

Mental health and psychosocial interventions integrating sexual and reproductive rights and health, and HIV care and prevention for adolescents and young people (10–24 years) in sub-Saharan Africa: a systematic scoping review



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Summary

Background Interventions targeting combined sexual and reproductive health, Human Immunodeficiency Virus (HIV) management and mental health care in sub-Saharan Africa (SSA) are few. There is a need to address common determinants of poor mental, psychosocial and sexual and reproductive health and rights (SRHR) through multimodal and multipronged interventions for adolescents. The main objective of this study was to identify whether and how interventions targeting adolescent SRHR and HIV with a focus on pregnant and parenting adolescents in SSA include mental health components and how these components and their outcomes have been reported in the literature.

Methods We carried out a two process scoping review approach between 01.04.2021 and 23.08.2022. In the first stage, we searched the PubMed database to identify studies focusing on adolescents and young people aged 10 to 24 from 2001 to 2021. We identified studies focusing on HIV and SRHR that had mental health and psychosocial aspects to the interventions. Our search yielded 7025 studies. Of these 38 were eligible based on our screening criteria that covered interventions, and on further scrutiny, using PracticeWise, an established coding system, we identified select problems and practices to provide a more granular assessment of how interventions developed for this context mapped on to specific problems. At this second stage process, we selected 27 studies for inclusion as actual interventional designs for further systematic scoping of their findings and we used the Joanna Briggs Quality Appraisal checklist to rate these studies. This review was registered within the International Prospective Register of Systematic Reviews (PROSPERO), number CRD42021234627.

Findings Our first set of findings is that when coding problems and solutions, mental health concerns were the least common category of problems targeted in these SRHR/HIV interventions; nevertheless, psychoeducation and cognitive behavioral strategies such as improved communication, assertiveness training, and informational support were offered widely. Of the 27 interventional studies included in the final review, 17 RCTs, 7 open trials, and 3 mixed designs, represented nine countries of the 46 countries in SSA. Intervention types included peer, community, family, digital, and mixed modality interventions. Eight interventions focused on caregivers and youth. Social or community ecology associated problems (being an orphan, sexual abuse, homelessness, negative cultural norms) were the most common risk factors and were more frequent than medical issues associated with HIV exposure. Our findings highlight the relevance and centrality of social issues related to adolescent mental and physical health along with the need to strengthen multimodal interventions along the lines of problems we have identified in our review.

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Interpretation Combined interventions jointly addressing adolescent SRHR, HIV, and mental health have been relatively understudied, despite evidence that adverse social and community factors are rampant in this population.

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Keywords: Adolescent mental health; SRHR; HIV treatment and prevention; Poverty

Research in context

Evidence before this study

Young people living in SSA are affected by poor sexual and reproductive and mental health. We used PubMed search of literature from April 01, 2021 to August 23, 2022 covering 2001–2022 and identified 38 studies at first screening and then on a second screening using Practice Wise Coding approach identified 27 eligible studies. Our inclusion criteria had studies focusing on HIV and SRHR that had mental health and psychosocial aspects to the interventions. Informational support on SRHR topics and communication skills were most studied problems. Six prominent types of interventions emerged: peer, community, family, digital, vocational, combined modality, interventions.

Added value of this study

This review characterises selected interventional studies into notable mental health targets including behavioral and

psychosocial characteristics, focuses on how these interact with SRHR and HIV associated issues. We carried out two levels of synthesis: identifying mental and behavioral health problems and synthesizing different types of interventions studied.

Implications of all the available evidence

Health literacy, knowledge about accessing services, and psychosocial tools to communicate to caregivers and healthcare providers might be important competencies needed for positive developmental outcomes. In the future it would be important to strengthen existing interventions by increasing the focus on targeted mental health and psychosocial support focusing on adverse exposures like early marriage, unplanned pregnancies, adolescent fathers, violence against women and girlchild as well as covering studies in other languages from SSA settings.

Introduction

Sub-Saharan Africa (SSA) is one of the few regions in the world where adolescents (ages 10–19) compose the largest proportion of the population, accounting for 23% of the total population¹ and United Nations defines people who are between 15 and 24 years as youth. In SSA, 60% of the entire continent are aged below 25. The region is affected by high levels of poverty, containing nearly 67% of the world's extremely impoverished population.² Upstream factors like poverty, insufficient public policy, and low-quality education have led to poor health outcomes. Structural inequalities like these and social environments impact adolescent well-being, especially their reproductive, educational, and long-term social development.³

From a life course perspective, adolescence is a critical stage connecting childhood development to opportunities for further growth in adulthood. A number of poor sexual and reproductive health outcomes are often traced back to adolescence and cast a shadow in an individual's life. UN figures estimate over 16 million girls worldwide give birth between ages 15–19 and around one million before the age of 15 in lower-and-middle-income countries (LMICs).^{4,5} Specifically, one of the prominent SRHR issues is

one of, adolescent pregnancy, which is on the rise in SSA. For example, an estimated 45% of the pregnancies are unintended among young women aged 15–19 years, resulting in unintended births, unsafe abortions, and miscarriages.⁶ Adolescent pregnancy predisposes girls to poor physical health outcomes and adverse mental health consequences, with depression and anxiety being the most common mental disorders.^{2,7} Depression during motherhood impacts the infant and has been associated with negative child outcomes ranging from impaired physical health to poor neuro-cognitive development.⁸ Over three million girls undergo unsafe abortions. Pregnancy and child birth complications are amongst the second leading cause of mortality in 15–19 years old girls and over three million girls undergo unsafe abortions.⁹ High prevalence of adolescent pregnancies and perinatal depression in vulnerable adolescents and women in low-income countries especially in SSA have resulted in a tremendous public health burden with cascading effects from the well-being of the offspring to damaging impact on family, community health and productivity of youth.^{4,10} Although epidemiological and intervention research on perinatal depression, adolescent mental health and child development is

well-established in LMIC contexts such as SSA,¹¹ systems are often not empowered or structured to implement the interventions supported by these innovative research findings. Systemic, cultural and individual agent-level barriers impose challenges to deal comprehensively with adolescent pregnancies, the resultant perinatal depression and its negative correlates.¹²

Marginalised adolescents include primarily girls but also an increasing number of young boys left out due to poverty, societal traditions, or geographical locations. These adverse social determinants impact their access to education, health information and services as well as social protection and personal development.¹¹ At the same time, the SSA region is witnessing an increasing number of adolescents experiencing poor mental health due to deteriorating poor health and social structures to support this population. Since 2010, the rates of mental and substance use disorders have increased and are projected to continue increasing to unprecedented levels among adolescents.¹³

The latest UNAIDS statistics show that adolescent girls and young women (AGYW) from sub-Saharan Africa (SSA), aged 15–24, remain at substantial risk of acquiring HIV (UNAIDS, 2022). Every week, an estimated 4900 incident infections occur among women in this age group globally^{14,15}. In SSA, approximately six out of seven new infections occur among adolescents aged 15–19 years, and young women aged 15–24 years are twice likely to be living with HIV than their male counterparts. Demographic transition and mortality improvement differences are shifting the global burden of adolescent mortality towards SSA and this is amongst the regions of the world where communicable (such as HIV) and maternal causes of death continue to predominate.¹⁶

Extending the agenda of the United Nations Millennium Development Goals (UN MDGs), the UN Sustainable Development Goals (SDGs) further aim to reduce inequalities in vulnerable populations and advance adolescent health by enhancing their legal and human rights, ensuring access to basic needs, education and reproductive health resources.^{17,18} There is a need to develop adolescent programs that integrate SRHR and mental health, given the closely linked relationship between the two.¹⁹ A multisectoral approach practicing integrated interventions will not only decrease HIV rates among young populations, but will also improve optimism, self-concept, and self-esteem, all of which contribute to better mental health.²⁰ Additionally, interventional programs that target groups, families and adolescent peers in particular, may have more success in improving health outcomes than individual-based programs.²¹ To address adolescent pregnancy and adolescent motherhood related health burdens, we need new ways of organizing maternal and child mental health services that address multiple needs, including

perinatal depression intervention, parenting skills with a focus on young fathers, and health promotion in youth.² Additionally, other effective programs include those that address life skills, prevent interpersonal violence, change harmful gender and social norms provide financial empowerment, improve communication among family members and peers, and reduce stigma associated with HIV.^{22,23} These interventions have demonstrated an ability to alleviate the mental health burden among adolescent boys and girls, as well as enable female and male caregivers, because of their empowering nature. Moreover, these programs are best delivered through family-based, peer-based, and community-based interventions rather than the traditional, individual-based approach.

Previous reviews have shown that the general SRHR interventions for adolescents continue to be limited in focus and are unevenly distributed across SSA countries.^{10,24} Within this, there is some body of evidence covering SRHR and mental health outcomes though these remain centered on cognitive behavioral and behavioral change principles. It has also been reported that larger sociocultural and gender responsive interventions are lacking²⁵ and these interventions have largely focused on HIV/sexually transmitted infections (STIs) treatment or prevention due to funding pressures which is often at the cost of considering a range of exposures and disease conditions.²⁶ Review evidence suggests that even this body of evidence from HIV is in nascent stage with limited multimodal interventions that have been tested.²⁷

In this paper, we reviewed interventional studies that focus on SRHR and HIV treatment, prevention and promotion and adolescent mental health from SSA to scope their characteristics and outcomes. We included studies with adolescent fathers and boys around whom we do not have enough psychosocial evidence.

Methods

Search strategy and selection criteria

We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Guidelines.²⁸ The study has been suitably registered within PROSPERO, registration number CRD42021234627.

Literature search

Articles for this systematic review were found through the electronic web-based literature database PubMed. The search strategy was developed, and searches were conducted in April 2021 led by health sciences librarian. After reviewing these initial search results, the search strategy was revised to August 2022 to better capture SSA countries and the target population. The revised search string is included in [Appendix 1](#) and is the basis of this review.

Our search strategy included keywords including but not limited to: *mental health treatment for pregnant*

adolescents, psychosocial interventions for behavioral health programs for teenage pregnancy, mental health interventions for adolescent pregnancy, mental health promotion of pregnant and parenting adolescents, mental health treatment for adolescent mothers, mental health treatment for pregnant teenagers, mental health interventions for parenting adolescents, mental health interventions for adolescent fathers, mental health promotion in adolescent fathers, anxiety, stress and depression interventions for in adolescent mothers, anxiety, stress and depression interventions for pregnant adolescents, reproductive health interventions for adolescent mothers, HIV prevention and promotion for pregnant and parenting adolescents, SRHR interventions for pregnant adolescents, SRHR and HIV interventions for adolescent parents, SRHR and HIV interventions for adolescent fathers and mothers.

The search strategy included Medical Subject Headings (MeSH) and their synonyms in addition to keywords. We applied a title/abstract limiter on keywords to restrict results to SSA countries and SRHR. We also included the Boolean operator NOT to exclude non-SSA LMIC countries. Filters were applied after we ran the search string in PubMed to limit the results to English language publications between 2001 and 2022. Titles and abstracts were screened to exclude studies without an interventional program.

Inclusion criteria

We predefined our search using Population, Intervention, Comparison, Outcome and Study (PICOS).

1. *Study population:* Adolescents and youth ages 10–24 years.
2. *Intervention:* Intervention programs including psychoeducation, health promotion, prevention, psychological treatment for pregnant women, adolescents, parents, boys, and girls in LMIC. Interventions covering SRHR and HIV components that have mental health components.
3. *Comparison:* Not applicable.
4. *Outcome:* Components of interventions: SRHR and HIV. Do interventions that include SHRH/HIV include mental health (including psychosocial, behavioral health) outcomes?
5. *Study type:* Interventional studies including study protocols conducted in the community, schools, and healthcare institutions of SSA countries and the stage two of our search included only interventional studies.
6. *Context:* SSA countries.

Exclusion criteria

1. Studies published in languages other than English.
2. Studies that did not conduct and analyze an interventional program.
3. Studies published before January 2009 and after August 2022.

Study selection

The search identified 7025 articles (see Fig. 1). The initial screening was done by two reviewers (AL, BRG) independently and systematically searched for all articles with reference to inclusion and exclusion criteria. Each reviewer screened titles and then abstracts to select the articles that met the inclusion criteria. Those articles that did not meet the inclusion criteria were excluded. Full texts of 38 articles were reviewed for coding of problems and solutions led by three reviewers (BC, KB, RG). Eleven studies were excluded in the second round that focused only on the interventional design. Four reviewers (OM, JN, SJ, and MK) met to seek extract data on the selected articles to develop a review of key outcomes and characterise the studies.

Data extraction

The principal method of identifying studies suitable for the review involved searching the databases previously mentioned led by CM. There were no duplicate papers that were removed, and studies were screened for eligibility according to the inclusion and exclusion criteria based on their title and abstract by two researchers (BR and AL). After that, both researchers read the full texts for eligibility ($n = 38$). Disagreements on full texts were discussed with a third reviewer (MK). On these 38 studies, a team of three reviewers, BC, KB, RG carried out a detailed review of problems and core elements of intervention characteristics. In a second stage review process, two authors reviewed data and discussed with a third reviewer to resolve in case of discrepancies (OM, JN and SJ). Extracted information included: region, country, study population and demographics for participants; details of the intervention with sufficient information for replication; study methodology; recruitment and sample procedures; enrolment start and end rates, as well as follow-up length; outcomes and times of measurement; statistical analysis used; key conclusions; and relevant references to similar studies.

Additional coding of problems and solutions identified: data coding

Portions of the coding were conducted using an amended version of the PracticeWise Clinical Coding System,²⁹ which allows a structured summary of the research literature according to multiple variables related to study design, sample and context characteristics, intervention targets and intervention practice elements. The coding system for the current study focused on four sets of variables relevant to the aims of the current study: (1) study characteristics (i.e. design), (2) sample characteristics (e.g. ethnicity, age, maternal status, locations), (3) problems or concerns experienced by sample participants, and (4) practice elements, which represent discrete clinical procedures that make up a packaged intervention.^{30,31} Thirty-seven problem codes

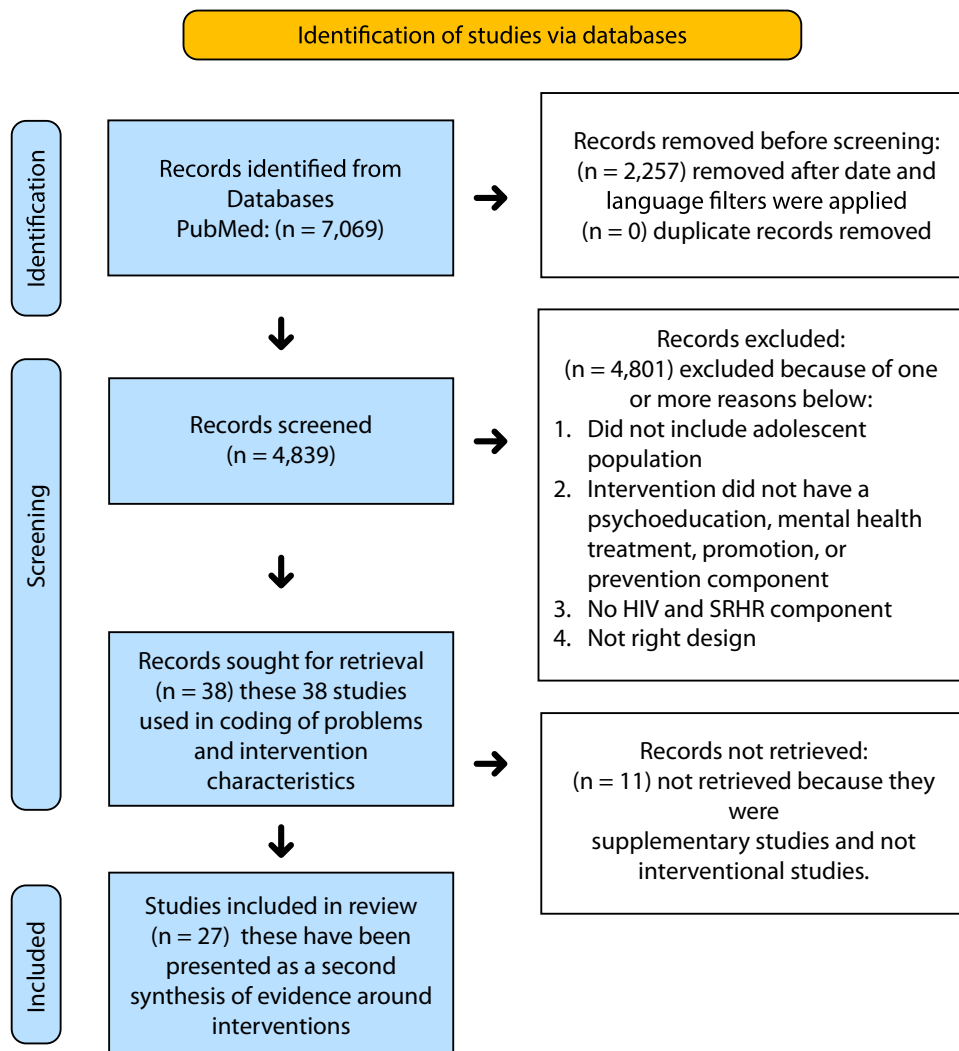


Fig. 1: Prisma flowchart.

were available and grouped into the following six categories: ecology, education, medical, mental health, resources, and other. Problem codes were binary, such that if the concern characterised any participant, the entire sample was coded as positive for that concern.

In addition to problems described in the samples, four intervention targets were coded: (1) *sexual and reproductive health*, (2) *mental health*, (3) *interpersonal/empowerment skills* (e.g., *how to manage conflict or build a supportive social network*), and (4) *adult life skills* (e.g., *finances, housing, and vocation*). Intervention targets differed from problems, in that targets were inferred from intervention descriptions as representing some part of the focus of the intervention.

Intervention components (i.e., the specific procedures used to address these targets) were characterised using 85 practice element codes. Coders were also

permitted to write in codes that did not fit existing practices. Practice elements were coded at the level of the active intervention arms (condition); thus, a study that included two active treatments (including treatment as usual) would have practice elements coded for each treatment condition.

Each article was coded independently by two members of the research team who possess expert content knowledge of youth interventions and who have extensive professional experience using the PracticeWise Clinical Coding System. Each coder first coded six studies independently and then met to discuss clarifications to the coding system. Each coder then coded an additional six studies, following which Cohen's Kappas (κ) were calculated and coders met to discuss additional coding clarifications. Coders then divided the remaining studies and each coded half independently. Reliabilities

for study and sample characteristics, as well as problem types, have been previously reported and shown to be good to excellent (i.e., $\kappa = 0.66\text{--}1.00$; ³¹). In the current study, κ for practice elements appearing at least twice in the reliability sample ranged from 0.59 to 1.0 (average $\kappa = 0.83$).

Data analysis

Quality of study methodology

Three researchers independently reviewed the full texts for quality and suitability. All eligible articles were assessed using Joanna Briggs Critical Appraisal checklist.³² The tool helps to examine the appropriateness of the study aim, adequacy and methodology, study design, data collection, study selection, data analysis, presentation of findings, author’s discussions, and conclusion. Any discrepancies were discussed until a consensus was reached.

Strategy for data synthesis

Due to heterogeneity between the studies, we concluded that a meta-analysis would not be appropriate. As a result, a scoping review was done focusing on interventional studies targeting improvements in a SRHR outcome.³³ We carried out a quality appraisal of the studies reported in the review to provide pointers to strength of the interventional evidence and methodological issues.

Ethical considerations

Our study is a systematic scoping review and we did not need ethics approval for secondary data analysis. There were no primary data collection; therefore, no informed consent was needed.

Role of the funding source

The funding agencies had no role in the writing of the manuscript or the decision to submit it for publication. All authors confirm that they had full access to all the data in the study and accept responsibility to submit for publication.

Results

We coded 38 peer-reviewed articles selected through our systematic scoping review process. For this process, when multiple articles were relevant to the intervention outcome study (e.g., an article described the treatment protocol only or only the rationale and design of the study), they were coded as a single study sample, study design, intervention, and set of results.

Study and sample characteristics

Sample sizes ranged from $n = 13$ to $n = 44,888$ (Mean = 620.62; Median = 112). The sample of studies included participants between the ages of 7 and 25 (median = 15.7). Of the 26 studies that reported

participant gender, 24 (92.3%) included at least one female and 16 (61.5%) included at least one male. Across all studies that reported more detailed gender information, the gender representation was approximately 9:1 for females and males. Other study and sample characteristics are presented in [Table 1](#).

Problems

The problems that characterised the 27 samples are shown in [Table 2](#). Problems related to the social or community ecology were most common (74.1% of samples) among the six categories, followed by concerns related to medical conditions (44.4%). Mental health concerns were the least common category of problems, characterizing just 7.4% of samples. At the specific problem code level, sexual risk behaviors and orphan status were the most prevalent ecological problems. Among those studies that included participants with medical issues, 91.7% of samples included youth living with HIV. Among mental health concerns, substance use was the only concern that characterised these samples of participants.

Interventions

Studies included 48 intervention conditions, which were characterised as active treatments ($n = 38$; 79.2%), no treatment controls ($n = 7$; 14.6%), waitlist controls ($n = 2$; 4.2%), and control not further specified ($n = 1$;

Study characteristics	N	%
Design reported	27	100.0
Randomized controlled trial	17	63.0
Open trial	7	25.9
Other design	3	11.1
Sample characteristics	N	%
Location reported	27	100
Uganda	8	29.6
South Africa	6	22.2
Tanzania	4	14.8
Nigeria	3	11.1
Kenya	2	7.4
Democratic Republic of Congo	1	3.7
Zimbabwe	1	3.7
Zambia	1	3.7
Rwanda	1	3.7
Education reported	21	77.8
Primary school	7	33.3
Secondary school	11	40.7
College/higher	1	4.8
No formal education (out of school)	1	4.8
Other education (e.g., vocational school; enrolled in school)	9	42.9

The sum of education categories exceeds 100% because a study could include participants that had attained different levels of education (e.g., some participants in primary school and some in secondary school).

Table 1: Study (N = 27) and sample (N = 27) characteristics.

Problem	N	%
Ecology	20	74.1
Orphaned	9	45.0
Sexual risk behaviors	9	45.0
Early sexual debut	2	10.0
Exposure to sexual abuse	2	10.0
High community rates of HIV	2	10.0
Ill family member	2	10.0
Homeless	1	5.0
Negative cultural norms	1	5.0
Medical	12	44.4
HIV positive	11	91.7
Medical regimen adherence	2	16.7
Sexually transmitted disease	1	8.3
Resources	9	33.3
Low income	5	55.6
Poor access to education about reproductive/sexual health	3	33.3
Prostitution	2	22.2
Unemployment	2	22.2
Education	4	14.8
Academic achievement	4	100.0
Mental health	2	7.4
Substance abuse/substance use	2	100.0
Problem not reported	3	11.1

Table 2: Presence of problems across the coded samples (N = 27).

2.1%). The 38 studies were coded as addressing the following intervention targets: sexual and reproductive health (n = 29; 76.3%), interpersonal/empowerment skills (n = 22; 57.9%), mental health (n = 13; 34.2%), and adult life skills (n = 10; 26.3%).

The practice elements that were coded within active interventions are presented in Table 3. Of the 85 possible practice elements, 33 (38.8%) appeared in at least one active intervention. Informational support about sexual/reproductive health was represented in most interventions (73.7%). Eight other practices appeared in at least 25% of interventions. The remaining 24 practices appeared in fewer active interventions, suggesting a collective breadth but not depth of representation of practices across interventions. In addition, write-in codes reflected support that was not clearly defined in the articles (e.g., counseling, parenting skills) or that did not have an existing code (e.g., making a will, community service and action).

Quality of study methodology

Results of quality assessment in accordance with Joanna Briggs Institute (JBI) critical appraisal tool are displayed in Table 4. 65% of the studies obtained above 100% “yes” response in the critical appraisal checklist. Most studies did report appropriately sampling of study participant and sample size calculation. However, Karamagi et al.³⁴ and Parker et al.³⁵ had unclear sampling

Practice element	N	%
Informational support: sexual/reproductive health topics	28	73.7
Communication skills	17	44.7
Insight building	15	39.5
Goal setting	12	31.6
Informational support: interpersonal/empowerment topics	12	31.6
Assertiveness training	10	26.3
Cognitive	10	26.3
Informational support: adult life topics	10	26.3
Problem solving	10	26.3
Informational support: overview of the intervention	9	23.7
Instrumental support: adult life resources	9	23.7
Support networking	9	23.7
Maintenance/relapse prevention	7	18.4
Medical care or recommendation	6	15.8
Psychoeducation for the youth	6	15.8
Modeling	4	10.5
Relaxation	4	10.5
Exposure	3	7.9
Narrative	3	7.9
Personal safety skills	3	7.9
Psychoeducation for the caregiver	3	7.9
Stimulus/antecedent control	3	7.9
Instrumental support: sexual/reproductive health resources	2	5.3
Mentoring	2	5.3
Mindfulness	2	5.3
Motivational enhancement	2	5.3
Self-monitoring	2	5.3
Accessibility promotion	1	2.6
Behavioral contracting	1	2.6
Caregiver coping	1	2.6
Family therapy	1	2.6
Peer pairing	1	2.6
Physical exercise	1	2.6

Table 3: Presence of practice elements across active intervention conditions (N = 38).

method, Willis et al.³⁶ and Lightfoot et al.³⁷ had small sample size, and 95% of participants were females.³⁸ The majority of studies reported strong participant study response rates. However, a study by Willis indicated 32% low response rates in the control arm,³⁹ and Ivanova et al.^{39,40} indicated 10% lost to follow-up, which might influence the outcome. In addition, Onyechi et al.⁴¹ and Ybarra et al.⁴² did not report on follow-up interviews on participants’ feedbacks, and the outcome was non-significant. Further, in a study by Larke et al.,⁴³ data was collected retrospectively, and some data were missing. Many studies also reported information on the reliability or validity of assessments.

Outcomes

Below are additional description of outcomes reported by interventions (see Table 5 and Supplementary

Source	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Total
Adejumo, 2012	Y	Y	Y	Y	Y	Y	Y	Y	N	8
^a Austrian et al. 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
^a Bandiera et al. 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
^a Betancourt et al. 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
^a Bhana et al., 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
^a Dow et al., 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Ezegbe et al., 2018	Y	Y	Y	Y	Y	Y	Y	Y	U	8
^a Harding et al., 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Ivanova et al., 2019	Y	Y	Y	Y	Y	Y	Y	Y	N	8
^a Jemmott et al. 2010	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Karamagi et al., 2018	Y	U	U	Y	Y	Y	Y	Y	Y	7
^a Kumakech et al. 2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Larke et al., 2010	Y	Y	Y	N	Y	N	Y	Y	N	6
Lightfoot et al., 2007	Y	N	N	Y	Y	Y	Y	Y	Y	7
Onyechi et al., 2016	Y	Y	Y	Y	Y	Y	Y	N	Y	8
Parker et al., 2013	Y	U	Y	Y	Y	Y	Y	Y	Y	8
^a Puffer et al. 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
^a Rotheram et al. 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Senyonyi et al., 2012	Y	N	Y	Y	Y	Y	Y	Y	Y	8
Snyder et al., 2014	Y	N	Y	Y	Y	N	Y	Y	Y	7
^a Ssewamala et al. 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
^a Thupayagale- ^b Tshweneagae et al. 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
^a Thurman et al. 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
^a Thurman et al. 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
^a Watt et al. 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Willis et al., 2019	Y	Y	N	Y	Y	Y	Y	Y	N	7
Ybarra et al., 2013	Y	N	Y	Y	Y	N	Y	Y	Y	7

The Joanna Briggs Institute. The Joanna Briggs Institute Critical Appraisal tools for use in JBI Systematic Reviews—Checklist for Prevalence Studies. Crit Apprais Checkl Preval Stud. 2017; 7. ^aY = Yes, N = NO, U = unclear, NA = Not applicable.1) Was the sample frame appropriate to address the target population?2) Were study participants sampled in an appropriate way?3) Was the sample size adequate?4) Were the study subjects and the setting described in detail?5) Was the data analysis conducted with sufficient coverage of the identified sample?6) Were valid methods used for the identification of the condition?7) Was the condition measured in a standard, reliable way for all participants?8) Was there appropriate statistical analysis.9) Was the response rate adequate, and if not, was the low response rate managed appropriately?

Table 4: Second stage quality appraisal of selected 27 studies.

Table S1). We have arranged them under SRHR and HIV, mental health, and psychosocial outcomes.

SRHR and HIV

HIV/STI risk reduction

Out of the twenty seven reviewed articles, thirteen intervention studies focused on improving HIV/STI risk reduction.^{34,37,38,40,42–50} Five were peer-based,^{38,44,46–48} two digital-based (28, 30), three community-based,^{34,37,43} one family-based,⁴⁵ one with vocational focus,⁵⁰ and one combined modality-based.⁴⁹ All these studies combined focus on SRHR and HIV components. Five studies showed a significant positive association between those who received interventions and condom use (22, 25, 34, 36–38). Others focused on decreased willingness to have sex,^{42,48,49} and decreased incidence of forced sex.^{34,47}

In addition, a study by Thurman and colleagues reported a 12% increase in condom negotiation self-efficacy among adolescents⁴⁵ and Karamagi reported those who had multiple sex partners.³⁴ Two studies

showed that there was decreased transactional sex (difference-in-differences = -0.118)^{34,47} and multiple sexual partners (1.83% vs 3.19%; P = 0.02; d = 0.42).⁴⁹ One study indicated that there was a decrease in gender based violence (GBV) and pregnancy cases among adolescent girls and young women (AGYW), and those who experienced GBV were able to share their experiences.³⁴ There was greater STI knowledge, and reported that all cohort participants reported that they would seek treatment from health facilities for future STIs.⁴¹ However, others reported that they sought treatment from traditional healers.⁴³

HIV knowledge

HIV knowledge increased significantly with interventions offered in seven studies.^{35,43,45–48,51} Three peer-based intervention studies,^{35,43,46} two family-based intervention studies,^{35,45} and community-based interventions reported a significant improvement in HIV knowledge.⁴³ However, there was no significant improvement in HIV knowledge among HIV positive

Study	Modality	Setting	Total participant count	Males	Females	Caregivers, adolescents	Age range	Pregnant?	Conditions
Adejumo, 2012	Peer-based	Public high school	120	60	60	YA	13–21	No	No
Austrian, Soler-Hampejsek, Behrman et al., 2020	Peer-based	10 sites (5 urban housing compounds and 5 rural villages)	4661	0	4661	YA	10–19	Y, some	No
Bandiera, Buehren, Burgess ... et al., 2012	Peer-based	Adolescent development club	4800	0	4800	YA	14–20	Y, some	Y, some had STDs
Betancourt, Ng, Kirk, ... et al., 2014	Family-based	-Some times at family home	39	22	17	C, A	A: 7–17, C: 30–70	No	At least 1 caregiver had HIV. Some youth were HIV-positive
Bhana, Mellins, Small, ... et al., 2016	Family-based	Two public hospitals in Durban	168	81	87	C, A	MA = 11.57 ± 1.16	No	Some youth had HIV
Dow Mmbaga, Turner ... et al., 2018	Family-based	Clinics	58	30	28	C, A	12–24	No	All youth had HIV
Ezegbe, Eseadi, Ede, ... et al., 2018	Digital and peer-based	Group meetings and at home	80	42	38	YA	MA = 14.63 ± 1.23 and 14.93 ± 0.83	No	No
Harding, Wei, Gwyther, & Miti. 2019	Peer-based	Residential camp	48	24	24	YA (completely orphaned)	14–18	No	All youth had HIV
Ivanova Wambua, Mwaisaka, ... et al., 2019	Digital	Coast Provincial General Hospital Comprehensive Care Clinic (CCC) and Family Care Clinic (FCC)	81	36	45	YA	15–24	No	All youth had HIV
Jemmott, Jemmott, O'Leary, ... et al., 2010	Peer-based and family-based	Primary school	1057	499	558	YA	MA = 12.4	No	No
Karamagi, Sensalire, Nabwire, ... et al., 2018	Community-based	Northern Uganda districts of Gulu and Omoro (Acholi sub region) and Oyam and Lira (Lango sub region).	409	0	409	YA	10–25	Y, some	No
Kumakech Cantor-Graae, Maling, ... et al., 2009	Peer-based	School	298	148	150	YA	10–15	No	All youth had HIV
Larke Cleophas-Mazige, Plummer, ... et al., 2010	Community-based	Health facility	1028	426	602	YA and OA (no caregivers)	Up to 24	No	Some were HIV positive
Lightfoot, Kasirye, Comulada, ... et al., 2007	Community-based	-Home -NGO clinic	100	28	72	YA	14–21	No	No
Onyechi, Eseadi, Okere, ... et al., 2016	Peer-based	Awka Education Zone in Anambra State, Nigeria. (in-school adolescents)	44	22	22	YA	No	No	No
Parker Maman, Pettifor, ... et al., 2013	Family-based	Family-centered HIV care and treatment program at a pediatric hospital	13	6	7	YA	15–24	No	All YA were HIV-positive
Puffer, Green, Sikkema, ... et al., 2016	Family-based and religious-based	Church	237	114	123	C, YA	10–16	No	No
Rotheram et al., 2012	Vocational	No	100	51	49	YA	13–23	No	No
Snyder, Wallace, Duby, ... et al., 2014	Peer-based	-Community hall -Library -Converted shipping containers	109	5	104	YA	16–24	No	All were HIV-positive
Ssewamala Karimli, Torsten, ... et al., 2016	Family-based and community-based	School	346	121	225	C, YA	12–16	No	No
Thupayagale-Tshweneagae et al., 2014	Peer-based	AIDS Day Center	15	No	No	YA	14–18	No	No
Thurman, Kidman, Carton, & Chiroro, 2016	Peer-based	Home	1014	529	485	C, YA	14–17	No	Some caregivers had AIDS
Thurman, Nice, Lockett, & Visser, 2018	Family-based	Home	105	41	64	C, YA	12–17	No	Some caregivers had HIV
Watt, Minja, Knettel, ... et al., 2021	Digital	Two urban health clinics	1531	492	1039	OA	Median age = 26	yes, all	Some had HIV

(Table 5 continues on next page)

Study	Modality	Setting	Total participant count	Males	Females	Caregivers, adolescents	Age range	Pregnant?	Conditions
(Continued from previous page)									
Willis Milanzi, Mawodzike, ... et al., 2019	Community-based	Gowke South District Clinic, Sesame Clinic, and Krima Clinic	94	41	53	C, YA	10–15	No	Youth were HIV positive
Ybarra, Korchmaros, Prescott, & Birungi, 2013	Digital	"Study cafes" in schools (two all-boys church-funded schools, one mixed-sex Muslim, and one mixed-sex public school)	366	307	59	YA	12–19	No	No

Table 5: Study and sample characteristics (N = 27).

youth using the digital-based, eHealth intervention (ELIMIKA Pilot Project) in Kenya.⁴⁰

HIV associated adherence to treatment

Two studies reported improved adherence to antiretroviral therapy among adolescents living with HIV in South Africa³⁸ and Zimbabwe.³⁹ One study reported that there were no changes in adherence to ART.⁴⁰

Gender differences

Adejumo⁴⁶ reported that female adolescents who received psychoeducation had high levels of self-concept and significant reduction in HIV sexual risk behavior (SRB) as compared with male adolescents in the control group who recorded the most unsafe post-intervention HIV SRB. Risk reduction behavior increased significantly with interventions, and this behavior varied with gender. Thurman and colleagues⁴⁴ reported fewer risky sexual partnerships among boys and more consistent condom use among girls ($\beta = 1.21$, SE = 0.52, $p = 0.02$ and $\beta = 1.37$, SE = 0.57, $p = 0.02$, respectively). One study reported a significant number of males experienced genital discharge and sought treatment from traditional healers.⁴³

Mental health and psychosocial outcomes

Family strengthening, connectedness, and communication

Seven studies reported an improvement on family communication and support after an intervention.^{35,38,45,52–55} Of these seven studies, three reported an increase in adolescent disclosure of their HIV positive status to others, especially caregivers.^{35,38,53} Three studies reported increases in general family communication about topics like sex,^{45,52,55} reported increase in social support,⁵⁴ and an increase in coping skills.⁵³ One community-based study reported a decrease in comfort level in discussing health concerns at a local clinic (89%–85%), but adolescents felt more supported by community adolescents treatment supporters (CATS) and support group members in getting the right care and treatment when they needed it.³⁹ There was an increase in the use of coping methods such as willingness to disclose HIV status to caregivers.⁵² A family-based intervention among 7–17 year-olds adolescents living with HIV (ALWHIV) in Rwanda and Uganda found that family connectedness ($t = 2.25$, $p < 0.05$; $t = 4.326$, $p < 0.05$), parenting skills ($t = 3.908$, $p < 0.05$; $t = 5.207$, $p < 0.05$), and social support ($t = 4.083$, $p < 0.05$; $t = 5.387$, $p < 0.05$) for both post-treatment and follow-up measurements improved, respectively.⁵⁶ Among orphaned children, the mental health support intervention program was able to improve relationships with caregivers.⁵⁷

Anxiety and depression

Five studies showed a significant improvement on anxiety and depression.^{52,56,58–60} Senyonyi et al.⁶¹ reported

that there was no significant improvement in depression ($p = 0.700$). However, mean scores in group showed significant decreases in anxiety ($p = 0.006$). The most common measure used to assess depression was Beck Youth Inventory⁵⁹ and Center for Epidemiological Studies Depression Scale for Children (CESDC).⁵⁶ One study reported that there was a decreased level of hopelessness ($p \leq 0.01$) and depression ($p \leq 0.01$) by economically empowering the participants.⁶⁰ There was a decrease in total difficulties ($p < 0.001$) using the Goodman's Strength and Difficulties Questionnaire.⁵⁸

Self-concept, confidence and self-esteem

Six studies reported improvements in self-concept or confidence.^{39,46,52,53,56,60} In addition, one study used financial empowerment to improve self-concept.⁶⁰ Other studies reported a significant increase in self-esteem, confidence and self-worth ($p < 0.001$).^{39,58} In both studies, the Rosenberg self-esteem measure was used to assess self-esteem. A study by Wills et al. found that adolescents who attended weekly CATS visits at home showed an increase by 0.49 points, $p < 0.001$ in confidence, self-esteem, worth and in quality of life (increase by 0.26 points).³⁹ Rosenberg Self-Esteem score increased ($p < 0.001$) among adolescents who attended a 5-day peer-based intervention in a residential camp.⁵⁸

Discussion

Our review aimed to examine the nature and quality of mental health and psychosocial intervention components and their outcomes in selected SRHR and HIV interventions. We examined the gaps in population, mental health, and psychosocial domains and types of services that remain underexplored or tested. We used two-stepped review: a formal systematic scoping systematic review of selected papers followed by a structured approach to coding interventions and targeting problem domains was carried out to deepen review efforts.

The studies covered nine SSA countries with most interventions reported from Uganda (Fig. 2). We covered 17 randomised-controlled trials and seven open trials.

Table 6 classifies the interventions into peer-, community-, family-, digital-, vocational, and then combined modality-based interventions. Informational support covering SRHR were the most reported intervention elements followed by communication skills and insight building. The interventions were offered in schools, community settings and churches as well as in homes of participants. HIV-associated medical problems, orphanhood, high risk sexual behaviors and low-income status, including exposure to poverty, were amongst the most reported problems that the interventions and practice elements focused on. Twenty-two studies included samples of adolescent boys, and a ratio of 9:1 of girls to boys suggests that more studies focusing on male adolescents are needed. Seven of these studies

included both caregiver and adolescent samples, and only one study focused on out-of-school adolescents who continue to remain a significantly neglected population with little access to healthcare, educational, or social support services. See Fig. 3 which presents a conceptual model examining the socioecological factors that our review identified from the problems and interventional targets reported in the included studies. We kept Bronfenbrenner's socioecological approach and Heise's integrated ecological frameworks in sight to extend this conceptual framework.^{62,63}

There is sufficient evidence that exposure to HIV is closely linked with poor adolescent and youth mental health outcomes among SSA youth.⁶⁴ The stigma associated with HIV can result in social isolation, humiliation, and condemnation for many of these youths,⁶⁵ and girls are at a disproportionately high disadvantage. Our results are supported by studies^{66,67} which indicate that age disparities in sexual relationships and cross-generational partnerships are risk factors for HIV transmission, especially among young women and is associated with poor socioeconomic condition of young people. The lack of social support further exacerbates the poor mental health as well as sexual and reproductive health outcomes among young girls.⁶⁸ It is important to recognise that there are varying degrees of depression among youth and that certain risk factors (e.g., poverty, orphan status, poor SRHR outcomes) can induce a more severe form of depression or trigger other mental illnesses. UNAIDS recommends incentives to keep girls in school and dissemination of social behavior change activities to address sexual behavior, HIV risk perception, gender norms, power, and gender-based violence, especially among adolescent girls and young women aged 15 to 24 in high HIV incidence settings.⁶⁹

In SSA, there is a need to understand factors that are linked to adolescents' sexual behaviors, psychosocial characteristics and how these altogether impact SRHR outcomes. Social or community ecology associated problems (e.g., being an orphan, sexual abuse, homeless, negative cultural norms) were the most reported problems, more than medical issues associated with HIV exposure. Such complex set of adverse exposure reveal that social issues can have severe impacts on adolescent mental and physical health. In order to understand these factors, we extend an adapted framework combining Urie Bronfenbrenner's Ecological Systems Theory and Heise's socioecological model that together provides a sound basis to understand the factors that influence the adolescents and young persons (including those living with HIV) in responding to SRHR and mental health challenges and engaging in provision of requisite services.⁷⁰ These factors can be classified into different levels, which include individual characteristics to social factors. Our findings indicated that individual factors included age, gender, self-esteem, confidence

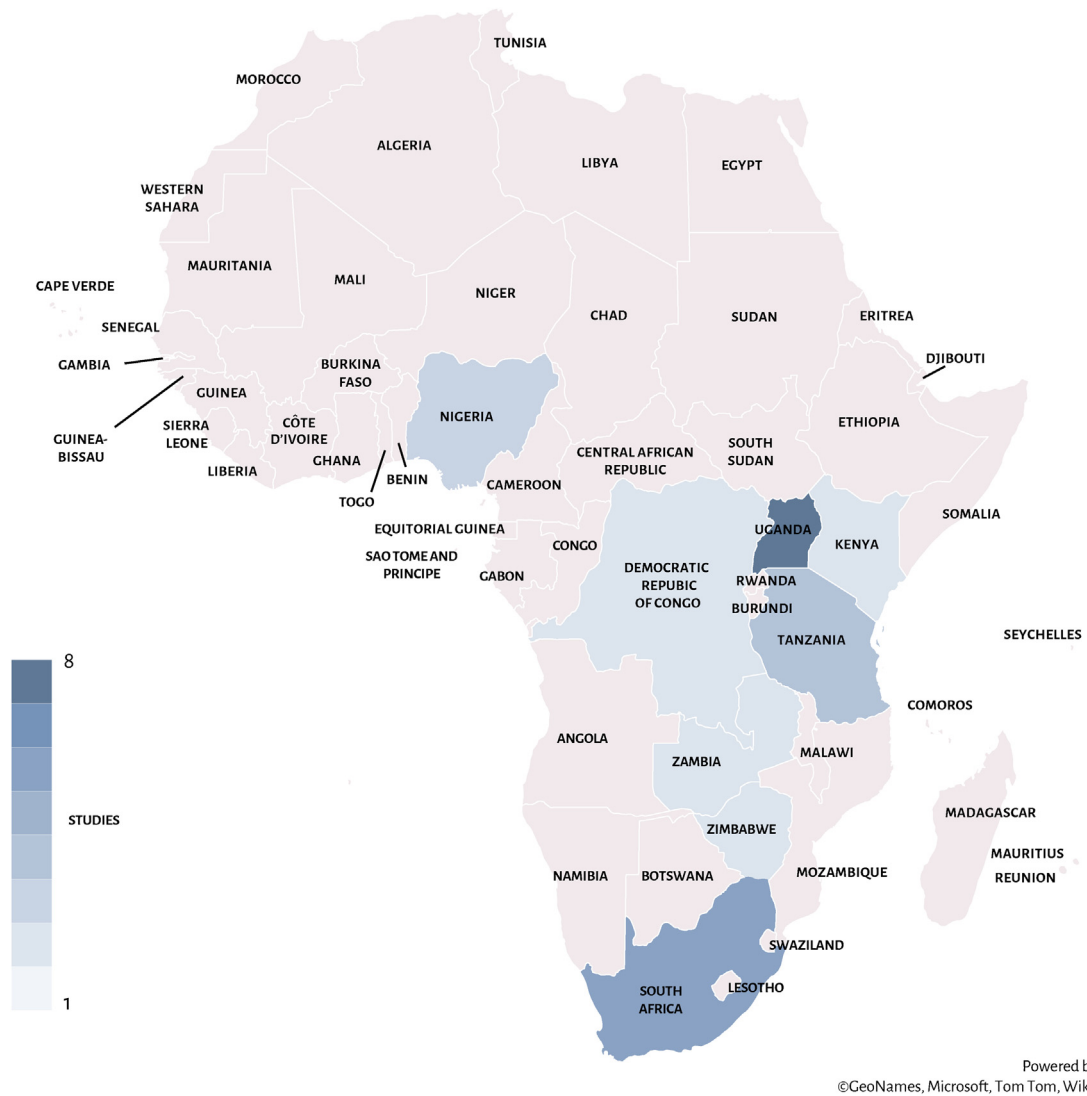


Fig. 2: Countries covered in the review.

and self-concept, depression, anxiety, etc. Social factors included sexual communication with family, transactional sex, family structure, GBV, and parental-adolescent relationship quality (see Fig. 3). This model proposes that interventions will most likely be effective when they address the determinants of an issue across these five levels. In our review, a glaring finding is that mental health concerns were the least common category of problems targeted in these interventions. Social problems including gender norm change also remain poorly integrated within SRHR or mental health programming.

Adverse exposures increase psychological distress and add to high-risk sexual exposures. Given the kind of complex exposures and adverse social determinants around adolescents and youth in SSA, the paucity of

tailored and targeted interventions strengthening mental health have emerged as a key concern. Very often HIV and SRHR issues do not exhaustively cover mental and behavioral health domains. We also found that mental health interventions have not been integrated in targeting sociocultural practices including early marriages, violence against women and oppressive gender and social norms practices in the region. Other studies have also argued that social development as a theme has not been well integrated within global mental health literature.^{26,71} However, based on our review we can also argue that use of a wide range of communication, cognitive and behavioral health skills like assertiveness, problem solving, insight building, support building can also convey the importance of these skills in addressing complex and mitigating adverse

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
Peer based interventions							
Adejumo, 2012, Nigeria	Psychoeducation	No	<ul style="list-style-type: none"> - HIV/AIDS education, HIV sexual risk avoidance behaviour, cognitive restructuring of thoughts/behaviours, sexual risk reduction. - Assertiveness training: concept, complement and practice of assertiveness behaviour. 	6 sessions	No information provided	<ul style="list-style-type: none"> - HIV/AIDS knowledge, - HIV SRB. Adolescent Personality Data inventory (A P D I). 	<ul style="list-style-type: none"> - Reductions in HIV SRB. - High self-concept and good knowledge of HIV/AIDS among female adolescents. - Low self- concept but with good HIV/AIDS knowledge among male adolescents.
Austrian, Soler-Hampejsek, Behrman et al., 2020, Zambia	The Adolescent Girls Empowerment Program (AGEP)	Theory of change	<ul style="list-style-type: none"> - Weekly girls group meetings on health, life skills and financial education. - Provision of a health voucher. - Sexual and reproductive health, HIV, life skills, and financial education. 	2 year intervention	Community female mentors aged 20–35 years	<ul style="list-style-type: none"> - Questionnaires on Social assets: self-efficacy and positive gender attitudes. - Economic assets: financial literacy. - Health assets: fertile period and contraceptive methods, HIV/AIDS knowledge. 	<ul style="list-style-type: none"> - Improved knowledge on SRHR. - Financial literacy. - Savings behaviour. - Self-efficacy. - Transactional sex.
Bandiera et al., 2012, Uganda	Empowerment and Livelihood for Adolescents (ELA)	No	<ul style="list-style-type: none"> - Vocational skills training teaches income generating activity activities, emphasizing small-scale enterprises -Life skills training teaches about SHRHR, menstruation, pregnancy, STI, HIV/AIDS awareness, family planning, rape, management skills, negotiation and conflict resolution, leadership among adolescents, legal knowledge about child marriage/violence against women. 	No	Female mentor	Questionnaires on Risk behavior: HIV knowledge, pregnancy knowledge, condom use, STD presence, sexual activity.	<ul style="list-style-type: none"> - Economic empowerment of adolescent girls and increased marriage age, and probability of having a child decreased Increase in HIV knowledge and Increased condom use and decreased unwilling sex.
Harding et al., 2019, Tanzania	Memory Work Therapy	Ecological model	<ul style="list-style-type: none"> - One-on-one support, 90 min of sports/ games. - Session 1: Memory book, Session 2: Memory box, Session 3: Tree of Life 1 and Tree of Life 2, Session 4: Hero (Active Citizen) book, Session 5: certificates of completion. 	5 sessions	Qualified social workers (n = 3), a clinical officer (n = 1) and a medical doctor (n = 1).	<ul style="list-style-type: none"> - The Brief Symptom Inventory (BSI). - The Rosenberg Self-Esteem scale. - The Strengths and Difficulties Questionnaire (SDQ) The Self-Efficacy Questionnaire for Children (SEQC). 	<ul style="list-style-type: none"> - Brief Symptom Inventory decreased. - Improved self-esteem. - Hyperactivity and emotional behaviour decrease. - Prosocial behavior increased. - Total difficulties decreased. Self-Efficacy: <ul style="list-style-type: none"> - Social and emotional increased.

(Table 6 continues on next page)

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
Kumakech et al., 2009, Uganda	Peer-group support intervention (psychosocial approach)	Participatory psychosocial approaches	16 semi-structured psychosocial exercises based on: Fears, worries and concerns about orphanhood; HIV/AIDS fears, how to handle them, and problem solving; improve of self-esteem and share of thoughts about themselves to other orphans; two peer-group support exercises after school by the teacher based on problem solving; physical healthcare monthly to the intervention group.	10 weeks	Trained teacher supervised by the researcher and experienced counsellor.	- Beck Youth Inventories (BYI).	- Decrease in anxiety, depression, and anger.
Onyechi et al., 2016, Nigeria	Rational-Emotive Health Education Program (REHEP)	REBT framework	HIV counseling, testing, and referral; Group problem identification, problem-solving, and cognitive restructuring.	16 session	No information provided	Rational-Emotive Behavior Therapy's Human Immunodeficiency Virus Risk Perceptions Questionnaire (REBT-HRPQ).	No differences in HIV risk perceptions between treatment and control group.
Senyonyi et al., 2012, Uganda	Cognitive behaviour therapy group intervention	CBT framework	<ol style="list-style-type: none"> Used the Teens Linked to Care-Act Safe module with cognitive behavioral therapy counseling as intervention. Module's goal is to empower youth to assess their substance use and increase use of condoms. There were eight 80-min cognitive behavioral therapy sessions. Included components like psychoeducation and information about HIV/AIDS, problem solving, self-efficacy, etc. Encouraged sexual abstinence. 13 to 18 adolescents in each group. 	8 sessions	Trained counsellor	Child Depression Inventory (CDI). Revised Children's Manifest Anxiety Scale-2nd ed. (RCMAS-2). Alcohol User Disorder Identification Scale (AUDIT).	<p>Decrease in anxiety compared to control group.</p> <ul style="list-style-type: none"> No significant difference between treatment and control groups post-test for sexual behavior, depression, and alcohol use.
Snyder et al., 2014			<p>Three areas: coping and support, HIV health, and positive prevention.</p> <p>Each session contained components like role plays, group reflections, relaxation exercises, discussions on physical and emotional health, and setting goals at end.</p>	3 sessions each 2 h long	Trained lay facilitators who were from the same community as intervention's participants		<ul style="list-style-type: none"> 85% of participants found the intervention to be educational. Increases in condom usage. Attended their first ART visit compared to the control group. Learned on how to access support from peers. More willing to disclose their status.

(Table 6 continues on next page)

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
Thupayagale-Tshweneagae et al., 2014, South Africa	Better Accept Reality	No	<ol style="list-style-type: none"> Has three approaches: psychoeducation approach, peer-based approach, and Erikson's fifth phase of adolescent development. Orientation phase: explaining to participants the program, choosing a name for the program, choosing peer group leaders, training group leaders, and deciding what the indicators of success are. Motivation phase: watch War Dance, a movie about an adolescent whose parents were killed during a war in Uganda and was abused by relatives afterwards. Adolescent overcame circumstances through music and hard work at school. Knowledge and skills acquisition phase: participants wrote about their needs and how to meet those needs 	14 sessions (2 h duration)	Group leaders (trained by researchers)	Focus group discussions and reflective diaries	<ul style="list-style-type: none"> There was positive change in youth attitudes toward caregivers, responsibility towards self and to others, and conversation regarding death
Thurman, Kidman, Carton, & Chiroro. 2016, South Africa	Interpersonal Psychotherapy for Groups (IPTG) and Vhutshilo	Curriculum-based behavioral intervention	<ol style="list-style-type: none"> Has three approaches: psychoeducation approach, peer-based approach, and Erikson's fifth phase of adolescent development. Orientation phase: explaining to participants the program, choosing a name for the program, choosing peer group leaders, training group leaders, and deciding what the indicators of success are. Motivation phase: watch War Dance, a movie about an adolescent whose parents were killed during a war in Uganda and was abused by relatives afterwards. Adolescent overcame circumstances through music and hard work at school. Knowledge and skills acquisition phase: participants wrote about their needs and how to meet those needs. 	IPTG: 16 Vhutshilo: 13	IPTG: Lay adult facilitator Vhutshilo: trained young adult facilitator	-N/A	<ul style="list-style-type: none"> Exposure to a single intervention did not impact behaviors. Risk-reduction behaviors, but these behaviors varied with gender (boys reported fewer risky sexual partnerships, and girls reported more consistent condom use. No difference in the likelihood of sexual debut for either gender. Providing both psychological and behavioral interventions resulted in long-term changes in sexual behavior.

(Table 6 continues on next page)

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
Community-based interventions							
Karamagi et al., 2018, Uganda	"Determined Resilient Empowered AIDS-free Mentored and Safe" (DREAMS) initiative	Quality improvement for behavior change (QBC) model	<ol style="list-style-type: none"> 1. HIV risk skills building and peer-to-peer support on topics like saying no to sex and negotiating condom use. 2. Setting up and making functional community QI teams to mobilize community resources to support young women and their partners to stop risky behavior. 3. Holding service delivery camps to provide HIV prevention services and commodities to AGYW, their partners, and other community members. 	Not provided, spread over 2 years	QI teams consisting of community elders, religious leaders, peer facilitators, local council members, Village Health Teams (VHTs), health workers, and teachers	SRHR service uptake, high risk behaviors, gender based violence	<p>Reduction in AGYW reporting multiple sexual partners and transactional sex.</p> <ul style="list-style-type: none"> - Increase in consistent condom use. - Increase in parental and partner support - Parental support resulted in less transactional sex and decrease in transactional sex - Decrease in gender-based violence - Decreased pregnancy rates
Larke Cleophas-Mazige, Plummer, ... et al., 2010, Tanzania	MEMA kwa Vijana Adolescent Sexual and Reproductive Health Intervention	No	<p>Four major components:</p> <ol style="list-style-type: none"> 1. Reproductive health education in primary school. 2. Provision of youth friendly sexual and reproductive health services (YFSRHS). 3. Community-based condom promotion and distribution. 4. Community-wide activities. 	No	Facility Healthworkers	<ul style="list-style-type: none"> - Sexually transmitted infection prevalence - Number of condoms distributed - Number of sexual contacts 	<ul style="list-style-type: none"> - Monthly outpatient attendance was higher - A greater increase in attendance by young men over time. - Attendances due to STI symptoms increased and more males attended. - Sexually active males and females from the trial cohort reported genital discharge. - Poor treatment, and embarrassment as reasons for nonattendance. - Seek treatment from health facilities for future STIs.
Lightfoot, Kasirye, Comulada, ... et al., 2007	Culturally-adapted intervention	No	<ol style="list-style-type: none"> 1. Six sessions for each of the three areas: physical health and nutrition, mental health, and reducing HIV transmission. 	18 sessions	<ul style="list-style-type: none"> - Youth and staff from Uganda Youth Development Link and other NGOs 	Sexual risk behaviors	<ul style="list-style-type: none"> - Condom use increased. - Significant decrease in log number of sexual partners. - No significant change in sexual activity or total number of sex act.

(Table 6 continues on next page)

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
Willis et al., 2019, Zimbabwe	Community adolescent treatment supporters (CATS) intervention	No	<ol style="list-style-type: none"> Standard of care (3 monthly clinic visit, clinical monitoring, management of OIs, CD4 count, ARVs, counselling and adherence support). Weekly CATS visit at home. Monthly support group. Pill boxes. Linkage to other services. 	12 months	- Africaid and the Ministry of Health and Child Care (MoHCC).	<ul style="list-style-type: none"> 16 questions on adherence 36 questions psychological well being 10 questions linkage and retention in care 	<ul style="list-style-type: none"> Improvement in adherence to ART. Retention in care with control group declined. Increase in confidence, self-esteem and self-worth. Linkage to services within the intervention group increased. Improvement in the number of adolescents who are satisfied with the referrals.
Family based interventions							
Betancourt et al., 2014, Rwanda, Uganda	Family Strengthening Intervention (FSI)	No	<ol style="list-style-type: none"> Has four main components: building parents skills, improving family communication; developing a family narrative to increase family connectedness and hope; and providing psychoeducation on HIV transmission, prevention, and normative responses that family members may have; teaching problem-solving skills and social support. These are delivered through 6 modules. 	Six modules	Counsellor	Fidelity to intervention; Participant satisfaction; Youth and family protective and risk factors (family connectedness, good parenting, perseverance/ self-esteem, pro-social behavior, harsh punishment and youth and caregivers ownsocial support); Youth mental health and functioning (depression, anxiety, irritability, conduct problems and functional impairment)	Family connectedness, good parenting, social support, prosocial behavior, self-esteem, depression and anxiety, harsh punishment scores improved.

(Table 6 continues on next page)

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
Bhana et al., 2016, South Africa	VUKA: cartoon-based family intervention	Social Action Theory	<p>Session topics include: (1) AIDS-related loss and bereavement; (2) HIV transmission and treatment knowledge; (3) Disclosure of HIV status to others; (4) Youth identity, acceptance and coping with HIV; (5) Adherence to medical treatment; (6) Stigma and discrimination; (7) Caregiver-child communication, particularly on sensitive topics such as puberty and HIV; (8) Puberty; (9) Identifying and developing strategies to keep children safe in high-risk situations where sexual behavior and drug use are possible; and (10) Social support.</p> <ol style="list-style-type: none"> 1. VUKA is a culturally-tailored cartoon storyline and curriculum about a 12-year old boy orphaned by AIDS, who moves in with his relatives to learn about his own HIV diagnosis and treatment needs. 2. Topics include AIDS-related loss, HIV transmission and treatment knowledge, disclosure of HIV status to others, youth identity/acceptance and coping with HIV, adherence to medical treatment, stigma/discrimination, caregiver-child communication (especially on sensitive topics), puberty, identifying/developing strategies to keep youth safe from sexual behavior and drug use, and social support. 	6 sessions	Lay Counsellors, supervised by psychologist	Strengths and Difficulties Questionnaire (SDQ); Children's Depression Inventory (CDI); Tennessee Self	<p>Increased communication with family and lower total difficulties scores (SDQ) among children were associated with lower. Caregiver depression less frequent caregiver</p> <ul style="list-style-type: none"> - Reported communication about difficult topics. - Higher youth self-concept scores.
Dow et al., 2018, Tanzania	Sauti ya Vijana (SYV; The Voice of Youth)	CBT framework	<ol style="list-style-type: none"> 1. First four group sessions encouraged youth to determine worries about living with HIV and to use relaxation methods. 2. Learned how to use the cognitive triangle (Cognitive Behavioral Therapy, CBT) to identify and change negative thoughts. 3. Sessions 5-7: there was an emphasis on nurturing strong familial and social relations. 4. Sessions 8-10: prior session teachings were incorporated to create a safe and healthy living environment through choices influenced by stigma, education about HIV, disclosure, and values. 	10 weekly group sessions and two individual sessions.	group leaders between the ages of 24-30 years of age.	The pre-intervention questionnaire included demographic, socioeconomic, mental health, risk-taking behavior, and HIV-related information.	<ul style="list-style-type: none"> - Youth attendance and caregiver increased over time. - Increased use of coping methods. - Increased willingness and ability to disclose HIV status to caregivers. - Increased understanding of youth's experiences by caregivers. - Gave confidence to them to educate community members about why they should not fear people with HIV. - Increased resilience and the utilization of new coping skills

(Table 6 continues on next page)

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
Parker Maman, Pettifor, ... et al., 2013, Democratic Republic of Congo	Supporting Youth and Motivating Positive Action (SYMPA)	Rogers' Diffusion of Innovation Theory	<p>Session 1 Living with HIV Identify personal strengths and challenges in relation to living with HIV.</p> <p>Session 2 Coping and Problem Solving Identify personal stressors; problem-solving skills; coping styles.</p> <p>Session 3 Safer Sex I Risk continuum; identify personal risk limits and problem solve triggers to risky behavior.</p> <p>Session 4 Safer Sex II Proper condom use; knowledge of Sexually Transmitted Infections (STIs); assertive communication.</p> <p>Session 5 Social Support and Disclosure</p> <p>Session 6 Wellbeing and Health Maintenance.</p>	6 weekly sessions	Facilitators with degrees in psychology or social work	No	<ol style="list-style-type: none"> 1. Participants enjoyed SYMPA intervention. 2. Filled gaps in education. 3. Identified ways intervention could be improved (how to disclose HIV status and marriage with HIV). 4. Many felt content with disclosing their HIV status to family members. 5. Most female youth wanted information about marriage, couple testing, and how to disclose HIV status. 6. Most intended to participate again
Thurman et al., 2018 South Africa	Let's Talk	No	1. Program model focuses on grief, interpersonal disputes, role transitions, and relationship deficits.	33 sessions (19 caregiver and 14 adolescent sessions, of which six were caregiver and adolescent sessions)	Trained facilitators (received three separate one-week training sessions)	Adolescent and caregiver HIV knowledge; Adolescent condom use knowledge; Adolescent condom negotiation & sexual refusalself-efficacy; Caregiver-adolescent sexual risk communication; Adolescent-caregiver connectedness; Adolescent and caregiver mental health (DASS-21)	<ul style="list-style-type: none"> - Increase in HIV transmission knowledge - Increase in condom knowledge and negotiation - Decrease in mental health - Increase in caregiver connection - Increase in caregiver sexual communication caregivers: - Decrease in mental health - Increase in HIV transmission knowledge

(Table 6 continues on next page)

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
Digital interventions							
Ivanova et al., 2019	ELIMKA: Interactive web-based peer support platform intervention	No	<ol style="list-style-type: none"> 1. Blog posts on topics like SHRH, HIV, medication, nutrition, relationships, etc. 2. Discussion sections. 3. Q&A sections with health care providers. 4. Stories contest and private messaging (platform resembled social media platforms). 	No	Web based	Usability, knowledge, perceived self-efficacy and adherence intention	No changes in knowledge and behavior and improvement in adherence intentions
Watt et al., 2021	Maisha: CBT Counseling	No	<ol style="list-style-type: none"> 1. It addresses three forms of stigma: internalized stigma, anticipated stigma, and enacted stigma. 2. Session 1: women with or without their partners watch 8-min video about stigma and care. Session 2: woman meets with counselor (with or without partner) to share HIV test results 3. Session 3: counselor asks about woman's initiation of ART and adherence. 	3 sessions personalized duration varying with ANC visits	Counselor with university-level education who received training and supervision from study team	<ul style="list-style-type: none"> - HIV Care Retention was assessed via medical record review - Internalized HIV Stigma - Internalized HIV stigma - HIV and Abuse Related Shame Inventory (HARSI) - Anticipated Stigma - Acceptance subscale of the Illness Cognition Questionnaire - Edinburgh Postnatal Depression Scale (EPDS) - Personal and Attributed Stigma Scale (PASS) 	<ul style="list-style-type: none"> - Highly feasible and acceptable among HIV negative individuals - Positive impact on participants' attitudes of moral judgment toward PLWHIV - Lower moral judgement scores - Fear of HIV stigma was a major driver of poor care engagement
Ybarra, 2015	CyberSenga: Internet-based HIV Prevention and Healthy Sexuality Education Program	No	<ol style="list-style-type: none"> 1. Module 1: focused on general HIV information. Module 2: focused on motivation, problem-solving, and communication skills. Module 3: discussed motivations to have sex. Module 4: behavior skills (condom use skills). Module 5: culturally-specific issues related to HIV 2. There were four different course pathways: sexually active adolescent me, sexually active adolescent women, abstinent adolescent men, and abstinent adolescent women 	5 weekly sessions	Research assistants to help with using CyberSenga program	<ol style="list-style-type: none"> 1. HIV prevention-related information was measured at each time point with six items. Three of these items (one with a slight modification) were used in the Teen Health Survey (e.g., "You can safely store condoms in your wallet for at least two months" with response options: definitely false to definitely true). The other three items were written to assess knowledge of information commonly misconstrued in the target population and were from the Uganda Demographic Health Survey (41) (e.g., "The HIV virus is small enough to go through a condom" with response options: definitely false to definitely true). An information score was created to reflect the percent of correct answers across the six items, with higher scores reflecting more knowledge of HIV-related 	<ul style="list-style-type: none"> - HIV-related information improved over time at a greater rate - Motivation for condom use changed to a greater degree - Behavioral skills for condom use and motivation and behavioral skills for abstinence were statistically similar over time

(Table 6 continues on next page)

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
						<p>information (1) attitudes, (2) subjective norms, and (3) behavioral intentions. 2. HIV prevention-related attitudes towards abstinence were measured with one item (i.e., "For me, not playing sex until I'm an adult would be ...". 3. HIV prevention-related subjective norms for abstinence were measured with two items (e.g., "My boyfriend or girlfriend thinks we should not play sex until we're both adults" with response options: very untrue to very true) and subjective norms for condom use were measured with eight items (e.g., "My friends would advise me to buy condoms or get them for free, during the next two months" with response options: very untrue to very true). 4. Behavioral intentions to be abstinent were measured with one item (i.e., "I'm planning not to play sex until I'm an adult" with response options: very untrue to very true) and behavioral intentions to use condoms were measured with four items (e.g., "During the next two months, I'm planning to buy condoms or get them for free" with response options: very untrue to very true). 5. Behavioral skills for abstinence were measured with one item (i.e., "How hard or easy would it be for you to make sure you do not play sex until you an adult?" with response options: very hard to very easy) and behavioral skills for using condoms were measured with five items (e.g., "If you play sex, how hard or easy would it be for you to make sure you and your partner use a condom every time?" with response options: very hard to very easy).</p>	

(Table 6 continues on next page)

Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
Combined modality interventions							
Ezegbe et al., 2018	Rational emotive digital storytelling intervention (REDStory intervention)	AIDS Risk Reduction Model the rational emotive behavior therapy (REBT),	<ol style="list-style-type: none"> 1. Combines rational-emotive education with HIV/AIDS audio-visual resources. 2. Watched videos and wrote down main messages. 3. Group meetings: discussions, narrations of videos, answering questions. 2. Discuss HIV risk perceptions. 3. Build HIV risk skills and peer to peer support in topics like saying no to sex and negotiating condom use to improve the ability of AGYW to stop risky behavior and to influence safer sex practices. 4. Set up and make functional QI teams to mobilize community resources to support young women and their partners to prevent risky behavior. 5. Have service delivery camps to provide HIV prevention services to AGYW, their partners, and other community members. 	8 week, twice per week	Therapist	HIV Knowledge Questionnaire (HIV-KQ-18), Perceived Risk of HIV Scale (PRHS) Demographic questionnaire	- Increased knowledge of and perceived risk of HIV among schoolchildren in treatment compared to control (P = 0)
Jemmott et al., 2010, South Africa	HIV/STD risk-reduction intervention	Social cognitive theory, the theory of planned behavior, and extensive formative research, or "targeted ethnography.	<ol style="list-style-type: none"> 1. Participants learn about HIV/STD risk reduction, enhance behavioral beliefs that support abstinence and condom use, and increase skills and self-efficacy to negotiate abstinence and condom use and how to use condoms. 2. Students had homework to work on with caregivers. 	6 sessions of two hours over 6 consecutive school days	Facilitators	Sexual Behaviors, HIV/STD Knowledge, and Self-efficacy	<p>HIV/STD risk reduction intervention were less likely to report sex penetration and multiple sexual partners.</p> <ul style="list-style-type: none"> - Boys were less likely than girls to report sexual inexperience - HIV/STD risk-reduction intervention were less likely to report having heterosexual anal intercourse in the previous 3 months. - Few reported engaging in same-sex sexual behavior.
Puffer et al., 2016, Kenya	Church based intervention	Community-based participatory methods	<ol style="list-style-type: none"> 1. Each session had three modules. <ul style="list-style-type: none"> - Economic empowerment. - Emotional support. - HIV education and prevention. 2. Teaches about communication regarding sex and HIV 3. Provides economic community and support related to caregiver-child communication. 	9 sessions of 2 hours duration	Facilitators were church members	Parent-Adolescent Communication Scale, Frequency and Quality of Communication About Sex and HIV and newly developed Economic Communication and Support Measure	- There were improvements in frequency and quality of family communication about sex.

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Authors, country of interest	Intervention name/type	Theoretical framework or theory of change	Intervention or practice components	No of sessions	Delivery agents	Measurement tools and domains assessed	Intervention outcomes
(Continued from previous page)							
Ssewamala, 2016 Uganda	Suubi-Maka Intervention: Family- Level Economic Strengthening	No	1) Promoting monetary savings for children. 2) Financial promotion. 3) Mentorship based on learning and optimism.	12 months	No near-pee	Education: Primary Leaving Examinations and Child's Confidence. In Achieving Educational Plans; Health: Beck Hopelessness Scale and Tennessee Self-Concept Scale.	- Level of hopelessness decreased. - Self-concept increased.
Vocational interventions							
Rotheram et al., 2012	Vocational Training	No	1. Both control and treatment groups received the 10-week Street Smart HIV intervention program initially. 2. Intervention was the Immediate Vocational Training group, and control was the Delayed Vocational Training group 3. Intervention contained apprenticeships in hairdressing, catering, tailoring, electronics, etc. 4. Classes were four to 8 h, five days a week 5. Artisans were trained on how to speak to youth, conflict resolution, HIV prevention, and how to talk to youth about HIV prevention 6. Five youth maximum were assigned to each artisan.	10 weeks	Facilitators	Brief symptom Inventory HAT-Quality of Life MOS Social Support Scale	- No significant difference in sexual risk - Greater increases in satisfaction with life, and greater increase in social support - Increase condom use - Decrease in number of sexual partners - conduct problems

Table 6: Intervention and practice descriptions across studies.

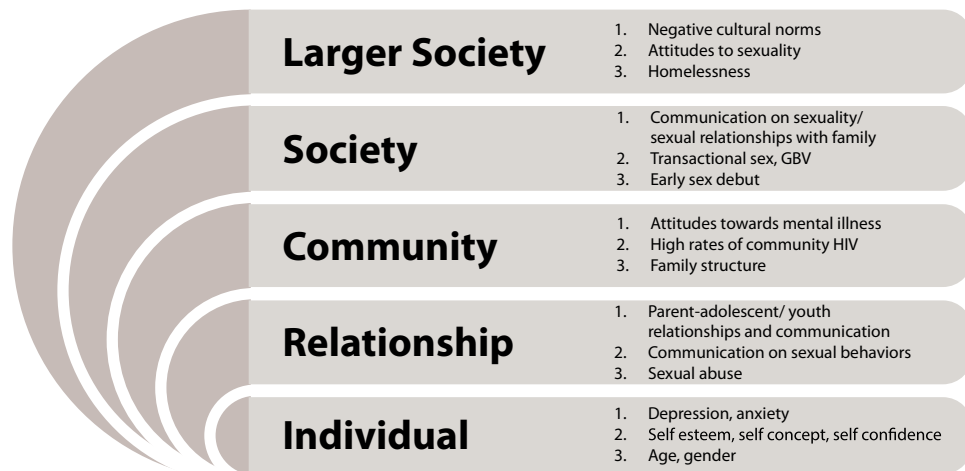


Fig. 3: Conceptual Model examining socioecological factors impacting adolescent mental health and SRHR.

sociocultural factors as well as physical and mental health outcomes.

The most common intervention components were informational support on SRHR topics and communication skills, suggesting that sexual education, even if basic, is necessary for youth in SSA and that learning how to speak about these issues to healthcare professionals, family members and peer group is also important. These behavioral competencies are an important medium to improve outcomes. In the future, it will be important to supplement these skills with a stronger focus on mental health and psychosocial support. Alongside informational support, how violence prevention, gender equity and norms change including diverse gender and sexual identity expression and rights will need to be prioritised as domains for further development. Despite tremendous socioeconomic stresses, the interventions did not target post-traumatic stress disorder, severe comorbid presentations or substance use in greater depth, psychopathologies we feel remain under-investigated in SSA.

While indeed the literature points to a connection between positive HIV status and poor adolescent mental health, our scoping review also reveals that simple solutions like assertiveness, communication building, insight building and life skills training can improve mental and physical health outcomes. We rated fourteen studies in our quality appraisal as providing good quality evidence. We found several multilevel interventions involving not only adolescents, but also their caregivers, peers, or community members.⁴⁹ These interventions provide not just general information on HIV and stigma, but also build skills in finance^{47,60} communication,^{35,42,52,55,56,72} and assertiveness,⁴⁶ empowering adolescents in multiple domains. Additionally, some of these programs facilitated discussions among the participants and aimed to build peer led social connections further.^{35,40,51,58,72,73} A strong

focus on empowering youth was found in many studies and the area of self-help interventions seeking to deepen a sense of agency and freedom will be important impetus to develop in future research. The State of the World's Children report 2021⁷⁴ showcased mental health and found that empowerment focused and youth led interventions were critical to improving mental health outcomes.

The success of an intervention program can be enhanced through the use of unique tools such as videos⁵¹ and cartoon narratives.^{52,72} However, these tools will be effective insofar as there are other active components like engaging discussions taking place around them to bring the lessons to life.^{42,75,76} Additionally, an active, multidisciplinary intervention can be more impactful than a singular intervention, as the former's use of various activities may encourage more engagement from the participants.⁵¹

Overwhelming evidence suggest that an intervention that comprises of these components can do more than just reduce poor mental health among adolescents. It also has the potential to improve family-, peer-, and community-level communication.^{35,45,52,55,56,72} These multilevel targets can ultimately result in positive outcomes like improved knowledge about HIV.^{35,45–48,51} Mutahi and colleagues⁴⁸ reach the same conclusion in analyzing mental health outcomes of pregnant adolescents and young women in SSA.

Non-traditional interventions too can improve perception of and readiness towards HIV prevention^{41,51} and ultimately promote adherence behaviors and safe sexual behaviors.^{34,43–49,77,78} This claim is further supported by another paper included in our review that demonstrates the effectiveness of a financial strengthening intervention in improving attitudes towards HIV-prevention among Ugandan adolescents.

The findings of our scoping review suggests that a program that seeks to empower adolescents in multiple ways can foster change and improvements at a number of different levels may offer a better simulation of complexity of reality on ground. Our review was inclusive in its approach and tried to scope various interventions offered to young people around their mental health, SRHR and HIV treatment and prevention with a focus on both problems, solutions and distilling different characteristics of the solutions/interventions. In this broad scoping, comparison groups were not mandatory and the study included open trials and did not carry out publication bias or reporting bias. A number of limitations of this review warrant acknowledgment. Our study did not focus on some compelling social problems such as early marriages, violence against young women, systemic oppression and violence against young girls and we did not find interventions targeting LGBTIQ populations and those targeting expression of diverse gender and sexual identities. This may also be due to limitations of our search strategy and the findings of this review may be limited to the papers that we were able to identify with the current search strategy and a focus on English language. SSA region is multilingual and we may have missed significant number of studies from French- or Portuguese-speaking countries or especially those published in local African regional languages. We so want to underscore that there is a disjunct between sociological evidence around adolescent SRHR needs, actual realities of young lives and ways in which these are then addressed within the field of mental health and psychosocial research. Around issues of early marriages, pregnancy and early motherhood culturally contextualised, evidence informed mental health interventions and their uptake continues to remain poor. This is an evidence gap warranting further attention.

In conclusion, our review offers a comprehensive summary of key mental health and psychosocial interventions including those for pregnant and parenting adolescents; synthesizing behavioral and mental health interventions cross-cutting HIV and SRHR interventions for young people in SSA. Our unique strength is the focus on adolescent boys and parenting adolescents (including fathers). Although we did identify a number of interventional modalities, including groups-, individual-, digital-, community-, family- and school-based interventions, mental health domains have not been studied in great depth across these modalities and key populations. Instead, informational empowerment and literacy around SRHR and HIV have been examined in depth, and few determinants such as access, readiness and basic education continue to be the focus the intersection of these intervention, intervention implementation set-up and in-depth mental health programming in these interventions remain underdeveloped. Moreover, there is poor attention to male adolescents and

adolescent parents—implying that such subset of populations who might need tailored support need to be the focus of future work. More nuanced mental health and psychosocial interventions are warranted for these populations and for the general population of adolescents and youth keeping the complexity of their lives and barriers in mind.

Contributors

MK developed the protocol; AL, BR, MK developed the search strategy and carried out first data extraction, OM, JN, SJ carried out the second round of review and quality assessment, BC, KB, RG coded for problems and solutions, MK wrote the first draft, OM, SJ co-developed the paper further. BC analysed the problems and solutions data. OM, SJ and MK have verified the overall data presented in the review. Practice wise coding data verified by BC and KB. All authors confirm that they had full access to all the data in the study and accept responsibility to submit for publication.

Data sharing statement

Data extraction files available for sharing on a reasonable request from the corresponding author.

Declaration of interests

KB is a consultant for and BC has an ownership interest in Practice-Wise, LLC, which offered a no-cost license for use of their codebook for this project.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.eclinm.2023.101835>.

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