselingsessions for those showing poor adherence or virologic failure, and peer psychosocial support services. |
| | | Denison et al. 2020 | Zambia | Randomized control trial | December 2017 to February 2019 | 273 | 15–26 years | **Project Yes!** Is a youth peer mentoring program led by trained HIV-positive young adults (ages 21–26 years) supporting HIV-positive youth (aged 15–24 years) in clinical settings. The intervention includes monthly one-on-one meetings, optional monthly youth group sessions, and three optional caregiver meetings over 6 months, complementing routine HIV care. |

**Table 2**
Continued

| Type of intervention | Number of studies | Author | Country | Method | Study period | Total sample | Participants | Intervention |
|---|---|---|---|---|---|---|---|---|
| | | Antelman, 2022 | Tanzania | Mixed-methods retrospective cross-sectional study | November 2015-October 2019 | 645 | 10–19 years | **Adolescent Support Club** is a facility-based psychosocial support intervention for ALHIV aged 10–19 years, delivered at clinics in Tanzania. The intervention includes monthly Saturday clinic sessions. The intervention was implemented differently across facilities. In three facilities, ALHIV aged 18 years and older were trained as peer facilitators who led the club meetings. These peer facilitators presented comprehensive topics focused on positive living with HIV, including adherence, treatment literacy, managing stigma, disclosure, sexual and reproductive health, and transition to adult care. In the remaining four facilities, club meetings were led by clinic staff and were oriented toward a wider age group that included younger children under 10 years old. In these facilities, health talks focused on a narrower set of HIV-related topics, with less emphasis on sexual and reproductive health or adolescent transition to adult care. |
| | | Alibi et al., 2023 | Malawi | Retrospective cohort study | January 2018 to December 2020 | 233 | 10–19 years | **Teen Club Model** is a facility-based differentiated service delivery intervention for ALHIV aged 10–19 years, delivered at health facilities in Blantyre, Malawi. The intervention includes clinic sessions conducted during weekends, once or twice per month. The model provides services including clinical review and ART services (rescripting, refills), family planning, laboratory services, referrals, structured adolescent-focused adherence support, and psychosocial support. Services are delivered by dedicated ART providers with specialized training in managing adolescent HIV clinics, along with social workers. |

**Table 3**
Key findings

| Author | Country | Intervention | Outcome measures | Key findings |
|---|---|---|---|---|
| Hacking et al. 2019 | South Africa | Virtual Mentors, is a youth peer-led mHealth intervention supporting newly diagnosed HIV-positive youths. The intervention includes one-on-one mobile phone-based communication (calls, SMS, and WhatsApp) for 2–8 weeks, providing encouragement, answering questions, and inviting mentees to HIV youth-adherence clubs. | Primary outcomes: *Linkage to ART care*: Number of patients who tested positive and initiated ART divided by the number of patients tested positive. *Retention in care on ART*: Number of patients retained in care at 6 and 12 months divided by the number of patients who initiated ART. *Viral load suppression*: Number of patients with suppressed viral load (<400 copies/mL) divided by the number of viral load results available. | The virtual peer mentorship intervention was associated with higher rates of linkage to ART care (80% in intervention vs. 43% in controls), with viral load suppression showing minimal difference (93% intervention vs. 91% control). Retention in care was similar for both groups at 6 and 12 months. |
| Ivanova et al. 2019 | Kenya | ELIMIKA, a web-based peer support platform for HIV-positive youth aged 15–24 years, implemented by peer volunteers and health-care providers. The intervention featured an interactive website with blogs, discussion forums, Q&A sessions with health-care providers, and private messaging, accessible via clinic computers or personal devices over a 3-month period to support ART adherence and HIV knowledge. | Primary outcomes: *HIV and ART adherence-related knowledge*: Total score on 17 true/false items adapted from previously validated instruments for HIV-positive youth. *Perceived importance of adherence*: Proportion of participants rating adherence-related behaviors on an eight-item differential scale ranging from "not important at all" to "extremely important" *Perceived self-efficacy in adherence*: Proportion of participants rating themselves on a 17- item scale ranging from "not confident at all" to "extremely confident". | Youth using the ELIMIKA digital platform showed high acceptability (95% intended to use it again) and demonstrated significantly improved adherence intentions at 3 months ($p = .03$). Self-reported adherence showed a slight increase from baseline (71.6% reporting no missed doses) to endline (77.8% reporting no missed doses), but this change was not statistically significant ($p = .95$). The intervention group showed no significant improvements in, perceived importance of adherence ($p = .84$), or perceived self-efficacy ($p = .31$). Notably, over 50% of participants reported needing help using the digital platform, indicating potential implementation challenges. |
| Willis et al. 2019 | Zimbabwe | Community Adolescent Treatment Supporters (CATS) is a peer-led community-based intervention which provides support to adolescents living with HIV aged 10–15 years. The intervention includes weekly home visits by trained HIV-positive peer counselors aged 18–24 years for individual counseling, adherence monitoring, and psychosocial support, complemented by optional support groups and clinic-based mentorship. Parents attended monthly 2-hour sessions where they received information and counseling. | Primary outcomes: *Linkage to services and retention in care*: Measured using a five-point Likert scale for questions related to satisfaction with referrals, connection with supportive peers, community support, and comfort discussing health concerns at local clinics. *Adherence to ART*: Self-reported adherence measured through a series of questions, with "yes" responses indicating adherence. *Psychosocial well- being*: Measured using a three-point Likert scale. Stigma: Assessed using a five-point Likert scale. | Adolescents receiving the CATS intervention had significantly improved linkage to services ($p < .001$), retention in care ($p < .001$), and self-reported adherence to ART (OR 3.934; $p = .008$). The intervention group also showed significant improvements in confidence, self-esteem, and self-worth ($p < .001$), as well as quality of life ($p = .028$). While stigma decreased in the intervention group, this change was not statistically significant ($p = .848$). |
| Mavhu et al. 2020 | Zimbabwe | Community Adolescent Treatment Supporters (CATS) is a peer-led community-based intervention which provides support to ALHIV aged 10–24 years. The intervention includes weekly home visits by trained HIV-positive peer counselors aged 18–24 years for individual counseling, adherence monitoring, and psychosocial support, complemented by optional support groups and clinic-based mentorship. Parents attended monthly 2-hour sessions where they received information and counseling. | Primary outcome: *Treatment failure or death*: Number of participants with viral load ≥1,000 copies per μL or who died divided by total number of participants in modified intention-to-treat population at 96 weeks. Secondary outcomes: *Discontinuation of ART:* Number of participants who completely stopped taking drugs for ≥3 months divided by total number of participants with available data. *Retention in care:* Number of participants who attended ≥80% of scheduled visits divided by total number of participants with attendance data. | At 96 weeks, treatment failure or death occurred in 22% of the intervention group compared to 36% in the control group (adjusted PR 0.58, 95% CI: 0.36–0.94, $p = .03$). While the intervention appeared to have positive effects on other outcomes, these were not statistically significant. ART discontinuation for 3 or more months was lower in the intervention group compared to control (7% vs. 11%, adjusted PR 0.68, 95% CI: 0.23–1.99, $p = .45$). Similarly, poor retention in care was slightly lower in the intervention group, with 13% attending less than 80% of scheduled visits compared to 15% in the control group (adjusted PR: 0.80, 95% CI: 0.32–2.02, $p = .62$). |

**Table 3**
Continued

| Author | Country | Intervention | Outcome measures | Key findings |
|---|---|---|---|---|
| Kopo et al. 2023 | Lesotho | PEBRA, a peer educator-led and nurse-supported model of care for young people living with HIV aged 15–24 years. The intervention involved regular individual preference assessments for medication pick-up, SMS notifications, and psychosocial support, with services delivered accordingly. Utilizes an eHealth application (PEBRApp) for coordination, with preference reassessments conducted monthly or quarterly based on viral load status. | Primary outcome: *Viral suppression*: Proportion of all participants in care with a viral load below 20 copies/mL at 12 months (range 9–15 months) after enrollment. Secondary outcomes: *Engagement in care*: Proportion of participants engaged in care at 6 months (range 5–8) and 12 months. *Adherence*: Proportion of participants reporting perfect adherence to ART in the past month (defined as no missed doses). *Quality of life*: Physical and mental quality of life scores measured using the Short Form 12 (SF-12) questionnaire. *Satisfaction with care*: Proportion of participants very satisfied with various aspects of care, based on a setting-validated HIV service satisfaction questionnaire. | The PEBRA intervention did not significantly improve viral suppression at 12 months compared to standard care (66% vs. 61%, adjusted OR: 1.27, 95% CI: 0.79–2.03, $p = .327$). However, overall viral suppression rates improved from 54% at baseline to 63% at 12 months across both groups. Also, in the intervention group participants reported significantly higher satisfaction with confidentiality (adjusted OR: 194.81, $p = .010$) and clinic staff attitude (adjusted OR 12.48, $p = .036$) at 12 months. |
| Vu et al. 2017 | Uganda | Link Up is peer-led HIV and SRH intervention for YLHIV aged 15–24 years, supporting groups of about 13 youth (473 YLHIV in 37 groups). The intervention includes monthly community-based peer support group meetings, held 1–2 times per month, five peer education sessions over 9 months, referrals to youth-friendly health facilities (average five visits over 9 months), and distribution of vouchers for integrated HIV and SRH services. | Primary outcomes: *Self-efficacy*: Score above median on a 10-question index using five-point Likert scale responses, measuring confidence in using condoms, contraceptives, and seeking health services. *HIV Knowledge*: Correct responses to all five items on the United Nations Programme on HIV/AIDS (UNAIDS) scale assessing knowledge of HIV transmission and prevention. *HIV Disclosure*: Proportion of sexually active participants who disclosed HIV status to partner before last sex. *ART adherence*: Proportion of participants currently on ART; proportion reporting no missed doses in past 14 days. *CD4 Testing*: Proportion of participants who had at least one CD4 test in past 12 months. | The Link Up intervention led to significant improvements across all targeted outcomes at 9-month follow-up. Participants showed increased odds of comprehensive HIV knowledge (AOR: 1.8; $p < .001$), self-efficacy for using condoms and contraceptives (AOR: 1.8; $p < .001$), HIV status disclosure (AOR: 1.6; $p < .05$), condom use at last sex (AOR: 1.7; $p < .01$), sexually transmitted infections (STI) service uptake (AOR: 2.1; $p < .001$), ART uptake (AOR: 2.5; $p < .001$), ART adherence (AOR: 2.5; $p < .01$), CD4 count testing (AOR: 2.4; $p < .001$), and use of modern contraceptives (AOR: 1.7; $p < .05$). |
| Ruria et al. 2017 | Kenya | Red Carpet Program (RCP) is a peer-designed fast-track program supporting newly diagnosed HIV- positive adolescents and youth (15–21 years). RCP includes VIP express services at 50 health-care facilities, peer counseling, psychosocial support, and school-based services in 25 boarding schools, with flexible hours and a support hotline. | Primary outcomes: *Linkage to care*: Proportion of newly identified adolescents and youth who completed their first appointment with an HIV care provider following a positive HIV test, measured at 1 month, 2 months, 3 months, and more than 3 months after testing. *Initiation on ART*: Proportion of newly diagnosed adolescents and youth who were started on ARV therapy. *Retention on ART*: Proportion of newly diagnosed adolescents and youth who were initiated and retained on ART at 3 and 6 months after being diagnosed. | The intervention significantly improved linkage to care (97.3% vs. 56.5%, $p < .001$) and retention on ART at 3 months (90.0% vs. 66.0%, $p < .001$) and 6 months (98.6% vs. 54.4%, $p < .001$) for adolescents and youth newly diagnosed with HIV. |
| Tafere et al. 2023 | Ethiopia | OTZ, a hospital-based program supporting ALHIV aged 10–19 years. The program includes monthly peer support sessions, weekend services, and integrated health services for HIV care, sexual and reproductive health, and adherence support. Aims to achieve zero missed appointments, medications and viral loads through youth-friendly activities and counseling. | Primary outcome: *Viral suppression* (VS): Proportion of patients with HIV viral load less than 1,000 copies/mL based on their latest viral load test result after at least 6 months on ART. Secondary outcomes: *Factors associated with viral suppression*: analyzed using multivariate logistic regression, adjusted for sociodemographic, behavioral, clinical, and psychosocial factors. | Adolescents in the Operation Triple Zero (OTZ) program had significantly higher odds of viral suppression compared to those in regular ART (aOR: 21.6, 95% CI: 3.499–133.9; $p = .041$). The viral suppression rate was significantly higher in the OTZ group (92.4%) than in the regular ART group (84.3%). Overall viral suppression was 88.3%, falling short of the 90% UNAIDS target. Factors significantly associated with lower viral suppression included alcohol use (aOR: 0.012; $p = .022$), cigarette smoking (aOR: 0.008; $p = .008$), social discrimination (aOR: 0.024. |

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**Table 3**
Continued

| Author | Country | Intervention | Outcome measures | Key findings |
|---|---|---|---|---|
| MacKenzie et al. 2017 | Malawi | Teen Club is an adolescent-centered psychosocial support intervention led by trained health-care workers and peer mentors supporting ALHIV aged 10–19 years in a clinical setting. The intervention includes monthly dedicated weekend clinic time (Saturdays), sexual and reproductive health education, peer mentorship, ART refill and adherence support, facilitated sports, arts, and games for positive peer interaction, small group sessions (age-stratified) for health education and adherence support, individualized clinical assessment and counseling as needed. | Primary outcome: *Retention in ART care*: Defined as patients whose status at the time of data extraction was not "lost to follow-up," "stopped," or "died." Patients were considered "not retained in care" (cases) if their status was any of these three categories. Secondary outcomes: *Teen Club exposure*: Defined as attendance at two or more Teen Club sessions before selection as a case or control. *Time on ART before starting Teen Club*: Categorized as starting Teen Club before ART initiation, within 1 month, 2–3 months, 4–12 months, 13–24 months, or >24 months after ART initiation. *Proportion of visits that were Teen Club sessions*: Calculated for Teen Club attenders by dividing the total number of Teen Club visits by the total number of visits after and including the first Teen Club visit. | Those who participated in Teen Club had about 3.7 times higher odds of being retained in care compared to those who did not participate. Age was also a factor in retention. ALHIV in the age group of 15 to 19 years were more likely to have attrition from care than ALHIV in the age group 10–14 years of age (aOR: 2.14; 95% CI: 1.12–4.11). This indicates that older adolescents had about 2.1 times higher odds of not being retained in care compared to younger adolescents. |
| Denison et al. 2020 | Zambia | Project Yes! Is a youth peer mentoring program led by trained HIV-positive young adults (aged 21–26 years) supporting HIV-positive youth (aged 15–24 years) in clinical settings. The intervention includes monthly one-on-one meetings, optional monthly youth group sessions, and three optional caregiver meetings over 6 months to help improve skills and knowledge. | Primary outcomes: *Viral suppression*: Defined as a viral load test result of <1,000 copies/mL versus a viral load test result of ≥1,000 copies/mL, measured at baseline and 6-month midline. *ART adherence treatment gap*: Defined as 48 consecutive hours or more without taking ART drugs in the past 3 months, assessed through two self-reported questions, measured at baseline and 6-month midline. *Internalized stigma*: Measured using three agree/disagree questions from the Internalized AIDS Stigma Scale (IA-RSS). | The intervention group experienced significantly reduced internalized stigma compared to the comparison arm (OR: 0.39; 95% CI: 0.21–0.73). In the pediatric clinic, intervention participants had significantly higher odds of viral suppression relative to the comparison arm (OR: 4.66; 95% CI: 1.84–11.78). Both arms showed significant increases in viral suppression over time (OR: 1.49; 95% CI: 1.08–2.07). No significant differences were found between arms for ART adherence gaps (34.4% vs. 33.9%) or viral suppression in adult clinics (74.4% vs. 0.86.3%). |
| Antelman, 2022 | Tanzania | Adolescent Support Club is a facility-based psychosocial support intervention for ALHIV aged 10–19 years, delivered at clinics in Tanzania. The intervention includes monthly Saturday clinic sessions. The intervention was implemented differently across facilities. In three facilities, ALHIV aged 18 years and older were trained as peer facilitators who led the club meetings. These peer facilitators presented comprehensive topics focused on positive living with HIV, including adherence, treatment literacy, managing stigma, disclosure, sexual and reproductive health, and transition to adult care. In the remaining four facilities, club meetings were led by clinic staff and were oriented toward a wider age group that included younger children under 10 years old. In these facilities, health talks focused on a narrower set of HIV-related topics, with less emphasis on sexual and reproductive health or adolescent transition to adult care. | Primary outcomes: *Visit adherence:* Defined as a binary variable ("good" vs. "poor"). Good visit adherence meant keeping appointments close enough that patients never had more than a 5-day gap between running out of their ARV drugs and their next visit. Measured over a 2-year period from November 2016 to October 2018.<br>*Viral suppression:* Defined as having a viral load below 1,000 copies/milliliter (cp/mL), based on the latest viral load result up to October 2018. Note that 17% of participants were missing viral load measures during this period and were excluded from the suppression analysis.<br>*Retention in care:* Defined as remaining on ART within 90 days of October 31, 2019, including verified transfers from one clinic to another. Those reported to have died or missed ART refill visits ≥90 days before October 2019 were classified as nonretained, including unverified transfers. | Adolescents attending 10+ clubs had significantly higher odds of adherence compared to those who didn't attend any clubs (OR: 2.72; 95% CI: 1.25, 5.94; $p = .012$). No significant association was found between club attendance and viral suppression in the main analysis, though self-efficacy was associated with viral suppression among interviewed participants (OR: 3.04; 95% CI: 1.08, 8.60). Of note, 17% of participants were missing viral load data. Participants who attended 1–9 club meetings were more likely to stay in care (OR: 3.0), while those attending 10+ clubs had even higher odds of retention (OR: 7.0) compared to nonattendees. |

**Table 3**
Continued

| Author | Country | Intervention | Outcome measures | Key findings |
|---|---|---|---|---|
| Alibi et al., 2023 | Malawi | Teen Club Model is a facility-based differentiated service delivery intervention for ALHIV aged 10−19 years, delivered at health facilities in Blantyre, Malawi. The intervention includes clinic sessions conducted during weekends, once or twice per month. The model provides services including clinical review and ART services (rescriptings, refills), family planning, laboratory services, referrals, structured adolescent-focused adherence support, and psychosocial support. Services are delivered by dedicated ART providers with specialized training in managing adolescent HIV clinics, along with social workers. | Primary outcomes: *Viral load suppression:* Defined as <999 copies/mL low detectable load (LDL) versus >999 copies/mL high detectable load (HDL), measured at 6, 12, and 24 months after ART initiation. *Virological failure:* Defined as failure to suppress and sustain an individual's viral load to <200 copies/mL of blood, tested between 12 and 18 months after ART initiation. *Retention in care:* Defined as remaining in care at 24 months after enrollment, with data showing retention rates of 90% for Teen Club participants versus 73% for Standard of Care. | At 24 months, viral load suppression was achieved by 90% of Teen Club participants compared to 56% in Standard of Care. Among those who achieved viral suppression, a higher proportion of Teen Club participants (76.4%) achieved viral load compared to Standard of Care participants (22.7%). The adjusted analysis showed Teen Club participants were less likely to have high viral load (adjusted relative risk (RR): 0.23, 95% CI: 0.11−0.61; $p = .002$). Regarding virological failure at 12 months, Teen Club participants had lower rates (3.1%) compared to Standard of Care participants (10.9%), with adjusted analysis showing that Teen Club participants were less likely to experience virological failure (adjusted RR: 0.16, 95% CI: 0.03−0.78; $p = .023$). Retention in care at 24 months was also higher among Teen Club participants at 90% compared to 73% in Standard of Care, with 80% of all defaulters coming from the Standard of Care arm. |
| McBride, 2019 | Malawi | Teen Clubs are monthly facility-based ART delivery clinics exclusively for HIV-positive adolescents aged 10−19 years in Malawi. The program combines clinical services with peer psychosocial support in a youth-friendly environment. The intervention includes monthly sessions where adolescents receive their ART medication along with dedicated adherence counseling if there are concerns about poor adherence or virologic failure. Implemented by Partners in Hope (PIH) with support from the Malawi Ministry of Health, Teen Clubs aim to improve health outcomes among HIV-positive adolescents by providing age-appropriate clinical care and peer support in an integrated model. | Primary outcome:<br>*ART adherence:* Defined as a binary variable ("optimal" vs. "suboptimal"). Optimal adherence was defined as ≥95% adherence based on pill count conducted by a clinical provider at documented visits during the study period (January−June 2017), either during monthly Teen Club sessions or ART clinic visits. Suboptimal adherence was defined as <95% based on pill count. | Older adolescents (15−19 years) had significantly higher odds of achieving optimal adherence (≥95% based on pill count) compared to younger adolescents (10−14 years) (aOR: 1.48, 95% CI: 1.16−1.90, $p < .01$). When stratified by gender, older adolescent males (15−19 years) were 64% more likely to achieve optimal adherence compared to younger males (aOR: 1.64, 95% CI: 1.16−2.31, $p < .01$), while for females, though there was a trend toward higher adherence among older adolescents, this effect was smaller and not statistically significant (aOR: 1.36, 95% CI: 0.96−1.94, $p = .08$). Overall mean adherence was 86%, with 62% of participants achieving optimal adherence at least once during the study period. |

effectiveness. For instance, both the CATS and Project YES! programs implemented weekly supervision meetings for their peer mentors, which likely contributed to the quality and consistency of the support provided [14–16]. Notably, most of the reviewed studies did not provide details on peer training or supervision, marking a significant gap in the literature. Participant age also emerged as an important factor. Several programs, including the Teen Club model, reported better outcomes among younger adolescents (10–14 years) compared to older adolescents (15–19 years) [8]. This finding suggests that interventions should be tailored to the distinct developmental needs of different age groups. Moreover, several factors hindered the effectiveness of interventions, particularly for digital programs. The ELIMIKA eHealth platform in Kenya, for example, was significantly hampered by a shortened implementation period, limited internet access and affordability for participants, and low digital literacy [7].

## Discussion

This review shows that there has been significant progress in peer-led support for AYPLHIV in Eastern and Southern Africa. Our work builds on the 2019 review by Casale et al. [3] by using stronger evidence, including four randomized controlled trials. The findings show that these models are effective in improving ART adherence, retention in care, and viral suppression. These improvements could be attributed to specific characteristics in the intervention. The most effective interventions were not merely peer-led, but multi-component, involving frequent and sustained engagement with participants. The CATS program in Zimbabwe is a prime example, where a combination of weekly home visits and integrated support for both adolescents and caregivers led to significant clinical improvements [15,16]. The emphasis on caregiver involvement is particularly crucial, as it aligns with a large body of evidence showing that caregiver supervision is strongly linked to adolescent adherence [18–20]. Similarly, the effectiveness of facility-based models such as OTZ [5] and the Red Carpet Program [6] aligns with the literature calling for youth-friendly services that reduce the stigma adolescents often face in adult clinics [21].

In contrast, interventions with less intense contact, such as the PEBRA model [17], or those relying solely on digital platforms [7,11], showed limited long-term clinical impact. The challenges faced by digital interventions, such as connectivity costs and low digital literacy [7], are echoed in other mHealth studies, which increasingly recommend hybrid models that combine technology with face-to-face support [22,23]. The effectiveness of these programs also depended on participants' ages. Our review found that interventions were generally more successful for younger adolescents (10–14 years) than older ones (15–19 years) [8]. This confirms previous research showing that older adolescents face unique challenges that require more specialized support [24].

### *Limitations of the review*

This review is subject to several limitations. Our search strategy was constrained using English language databases only, which may have introduced language bias. Additionally, some of the studies included were retrospective, which may have influenced certain findings. The inclusion of cross-sectional studies further limited our ability to establish causality. Nonetheless, this review offers a thorough overview of peer-led models for improving HIV treatment and care outcomes among AYPLHIV in Eastern and Southern Africa.

### *Conclusions*

The included studies showed several methodological limitations. Some relied on small sample sizes, while others demonstrated potential selection bias. The diversity of methods used made it challenging to synthesize findings, and the predominant use of self-reported outcomes for ART adherence may have introduced reporting bias. In conclusion, this review confirms that peer-led models work well for improving HIV outcomes among young people in Sub-Saharan Africa. The best programs are comprehensive, offering frequent contact, caregiver support, and structured supervision. For clinics, youth-friendly services are essential. While digital tools have potential, they work best when combined with in-person support. For these programs to be sustainable, future research must focus on their cost-effectiveness.

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