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Mental Health Interventions for Adolescents Living with HIV/AIDS in Sub-Saharan Africa: A Systematic Review Protocol.

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Abstract

Introduction: Adolescents living with HIV/AIDS (ALHIV) in sub-Saharan Africa face numerous challenges that can adversely impact their mental health and well-being. Despite the evident need, there is absence of a comprehensive evidence synthesis and evaluation of the effectiveness of mental health interventions for adolescents living with HIV/AIDS in this region. Consequently, we will conduct a systematic review to synthesize the literature on existing mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa.

Methods and Analysis: This review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Eligible studies will include those conducted in sub-Saharan African countries, involving adolescents (aged 10-19 years) living with HIV/AIDS, and evaluating psychosocial, psychological, or other forms of interventions aimed at improving mental health outcomes. Comprehensive searches will be conducted in electronic databases (PubMed, MEDLINE, CINAHL, Scopus, PsycINFO) and grey literature sources. Study authors will be contacted, and a reference list of retrieved articles will be reviewed for additional articles/papers. Study selection, data extraction, and quality assessment will be performed by two independent reviewers. Any disagreement will be addressed via consensus or by inviting a third party. A narrative synthesis will be conducted, and if possible, meta-analyses will be performed to estimate the overall effect sizes of interventions on mental health outcomes.

Ethics and Dissemination: No primary data collection will be undertaken; therefore, no ethical approval is required. The findings of this review will be disseminated through publication in a peer-reviewed journal and presented at relevant conferences.

Conclusion: This systematic review will provide a comprehensive synthesis of mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa, identifying gaps and informing future research and intervention development to support the well-being of this vulnerable population.

PROSPERO registration number: CRD42024538957

Keywords: Adolescents, HIV/AIDS, Depression, Anxiety, Suicidal thoughts, Mental Health interventions, Africa.

Strengths and limitations of the review protocol

1. While several prior reviews have explored mental health interventions for people living with HIV/AIDS, this systematic review protocol stands out due to its particular emphasis on adolescents living with HIV/AIDS in sub-Saharan Africa.
2. The protocol follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, ensuring transparency, reproducibility, and adherence to established standards for conducting systematic reviews.
3. The protocol outlines a comprehensive search strategy that includes multiple general and specialized electronic databases (PubMed, MEDLINE, PsycINFO, CINAHL, Scopus) and gray literature sources. This increases the likelihood of identifying all relevant studies, reducing potential publication bias.
4. The protocol specifies a systematic process for study selection and data extraction, with two independent reviewers involved in each step. This approach minimizes potential biases and errors in the selection and data extraction processes.

5. Given the diverse settings, interventions, and study designs that may be included, there is a potential for substantial heterogeneity among the included studies. This could limit the ability to conduct meta-analyses or draw robust conclusions.
6. The protocol includes only studies published in English, which may lead to the exclusion of relevant studies published in other languages, potentially introducing language bias.

Introduction

The HIV/AIDS epidemic continues to be a significant public health challenge in sub-Saharan Africa, disproportionately affecting vulnerable populations, including adolescents. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), approximately 4.8 million young people aged 10-24 years were living with HIV in 2021, with over 80% residing in sub-Saharan Africa [1].

Adolescents living with HIV in sub-Saharan Africa face a significant burden of mental health problems, including anxiety, depression, and suicidal ideation [2-5]. A recent systematic review in sub-Saharan Africa found that 25% of ALHIV screened positive for any psychiatric disorder, whereas 30–50% presented with emotional, and behavioural difficulties or significant psychological distress [3]. The distribution of the burden of mental health problems differs greatly, with some countries documenting greater prevalence statistics.

In South Africa, a study by Woollett et al. [6] found that 27% of HIV-positive adolescents aged 10-19 years accessing HIV treatment in Johannesburg had symptoms of depression, and 12% had anxiety symptoms. In Botswana, 15.0% of HIV-positive adolescents reported suicidal ideation, with female adolescents endorsing more thoughts of suicidality/self-harm than males [7], whereas

in Ethiopia Abebe et al. [8] found a 35.5% prevalence of depression among HIV-positive young adults, with significant correlations to age 20-24 years, opportunistic infections, low social support and stigma. Among adolescents aged 12-17 years in Uganda, Musisi and Kinyanda [9] reported 19.8% and 8.9% prevalence of depression and anxiety disorders, respectively.

The mental health burden in this population is exacerbated by various factors, including stigma, discrimination, poverty, limited access to healthcare services and the psychological burden of coping with a chronic and stigmatized condition [10-11]. These mental health issues can have far-reaching consequences, including poor treatment adherence, increased risk-taking behaviours, impaired social and academic functioning, and overall well-being of HIV-positive adolescents [2,12-13]. Despite the evident need for mental health support, access to appropriate services and interventions remains limited in many resource-constrained settings in sub-Saharan Africa.

Over the past two decades, various mental health interventions have been developed and implemented to address the unique needs of adolescents living with HIV/AIDS [13-14]. These interventions range from psychosocial support programs to evidence-based psychotherapies, such as cognitive-behavioural therapy (CBT) and interpersonal therapy (IPT) [15-17]. However, most of these interventions have been developed and evaluated in high-income countries, raising questions about their effectiveness or appropriateness in resource-constrained and sociocultural diverse contexts of sub-Saharan Africa [18].

Furthermore, existing systematic reviews and meta-analyses on mental health interventions for people living with HIV/AIDS have primarily focused on adult populations, overlooking the unique developmental needs and challenges faced by adolescents [19-20]. Systematic reviews addressing the adolescent HIV population have predominantly taken place within a global framework and low-middle-income countries [14,21-22], with a notable lack of emphasis on sub-Saharan Africa.

These reviews highlight the need for interventions tailored to the developmental stage, cultural context, and lived experiences of adolescents living with HIV/AIDS in sub-Saharan Africa. Moreover, while some mental health interventions have been implemented for adolescents living with HIV/AIDS in sub-Saharan Africa [23-24], studies are yet to comprehensively synthesize their effectiveness in improving mental health outcomes, such as depression, anxiety, suicide and treatment adherence.

To address these gaps, we propose to conduct a systematic review of the literature on existing mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa. This review will aim to synthesize the available evidence on the types, effectiveness, implementation approaches and challenges and cultural relevance of these interventions. This systematic review will also examine the strengths, weaknesses, and gaps in the current literature, to help inform future research efforts and the development of innovative, context-specific, and culturally appropriate mental health interventions for this vulnerable population.

The specific objectives of this systematic review protocol will be:

1. Identify and describe the types of mental health interventions that have been developed, implemented and evaluated for adolescents living with HIV/AIDS in sub-Saharan Africa.
2. Assess the effectiveness of these interventions in improving mental health outcomes, such as depression, anxiety, suicide, and adherence, among adolescents living with HIV/AIDS.
3. Describe the implementation approaches of these interventions and document the implementation gaps.

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3 **Methods**

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6 **Design**

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9 This systematic review will adhere to the standards outlined in the revised 2020 edition of the

10 Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) [25]. We refined

11 our review question and criteria for inclusion and exclusion by following the guidelines set forth

12 in the Cochrane Handbook for Systematic Reviews of Interventions [26]. The PICO acronym, as

13 developed by the Cochrane Collaboration guidelines, was employed to structure the key concepts

14 that will guide our review. Additionally, following the Cochrane Collaboration guideline, the

15 primary outcome measures of interest will be limited to changes in depression, anxiety and suicide

16 score while the secondary outcome of interest will be limited to adherence to antiretroviral therapy

17 (ART).

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30 **Review Question**

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33 What mental health interventions have proven effective in improving the mental health outcomes

34 for adolescents living with HIV/AIDS in Africa?

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39 **Review question in PICO format.**

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42 *Table 1. Review question in PICO format*

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<i>PICO format</i>	<i>Concepts</i>
P -Population-	Adolescents living with HIV/AIDS in Sub-Sahara Africa.
I -Intervention -	Interventions designed to improve mental health and wellbeing.
C -Comparison-	Adolescents with HIV not receiving the intervention or in standard care

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O-Outcome-	Primary	Changes in depression, anxiety and
		suicide score
	Secondary	Adherence to anti-retroviral therapy.

Eligibility criteria

The eligibility criteria were informed by the PICO acronym and the guidelines outlined in the Cochrane Handbook Collaboration. Additional criteria considered for this review were the types of studies, setting/context, timelines and language restrictions.

Inclusion criteria

Population

Studies involving adolescents aged 10-19 years living with HIV/AIDS in sub-Saharan African countries will be considered. This criterion specifies the target population of interest for this systematic review, which is adolescents between the ages of 10 and 19 years who have been diagnosed with HIV/AIDS and reside in sub-Saharan African countries. The age range of 10-19 years aligns with the World Health Organization's definition of adolescence [27] and captures the unique developmental stage and experiences of this age group. Limiting the population to those living in sub-Saharan Africa ensures that the interventions and findings are relevant to the specific socio-cultural, economic, and healthcare contexts of this region.

Intervention

Studies evaluating psychosocial, or mental health interventions aimed at improving mental health outcomes (depression, anxiety, suicide, adherence to ART) for adolescents living with HIV/AIDS will be selected for inclusion in this systematic review. This criterion focuses on interventions that

are specifically designed to address mental health issues or have a psychosocial or psychological component aimed at improving mental health outcomes. Examples of such interventions may include cognitive-behavioral therapy, interpersonal therapy, family-based interventions, peer support programs, psychoeducation, and stress management techniques. The interventions should target mental health outcomes such as depression, anxiety, suicide, and adherence to HIV/AIDS treatment, which are common challenges faced by adolescents living with HIV/AIDS [28-29].

Comparison/Control

Studies that include a control group will be eligible for inclusion in the systematic review. A control group typically receives no intervention, a placebo, or treatment as usual, and serves as a baseline or reference point for comparison with the intervention group [30]. The presence of a control group allows researchers to determine if any observed changes or outcomes are due to the intervention itself [31], rather than other factors. Studies that include a comparison group will also be eligible for inclusion. A comparison group may receive a different intervention, an alternative treatment, or a variation of the intervention being studied. Comparing the outcomes between the intervention group and the comparison group can provide insights into the relative effectiveness or superiority of the intervention under investigation. Including studies with control or comparison groups enhances the methodological rigour and internal validity of the systematic review. In comparing the outcomes between groups that received different conditions (intervention vs. control/comparison), the review can more reliably assess the true effects of the mental health interventions being evaluated. This approach also helps account for potential confounding factors and biases that may influence the outcomes, strengthening the conclusions that will be drawn from the review.

Outcomes of interest

The studies that will be included in this review must report on quantitative measures or scores related to depression, anxiety, and suicidal ideation or behaviour. These measures include standardized scales, questionnaires, or other validated assessment tools used to evaluate the presence and severity of these mental health conditions. The studies should also report on the changes in these mental health scores from baseline (pre-intervention) to the last available follow-up timepoint after the intervention was implemented. This allows for the evaluation of the potential impact or effectiveness of the intervention on improving mental health outcomes over time. Furthermore, the studies must have used validated and reliable instruments or tools to measure depression, anxiety, and suicidality. This ensures that the mental health outcomes are assessed using standardized and psychometrically sound measures, increasing the validity and comparability of the findings. In addition to mental health outcomes, the studies should also report on measures or indicators related to adherence to antiretroviral therapy (ART) among adolescents living with HIV/AIDS. Adherence to ART is a crucial aspect of HIV/AIDS management [32], and mental health interventions may potentially impact treatment adherence, which is an important outcome to consider.

Study Design

This criterion specifies the types of study designs that will be included in the review, focusing on studies that evaluate the effectiveness or feasibility of mental health interventions. Randomized controlled trials, quasi-experimental studies, pilot interventions, and pre-post studies evaluating mental health interventions will be considered for inclusion. Randomized controlled trials (RCTs) are considered the gold standard for evaluating interventions [33], as they provide the highest level of evidence by minimizing potential biases. Quasi-experimental studies, pilot interventions, and

pre-post studies are also included to capture a broader range of evidence and interventions that may be in earlier stages of development or implementation.

Setting

Only studies conducted in sub-Saharan African countries will be included in the review. This criterion ensures that the included studies are specific to the context of sub-Saharan African countries, where the HIV/AIDS epidemic has had a significant impact and where resources for mental health interventions may be limited. It aligns with the overall focus of the systematic review on interventions for adolescents living with HIV/AIDS in this region.

Language

Studies published in English. This criterion limits the included studies to those published in the English language due to resource constraints (cost of translation) and the need for consistent data extraction and synthesis. While this may introduce some language bias, English is a commonly used language for academic publications in sub-Saharan Africa.

Time Period

This criterion establishes a time frame for the literature search, focusing on studies published from the year 2004 onwards. This time frame captures a significant period of research and intervention development in the field of HIV/AIDS and mental health, particularly in the context of sub-Saharan Africa. Including studies from 2004 onwards ensures that the findings and recommendations are relevant to current practices and context.

Exclusion criteria

- Studies focusing solely on adults (>19 years) or children (<10 years) living with HIV/AIDS. The rationale for this exclusion is to maintain a clear focus on the unique developmental needs and experiences of adolescents, which may differ from those of adults or younger children.
- Studies reporting data on participants with different ages in which it is difficult to separate data on adolescents for analysis.
- Studies evaluating solely biomedical or pharmacological interventions without a psychosocial/mental health component. The rationale for this exclusion is to align the review with its primary objective of examining mental health interventions for adolescents living with HIV/AIDS.
- Reviews, editorials, commentaries, case reports, and qualitative studies without an intervention component. However, qualitative studies that include an intervention component may be considered for inclusion if they meet the other criteria.
- Studies for which the full-text is not available or accessible either through online databases or other means. This exclusion criterion is based on practical considerations related to the systematic review process and to ensure that the reviewers have access to the complete information and details necessary for data extraction and quality assessment. However, efforts will be made to obtain full-text articles through interlibrary loan or other means before excluding studies based on this criterion.

Search strategy

For this review, we identified the PICO components and cross-referenced them with search terms utilized in comparable previous reviews to ensure completeness [14,21]. The authors have developed composite search terms that included controlled vocabulary for the selected databases (eg. Mesh terms for PubMed) and keywords for the population, intervention types, and outcomes of interest. To ensure that the search strategy retrieved studies evaluating mental health interventions focused on depression, anxiety and suicidal thoughts/ suicide, Mesh terms or the controlled vocabulary for each database and keywords/test words of these mental disorders were infused in the search strategy as shown in table 2.

Table 2. Sample, Search strategy for PubMed using Boolean Operators (OR & AND)

PICO Format	Combined MeSH Terms and Text Words
P- population	"Adolescent"[MeSH Terms] OR Adolescent[Text Word] OR Adolescenc*[Text Word] OR "young adult*[Text Word] OR teen[Text Word] OR youth[Text Word] "young people" [Text Word] OR "young women" [Text Word] OR "young men" [Text Word] OR teenager*[Text Word] OR "young person" [Text Word] OR "10-19 year olds" AND "hiv"[MeSH Terms] OR HIV[Text Word] OR "human immunodeficiency virus" [Text Word] OR AIDS[Text Word] OR "HIV/AIDS" [Text Word] OR "HIV and AIDS"[Text Word] OR "acquired immunodeficiency syndrome" [Text Word] OR "immune failure" [Text Word] OR "HIV-positive"[Text Word] OR SADA[Text Word]
I- intervention	"Mental health intervention*"[Text Word] OR "school-based intervention*"[Text Word] OR "community-based intervention*"[Text Word] OR "peer intervention*"[Text Word] OR "church-based intervention*"[Text Word] OR

"family-based intervention*" [Text Word] OR "health facility based intervention" [Text Word] OR "group based intervention" [Text Word] OR "cognitive behavioural therap*" [Text Word] OR "Psychosocial intervention*" [Text Word] OR "Psychological intervention*" [Text Word] OR "interpersonal therap*" [Text Word] AND

C- comparison

O- outcome

"Mental disorders"[MeSH Terms] OR Mental Disorders[Text Word] OR "Mental disorder*" [Text Word] OR "psychiatric disorder" [Text Word] OR "mental illness*" [Text Word] OR "psychiatric illness" [Text Word] OR "mood disorder" [Text Word] OR "affective disorder*" [Text Word] OR "emotional distress" [Text Word] OR depression [Text Word] OR "depressive disorder*" [Text Word] OR "depressive symptom*" [Text Word] OR "depressive symptomatology" [Text Word] OR anxiety [Text Word] OR "anxiety disorder" [Text Word] OR suicide [Text Word] OR "suicidal ideation" [Text Word] AND adherence [Mesh] OR adheren* [Text Word] OR complian* [Text Word] OR noncomplian* [Text Word] OR non-complian* [Text Word] OR concordance [Text Word] OR persisten* [Text Word] OR discontinu* [Text Word] OR retention [Text Word] AND ART [Text Word] OR HAART [Text Word] OR "anti-retroviral" [Text Word] OR "antiretroviral drug*" [Text Word] OR "antiretroviral agents" [Mesh] OR "highly active antiretroviral therapy" [Text Word]

"Africa" [Mesh] OR Africa [Text Word] OR "Sub Saharan Africa" [Text Word]

Information sources

Six (6) major Cochrane-recommended electronic databases will be selected and searched using the predetermined customized search strategy. Thus, PubMed, Scopus, MEDLINE, CINAHL,

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3 PsycINFO, and Health Source: Nursing academic edition. To limit the potential risk of publication
4 bias, the reviewers will conduct additional searches in Google Scholar engine, Library catalogues,
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6 Conference Proceedings, Clinical Trials databases, such as ClinicalTrials.gov, dissertation
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8 abstracts and institutional databases, such as UNAIDS, and WHO reports. Additionally, hand
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10 searches of relevant journals and reference lists of included studies will be conducted to identify
11
12 potentially relevant studies. Researchers developing mental health interventions for adolescents
13
14 living with HIV/AIDS will be contacted for additional papers.
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20 **Data records, management and screening.**

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23 The search results will be imported into a reference management software specifically Rayyan,
24
25 and duplicate records will be identified and removed. Two independent reviewers will screen the
26
27 titles and abstracts of the identified records against the inclusion and exclusion criteria. Any
28
29 disagreements will be resolved through discussion or consultation with a third reviewer. Full-text
30
31 articles of potentially eligible studies will be retrieved and further assessed for inclusion by two
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33 independent reviewers. A third reviewer will be consulted in case of disagreement. Reasons for
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35 the exclusion of studies at this phase of screening will be collated and detailed through a PRISMA
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37 flow diagram.
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42 **Data Extraction**

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45 A standardized data extraction form (Excel spreadsheet) similar to those used in previous
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47 systematic reviews [14,21] will be adapted to capture relevant information from the included
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49 studies. Two reviewers will conduct a pilot test of the data extraction format, engage in discussions,
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51 and iteratively refine the form based on their deliberations. Two independent reviewers will
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53 conduct the data extraction process, and any discrepancies will be resolved through discussion and
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the involvement of a third reviewer. The extracted data will include study characteristics (e.g., author, year, country, study design), population details, intervention details, key findings on the effectiveness of the intervention and implementation approaches and challenges.

Data synthesis

A qualitative content analysis approach [34] will be used to collate the extracted data to categorize and compare similarities, differences, and relationships surrounding mental health interventions and their impact on mental health outcomes, and adherence to ART across the different studies. The data will be synthesized through the identification of themes and concepts relevant to the review question. If possible, meta-analyses will be performed to estimate the overall effect sizes of interventions on mental health outcomes.

Risk of bias assessment

Eligible studies will undergo quality assessment using standardized criteria appropriate for each respective study design. Two reviewers will independently review each included study for methodological quality. Discrepancies in this assessment will be resolved through discussion among the two reviewers. Where necessary, a third reviewer will be included to make a final judgement of the rating of an included study. Randomized Controlled Trials will be appraised via the Cochrane Risk of Bias tool examining sources of potential bias in areas like randomization, allocation concealment, and selective reporting among others [35]. The modified version of the Newcastle–Ottawa Scale [36] will be used to appraise nonrandomized studies. The mixed method appraisal tool (MMAT) version 2018 [37] will be used to evaluate considerations unique to mixed methods studies and to appraise article quality. This tool was chosen over other quality appraisal

tools because it is explicitly applied to mixed methods research, and also makes provision to assess the individual methods (quantitative and qualitative) within the design. When study reports lack adequate information, a judgement of "UNCLEAR" will be assigned to specific risk of bias items within the assessment tools. Following this, each study will be given a final quality rating—classified as "low," "moderate," or "high"—based on the comprehensive evaluation of bias risk.

Discussion

While several previous reviews have examined mental health interventions for people living with HIV/AIDS [19-20], this systematic review protocol is unique in its specific focus on adolescents living with HIV/AIDS in sub-Saharan Africa. By narrowing the scope to this vulnerable population and geographic region, the review aims to address a critical gap in the existing literature. Furthermore, this protocol incorporates rigorous methodological approaches, such as the use of standardized quality assessment tools (e.g., Cochrane Risk of Bias Tool). These methodological considerations align with best practices in conducting systematic reviews and meta-analyses, ensuring a high level of transparency and scientific rigour.

The findings of this systematic review will have significant implications for research, practice, and policy related to the mental health care of adolescents living with HIV/AIDS in sub-Saharan Africa. First, it will identify gaps and limitations in the existing literature, highlighting areas that require further investigation and intervention development. This knowledge can inform future research priorities and funding allocations, ensuring that resources are directed towards addressing the most pressing needs of this vulnerable population. Second, the review will provide evidence-based insights into the effectiveness, feasibility, and cultural appropriateness of various mental health interventions in the sub-Saharan African context. This information can guide healthcare

practitioners, policymakers, and program implementers in selecting and adapting interventions that are most likely to be effective and sustainable in resource-limited settings.

Based on the existing literature and previous reviews in related areas, several inferences can be drawn regarding the potential findings of this systematic review: Previous reviews have highlighted the paucity of research on mental health interventions specifically tailored for adolescents living with HIV/AIDS in sub-Saharan Africa [6,12]. This systematic review is likely to corroborate these findings, underscoring the need for more research in this area. Secondly, existing studies have primarily focused on psychosocial support interventions and cognitive-behavioural therapy (CBT) for this population [38-39]. The review may reveal a limited diversity of intervention types, suggesting the need for exploring alternative or culturally-adapted approaches. Lastly, previous reviews have identified challenges in implementing mental health interventions in resource-limited settings, such as shortages of trained healthcare professionals, stigma, and logistical barriers [14,40]. This systematic review may provide further evidence of these challenges and highlight the need for sustainable and scalable intervention models.

Conclusion

This systematic review protocol represents a timely and necessary effort to synthesize the available evidence on mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa. By identifying gaps, evaluating the effectiveness and feasibility of interventions, and providing evidence-based recommendations, this review has the potential to inform research, practice, and policy decisions aimed at improving the mental health and well-being of this vulnerable population.

Contributors: Conceptualization of study: S.A, D.S.B, E.X, V.V.A, P.A, Y.Y, A.B.F, L.K.O
Methods and design: S.A, D.S.B, E.X, V.V.A, P.A, YY, L.K.O, & A.B.F Original Draft
Preparation: D.S.B, E.X, V.V.A, P.A, YY, L.KO, & A.B.F Review and Editing: S.A & D.S.B.
All authors have read and agreed to the published version of the protocol.

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Competing interest: None declared

Data availability statement: Data will be made available upon request from the corresponding author.

Patient consent for publication: Not applicable.

Ethics approval: Not applicable

Patient and public involvement: Not applicable

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Mental Health Interventions for Adolescents Living with HIV/AIDS in Sub-Saharan Africa: A Systematic Review Protocol.

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Abstract

Introduction: Adolescents living with HIV/AIDS (ALHIV) in sub-Saharan Africa face numerous challenges that can adversely impact their mental health and well-being. Despite the evident need, there is absence of a comprehensive evidence synthesis and evaluation of the effectiveness of mental health interventions for adolescents living with HIV/AIDS in this region. Consequently, we will conduct a systematic review to synthesize the literature on existing mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa.

Methods and Analysis: This review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Eligible studies will include those conducted in sub-Saharan African countries, involving adolescents (aged 10-19 years) living with HIV/AIDS, and evaluating psychosocial, psychological, or other forms of interventions aimed at improving mental health outcomes. Comprehensive searches will be conducted in electronic databases (PubMed, MEDLINE, CINAHL, Scopus, PsycINFO) and grey literature sources, with a search strategy, focused on Population (adolescent*OR adolescence OR teen* OR HIV OR AIDS OR “HIV infections” OR “acquired immunodeficiency syndrome”), Interventions (“psychosocial intervention*” OR “psychological intervention*” OR “cognitive behavioral therapy” OR “family-based therapy”), Outcome (depress*OR “anxiety disorder” OR adherence) and context (“sub-Saharan Africa” OR Africa). The search will include studies published between 2004 and 2024, with a restriction to English-language publications. Study authors will be contacted, and reference lists of retrieved articles will be reviewed for additional papers. Study selection, data extraction, and quality assessment will be performed by two independent reviewers, with any disagreements resolved by consensus or involving a third party. A narrative synthesis will be conducted, and if possible, meta-analyses will be performed to estimate the overall effect sizes of interventions on

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2
3 mental health outcomes. Eligible studies will undergo quality assessment using standardized
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5 criteria appropriate for each respective study design.
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8 **Ethics and Dissemination:** No primary data collection will be undertaken; therefore, no ethical
9
10 approval is required. The findings of this review will be disseminated through publication in a
11
12 peer-reviewed journal and presented at relevant conferences.
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16 **PROSPERO registration number:** CRD42024538975
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19 **Keywords:** Adolescents, HIV/AIDS, Depression, Anxiety, Suicidal thoughts, Mental Health
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21 interventions, Africa.
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27 **Strengths and limitations of the study**
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 - The protocol adheres to the PRISMA guidelines, ensuring transparency, reproducibility,
31 and compliance with systematic review standards.
 - The protocol includes a comprehensive search strategy across multiple databases and
32 gray literature sources.
 - The protocol employs a systematic study selection and data extraction process with two
33 independent reviewers.
 - The potential for substantial heterogeneity among the included studies, due to varied
34 settings, interventions, and designs.
 - The protocol restricts inclusion to only English-language studies.

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Introduction

The HIV/AIDS epidemic continues to be a significant public health challenge in sub-Saharan Africa, disproportionately affecting vulnerable populations, including adolescents. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), approximately 4.8 million young people aged 10-24 years were living with HIV in 2021, with over 80% residing in sub-Saharan Africa [1].

Adolescents aged 10 to 19 years living with HIV (ALHIV) in sub-Saharan Africa experience a high prevalence of mental health challenges, such as anxiety, depression, and suicidal ideation, underscoring the urgent need for mental health support across the region [2-5]. A systematic review reported that 25% of ALHIV screened positive for psychiatric disorders, with 30–50% exhibiting emotional or behavioral difficulties or significant psychological distress [3]. The distribution of mental health burdens varies, with certain countries reporting notably higher prevalence rates. For instance, in South Africa, Woollett et al. [6] found that among ALHIV aged 10-19 years receiving HIV treatment in Johannesburg, 27% had symptoms of depression, and 12% experienced anxiety. In Botswana, 15.0% of ALHIV reported suicidal ideation, with a higher prevalence among females [7]. In Ethiopia, Abebe et al. [8] reported a 35.5% prevalence of depression among young adults living with HIV, particularly among those aged 20-24 years, with contributing factors including opportunistic infections, low social support, and stigma. Similarly, Musisi and Kinyanda [9] found that among Ugandan adolescents aged 12-17 years, the prevalence of depression was 19.8%, while anxiety disorders affected 8.9%. This epidemiological data highlights both the widespread nature and the variability of mental health needs among ALHIV, emphasizing the importance of tailored, regionally relevant interventions across sub-Saharan Africa.

The mental health burden in this population is exacerbated by various factors, including stigma, discrimination, poverty, limited access to healthcare services and the psychological burden of coping with a chronic and stigmatized condition [10-11]. These mental health issues can have far-reaching consequences, including poor treatment adherence, increased risk-taking behaviours, impaired social and academic functioning, and overall well-being of ALHIV [2,12-13]. Despite the evident need for mental health support, access to appropriate services and interventions remains limited in many resource-constrained settings in sub-Saharan Africa.

Over the past two decades, various mental health interventions have been developed and implemented to address the unique needs of adolescents living with HIV/AIDS [13-14]. These interventions range from psychosocial support programs to evidence-based psychotherapies, such as cognitive-behavioural therapy (CBT) and interpersonal therapy (IPT) [15-17]. However, most of these interventions have been developed and evaluated in high-income countries, raising questions about their effectiveness or appropriateness in resource-constrained and sociocultural diverse contexts of sub-Saharan Africa [18].

Furthermore, existing systematic reviews and meta-analyses on mental health interventions for people living with HIV/AIDS have primarily focused on adult populations, overlooking the unique developmental needs and challenges faced by adolescents [19-20]. Systematic reviews addressing the adolescent HIV population have predominantly been conducted within a global context, particularly in low- and middle-income countries [14,21-22], with a notable lack of emphasis on sub-Saharan Africa. These reviews highlight the need for interventions tailored to the developmental stage, cultural context, and lived experiences of adolescents living with HIV/AIDS in sub-Saharan Africa. Moreover, while some mental health interventions have been implemented for adolescents living with HIV/AIDS in sub-Saharan Africa [23-24], studies are yet to

comprehensively synthesize their effectiveness in improving mental health outcomes, such as depression, anxiety, and suicide as well as their impact on adherence to antiretroviral therapy (ART), which is often influenced by mental health challenges.

To address these gaps, we propose to conduct a systematic review of the literature on existing mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa. This review will aim to synthesize the available evidence on the types, effectiveness, implementation approaches and challenges and cultural relevance of these interventions. This systematic review will also examine the strengths, weaknesses, and gaps in the current literature, to help inform future research efforts and the development of innovative, context-specific, and culturally appropriate mental health interventions for this vulnerable population.

The specific objectives of this systematic review protocol will be:

1. Identify and describe the types of mental health interventions that have been developed, implemented and evaluated for adolescents living with HIV/AIDS in sub-Saharan Africa.
2. Assess the effectiveness of these interventions in improving mental health outcomes, such as depression, anxiety, suicide, and adherence, among adolescents living with HIV/AIDS.
3. Describe the implementation approaches of these interventions and document the implementation gaps.

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3 **Methods and Analysis**

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6 **Design**

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9 This systematic review will adhere to the standards outlined in the revised 2020 edition of the

10 Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) [25]. We refined

11 our review question and criteria for inclusion and exclusion by following the guidelines set forth

12 in the Cochrane Handbook for Systematic Reviews of Interventions [26]. The PICO acronym, as

13 developed by the Cochrane Collaboration guidelines, was employed to structure the key concepts

14 that will guide our review. Additionally, following the Cochrane Collaboration guideline, the

15 primary outcome measures of interest will be limited to changes in depression, anxiety and suicide

16 score while the secondary outcome of interest will be limited to adherence to antiretroviral therapy

17 (ART).

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30 **Review Question**

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33 What mental health interventions have proven effective in improving the mental health outcomes

34 for adolescents living with HIV/AIDS in Africa? (see Table 1).

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39 *Table 1. Review question in PICO format*

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<i>PICO format</i>	<i>Concepts</i>
P -Population-	Adolescents living with HIV/AIDS in Sub-Sahara Africa.
I -Intervention -	Interventions designed to improve mental health and wellbeing.
C -Comparison-	Adolescents with HIV not receiving the intervention or in standard care
O -Outcome- Primary	Changes in depression, anxiety and suicide score between baseline and

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follow-up.

Secondary

Adherence to anti-retroviral therapy.

Eligibility criteria

The eligibility criteria were informed by the PICO acronym and the guidelines outlined in the Cochrane Handbook Collaboration. Additional criteria considered for this review were the types of studies, setting/context, timelines and language restrictions.

Inclusion criteria

Population

Studies involving adolescents aged 10-19 years living with HIV/AIDS in sub-Saharan African countries will be considered. This criterion specifies the target population of interest for this systematic review, which is adolescents between the ages of 10 and 19 years who have been diagnosed with HIV/AIDS and reside in sub-Saharan African countries. The age range of 10-19 years aligns with the World Health Organization's definition of adolescence [27] and captures the unique developmental stage and experiences of this age group. Limiting the population to those living in sub-Saharan Africa ensures that the interventions and findings are relevant to the specific socio-cultural, economic, and healthcare contexts of this region.

Intervention

Studies evaluating psychosocial, or mental health interventions aimed at improving mental health outcomes (depression, anxiety, suicide, adherence to ART) for adolescents living with HIV/AIDS will be selected for inclusion in this systematic review. This criterion focuses on interventions that are specifically designed to address mental health issues or have a psychosocial or psychological

component aimed at improving mental health outcomes. Examples of such interventions may include cognitive-behavioral therapy, interpersonal therapy, family-based interventions, peer support programs, psychoeducation, and stress management techniques. While we aim to include interventions grounded in evidence-based frameworks, we also recognize the importance of emerging or community-informed interventions that may not yet have a strong evidence base but are relevant in the sub-Saharan African context. The interventions should target mental health outcomes such as depression, anxiety, suicide, and adherence to HIV/AIDS treatment, which are common challenges faced by adolescents living with HIV/AIDS [28-29].

Comparison/Control

Studies that include a control group will be eligible for inclusion in the systematic review. A control group typically receives no intervention, a placebo, or treatment as usual, and serves as a baseline or reference point for comparison with the intervention group [30]. The presence of a control group allows researchers to determine if any observed changes or outcomes are due to the intervention itself [31], rather than other factors. Studies that include a comparison group will also be eligible for inclusion. A comparison group may receive a different intervention, an alternative treatment, or a variation of the intervention being studied. Comparing the outcomes between the intervention group and the comparison group can provide insights into the relative effectiveness or superiority of the intervention under investigation. Including studies with control or comparison groups enhances the methodological rigour and internal validity of the systematic review. In comparing the outcomes between groups that received different conditions (intervention vs. control/comparison), the review can more reliably assess the true effects of the mental health interventions being evaluated. This approach also helps account for potential confounding factors

and biases that may influence the outcomes, strengthening the conclusions that will be drawn from the review.

Outcomes of interest

The studies that will be included in this review must report on quantitative measures or scores related to depression, anxiety, and suicidal ideation or behaviour. These measures include standardized scales, questionnaires, or other validated assessment tools used to evaluate the presence and severity of these mental health conditions. The studies should also report on the changes in these mental health scores from baseline (pre-intervention) to the last available follow-up timepoint after the intervention was implemented. This allows for the evaluation of the potential impact or effectiveness of the intervention on improving mental health outcomes over time. Furthermore, the studies must have used validated and reliable instruments or tools such as the Patient Health Questionnaire (PHQ-9), the Generalized Anxiety Disorder scale (GAD-7), and the Columbia-Suicide Severity Rating Scale (C-SSRS) to measure depression, anxiety, and suicidality. This ensures that the mental health outcomes are assessed using standardized and psychometrically sound measures, increasing the validity and comparability of the findings. In addition to mental health outcomes, the studies should also report on measures or indicators, including self-reported adherence scales, pharmacy refill records, electronic monitoring devices, and viral load measurements as indirect indicators of adherence to antiretroviral therapy (ART) among adolescents living with HIV/AIDS. Adherence to ART is a crucial aspect of HIV/AIDS management [32], and mental health interventions may potentially impact treatment adherence, which is an important outcome to consider.

Study Design

This criterion specifies the types of study designs that will be included in the review, focusing on studies that evaluate the effectiveness or feasibility of mental health interventions. Randomized controlled trials, quasi-experimental studies, pilot interventions, and pre-post studies evaluating mental health interventions will be considered for inclusion. Randomized controlled trials (RCTs) are considered the gold standard for evaluating interventions [33], as they provide the highest level of evidence by minimizing potential biases. Quasi-experimental studies, pilot interventions, and pre-post studies are also included to capture a broader range of evidence and interventions that may be in earlier stages of development or implementation.

Setting

Only studies conducted in sub-Saharan African countries will be included in the review. We will define sub-Saharan Africa based on the World Bank classification, which includes countries across Eastern, Western, Central, and Southern Africa. This criterion ensures that the included studies are specific to the context of sub-Saharan African countries, where the HIV/AIDS epidemic has had a significant impact and where resources for mental health interventions may be limited. It aligns with the overall focus of the systematic review on interventions for adolescents living with HIV/AIDS in this region.

Language

Studies published in English. This criterion limits the included studies to those published in the English Language due to resource constraints (cost of translation) and the need for consistent data extraction and synthesis. While this may introduce some language bias, English is a commonly used language for academic publications in sub-Saharan Africa.

Time Period

This criterion establishes a time frame for the literature search, focusing on studies published from the year 2004 onwards. This time frame captures a significant period of research and intervention development in the field of HIV/AIDS and mental health, particularly in the context of sub-Saharan Africa. Including studies from 2004 onwards ensures that the findings and recommendations are relevant to current practices and context.

Exclusion criteria

- Studies focusing solely on adults (>19 years) or children (<10 years) living with HIV/AIDS. The rationale for this exclusion is to maintain a clear focus on the unique developmental needs and experiences of adolescents, which may differ from those of adults or younger children.
- Studies reporting data on participants with different ages in which it is difficult to separate data on adolescents for analysis.
- Studies evaluating solely biomedical or pharmacological interventions without a psychosocial/mental health component. The rationale for this exclusion is to align the review with its primary objective of examining mental health interventions for adolescents living with HIV/AIDS.
- Reviews, editorials, commentaries, case reports, and qualitative studies without an intervention component. However, qualitative studies that include an intervention component may be considered for inclusion if they meet the other criteria.
- Studies for which the full-text is not available or accessible either through online databases or other means. This exclusion criterion is based on practical considerations related to the

systematic review process and to ensure that the reviewers have access to the complete information and details necessary for data extraction and quality assessment. However, efforts will be made to obtain full-text articles through interlibrary loan or other means before excluding studies based on this criterion.

Search strategy

For this review, we identified the PICO components and cross-referenced them with search terms utilized in comparable previous reviews to ensure completeness [14,21]. The authors have developed composite search terms that included controlled vocabulary for the selected databases (eg. Mesh terms for PubMed) and keywords for the population, intervention types, and outcomes of interest. To ensure that the search strategy retrieved studies evaluating mental health interventions focused on depression, anxiety and suicidal thoughts/ suicide, Mesh terms or the controlled vocabulary for each database and keywords/test words of these mental disorders were infused in the search strategy as shown in Table 2.

Table 2. Sample, Search strategy for PubMed using Boolean Operators (OR & AND)

PICO Format	Combined MeSH Terms and Text Words
P- population	"Adolescent"[MeSH Terms] OR Adolescent[Text Word] OR Adolescen*[Text Word] OR "young adult*[Text Word] OR teen[Text Word] OR youth[Text Word] OR "young people" [Text Word] OR "young women" [Text Word] OR "young men" [Text Word] OR teenager*[Text Word] OR "young person" [Text Word] OR "10-19 year olds" AND "hiv"[MeSH Terms] OR HIV[Text Word] OR "human immunodeficiency virus" [Text Word] OR AIDS[Text Word] OR "HIV/AIDS" [Text Word] OR

"HIV and AIDS"[Text Word] OR "acquired immunodeficiency syndrome" [Text Word] OR "immune failure" [Text Word] OR "HIV-positive"[Text Word] OR SADA[Text Word]

I- intervention

"Mental health intervention*" [Text Word] OR "school-based intervention*" [Text Word] OR "community-based intervention*" [Text Word] OR "peer intervention*" [Text Word] OR "church-based intervention*" [Text Word] OR "family-based intervention*" [Text Word] OR "health facility based intervention" [Text Word] OR "group based intervention" [Text Word] OR "cognitive behavioural therap*" [Text Word] OR "Psychosocial intervention*" [Text Word] OR "Psychological intervention*" [Text Word] OR "interpersonal therap*" [Text Word] AND

C- comparison

O- outcome

"Mental disorders"[MeSH Terms] OR Mental Disorders[Text Word] OR "Mental disorder*" [Text Word] OR "psychiatric disorder" [Text Word] OR "mental illness*" [Text Word] OR "psychiatric illness" [Text Word] OR "mood disorder" [Text Word] OR "affective disorder*" [Text Word] OR "emotional distress" [Text Word] OR depression [Text Word] OR "depressive disorder*" [Text Word] OR "depressive symptom*" [Text Word] OR "depressive symptomatology" [Text Word] OR anxiety [Text Word] OR "anxiety disorder" [Text Word] OR suicide [Text Word] OR "suicidal ideation" [Text Word] AND adherence [Mesh] OR adheren* [Text Word] OR complian* [Text Word] OR noncomplian* [Text Word] OR non-complian* [Text Word] OR concordance [Text Word] OR persisten* [Text Word] OR discontinu* [Text Word] OR retention [Text Word] AND ART [Text Word] OR HAART [Text Word] OR "anti-retroviral" [Text Word] OR "antiretroviral drug*" [Text Word] OR "antiretroviral agents" [Mesh] OR "highly active antiretroviral therapy" [Text Word]

"Africa"[Mesh] OR Africa [Text Word] OR “Sub Saharan Africa” [Text Word]

Information sources

Six (6) major Cochrane-recommended electronic databases will be selected and searched using the predetermined customized search strategy. Thus, PubMed, Scopus, MEDLINE, CINAHL, PsycINFO, and Health Source: Nursing academic edition. To limit the potential risk of publication bias, the reviewers will conduct additional searches in Google Scholar engine, Library catalogues, Conference Proceedings, Clinical Trials databases, such as ClinicalTrials.gov, dissertation abstracts and institutional databases, such as UNAIDS, and WHO reports. Additionally, hand searches of relevant journals and reference lists of included studies will be conducted to identify potentially relevant studies. Researchers developing mental health interventions for adolescents living with HIV/AIDS will be contacted for additional papers.

Data records, management and screening.

The search results will be imported into a reference management software specifically Rayyan, and duplicate records will be identified and removed. Two independent reviewers will screen the titles and abstracts of the identified records against the inclusion and exclusion criteria. Any disagreements will be resolved through discussion or consultation with a third reviewer. Full-text articles of potentially eligible studies will be retrieved and further assessed for inclusion by two independent reviewers. A third reviewer will be consulted in case of disagreement. Reasons for the exclusion of studies at this phase of screening will be collated and detailed through a PRISMA flow diagram.

Data Extraction

A standardized data extraction form (Supplementary file) similar to those used in previous systematic reviews [14,21] will be adapted to capture relevant information from the included studies. Two reviewers will conduct a pilot test of the data extraction format, engage in discussions, and iteratively refine the form based on their deliberations. Two independent reviewers will conduct the data extraction process, and any discrepancies will be resolved through discussion and the involvement of a third reviewer. The extracted data will include study characteristics (e.g., author, year, country, study design), population details, intervention details, key findings on the effectiveness of the intervention and implementation approaches and challenges.

Data synthesis

A qualitative content analysis approach [34] will be used to collate the extracted data to categorize and compare similarities, differences, and relationships surrounding mental health interventions and their impact on mental health outcomes, and adherence to ART across the different studies. The data will be synthesized through the identification of themes and concepts relevant to the review question. Themes will be generated through a systematic process, involving familiarization with the data, initial coding, theme development, and revision. If possible, meta-analyses will be performed to estimate the overall effect sizes of interventions on mental health outcomes.

Risk of bias assessment

Eligible studies will undergo quality assessment using standardized criteria appropriate for each respective study design. Two reviewers will independently review each included study for methodological quality. Discrepancies in this assessment will be resolved through discussion

among the two reviewers. Where necessary, a third reviewer will be included to make a final judgement of the rating of an included study. Randomized Controlled Trials will be appraised via the Cochrane Risk of Bias tool examining sources of potential bias in areas like randomization, allocation concealment, and selective reporting among others [35]. The modified version of the Newcastle–Ottawa Scale [36] will be used to appraise nonrandomized studies. The mixed method appraisal tool (MMAT) version 2018 [37] will be used to evaluate considerations unique to mixed methods studies and to appraise article quality. This tool was chosen over other quality appraisal tools because it is explicitly applied to mixed methods research, and also makes provision to assess the individual methods (quantitative and qualitative) within the design. When study reports lack adequate information, a judgement of "UNCLEAR" will be assigned to specific risk of bias items within the assessment tools. Following this, each study will be given a final quality rating—classified as "low," "moderate," or "high"—based on the comprehensive evaluation of bias risk.

Patient and public involvement: None

Ethics and Dissemination

Since no primary data will be collected, ethical approval is not needed. The review's findings will be disseminated through publication in a peer-reviewed journal and presented at relevant conferences.

Discussion

While several previous reviews have examined mental health interventions for people living with HIV/AIDS [19-20], this systematic review protocol is unique in its specific focus on adolescents living with HIV/AIDS in sub-Saharan Africa. By narrowing the scope to this vulnerable

population and geographic region, the review aims to address a critical gap in the existing literature. Furthermore, this protocol incorporates rigorous methodological approaches, such as the use of standardized quality assessment tools (e.g., Cochrane Risk of Bias Tool). These methodological considerations align with best practices in conducting systematic reviews and meta-analyses, ensuring a high level of transparency and scientific rigour.

The findings of this systematic review will have significant implications for research, practice, and policy related to the mental health care of adolescents living with HIV/AIDS in sub-Saharan Africa. First, it will identify gaps and limitations in the existing literature, highlighting areas that require further investigation and intervention development. This knowledge can inform future research priorities and funding allocations, ensuring that resources are directed towards addressing the most pressing needs of this vulnerable population. Second, the review will provide evidence-based insights into the effectiveness, feasibility, and cultural appropriateness of various mental health interventions in the sub-Saharan African context. This information can guide healthcare practitioners, policymakers, and program implementers in selecting and adapting interventions that are most likely to be effective and sustainable in resource-limited settings.

Based on the existing literature and previous reviews in related areas, several inferences can be drawn regarding the potential findings of this systematic review: Previous reviews have highlighted the paucity of research on mental health interventions specifically tailored for adolescents living with HIV/AIDS in sub-Saharan Africa [6,12]. This systematic review is likely to corroborate these findings, underscoring the need for more research in this area. Secondly, existing studies have primarily focused on psychosocial support interventions and cognitive-behavioural therapy (CBT) for this population [38-39]. The review may reveal a limited diversity of intervention types, suggesting the need for exploring alternative or culturally-adapted

approaches. Lastly, previous reviews have identified challenges in implementing mental health interventions in resource-limited settings, such as shortages of trained healthcare professionals, stigma, and logistical barriers [14,40]. This systematic review may provide further evidence of these challenges and highlight the need for sustainable and scalable intervention models.

The review faces several limitations that may impact its findings. First, the potential for substantial heterogeneity among the included studies, due to diverse settings, interventions, and study designs, could limit the feasibility of conducting meta-analyses or drawing robust conclusions. Additionally, the protocol includes only studies published in English, which may result in the exclusion of relevant non-English studies and potentially introduce language bias. Furthermore, mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa represent a rapidly evolving field, meaning new studies and interventions may emerge, quickly rendering the review outdated and necessitating periodic updates. Lastly, while the review focuses on sub-Saharan Africa, its findings may have limited generalizability to other regions or contexts due to cultural, socioeconomic, and healthcare system differences.

Contributors:

Conceptualization of study: S.A, D.S.B, E.X, V.V.A, P.K.A, Y.Y.B, A.F.B, L.O.K

Methods and design: S.A, D.S.B, E.X, V.V.A, P.K.A, Y.Y.B, A.F.B, L.O.K, & C.Y

Original Draft Preparation: D.S.B, E.X, V.V.A, P.K.A, Y.Y.B, A.F.B, L.O.K, & C.Y

Review and Editing: S.A & D.S.B.

S.A is the guarantor responsible for the overall content of the protocol.

All authors have read and agreed to the published version of the protocol.

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Ethics approval: Not applicable

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Mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa: protocol for a systematic review

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**Mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa:
protocol for a systematic review**

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Abstract

Introduction: Adolescents living with HIV/AIDS in sub-Saharan Africa have heightened risk for mental health and psychosocial burden owing to their exposure to a multiplicity of adverse conditions such as stigma and discrimination. However, there is no comprehensive evidence synthesis and evaluation of the effectiveness of mental health interventions for adolescents living with HIV/AIDS in this region. We aim to conduct a systematic review to synthesize the literature on existing mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa.

Methods and analysis: This review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines. Eligible studies will include those investigating the effectiveness of psychosocial, psychological, or other forms of interventions on mental health outcomes, conducted in sub-Saharan African countries, and involving adolescents (aged 10-19 years) living with HIV/AIDS. Comprehensive searches will be conducted in electronic databases (PubMed, MEDLINE, CINAHL, Scopus, PsycINFO) and grey literature sources. The search will be restricted to studies published from 2004 onwards and in the English language. Study authors will be contacted, and reference lists of retrieved articles will be reviewed for additional papers. Study selection and data extraction will be performed by two independent reviewers, with any disagreements resolved by consensus or involving a third party. A narrative synthesis will be conducted, and if possible, meta-analyses will be performed to estimate the overall effect sizes of interventions on mental health outcomes. Eligible studies will undergo quality assessment using standardized criteria appropriate for each respective study design.

Ethics and dissemination: No primary data collection will be undertaken; therefore, no ethical approval is required. The findings of this review will be disseminated through publication in a peer-reviewed journal and presented at relevant conferences.

Study registration: PROSPERO, CRD42024538975.

Keywords: Adolescents, HIV/AIDS, Depression, Anxiety, Suicidal thoughts, Mental Health interventions, Africa.

Strengths and limitations of this study

- The review includes a comprehensive search strategy across multiple databases and grey literature sources.
- The review will employ a systematic study selection and data extraction process with two independent reviewers.
- The reporting will follow appropriate PRISMA guidelines, ensuring transparency, reproducibility, and compliance with systematic review standards.
- There is potential for substantial heterogeneity among the studies, due to varied settings, interventions, and study designs.
- Inclusion is limited to studies reported in English.

INTRODUCTION

The HIV/AIDS epidemic continues to be a significant public health challenge in sub-Saharan Africa (SSA), disproportionately affecting vulnerable populations, including adolescents. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), approximately 4.8 million young people aged 10-24 years were living with HIV in 2021, with over 80% residing in sub-Saharan Africa [1]. Adolescents living with HIV (ALHIV) experience a high prevalence of mental health challenges, such as anxiety, depression, and suicidal ideation, underscoring the urgent need for mental health support across the sub-Saharan African region [2-5]. A systematic review of studies conducted in SSA reported that 25% of ALHIV screened positive for psychiatric disorders, with 30–50% exhibiting emotional or behavioural difficulties or significant psychological distress [3]. Notably, the distribution of mental health burden varies across the SSA region. For instance, in South Africa, Woollett et al. [6] found that among ALHIV aged 10-19 years receiving HIV treatment in Johannesburg, 27% had symptoms of depression, and 12% experienced anxiety. In Botswana, 15.0% of ALHIV reported suicidal ideation, with a higher prevalence among females [7]. In Ethiopia, Abebe et al. [8] reported a 35.5% prevalence of depression among young adults living with HIV, particularly among those aged 20-24 years, with contributing factors including opportunistic infections, low social support, and stigma. Similarly, Musisi and Kinyanda [9] found that among Ugandan adolescents aged 12-17 years, the prevalence of depression was 19.8%, while anxiety disorders affected 8.9% of the participants. This epidemiological data highlights both the widespread nature and the variability of mental health needs among ALHIV, emphasizing the importance of tailored, regionally relevant interventions.

The mental health burden of ALHIV is exacerbated by various factors, including stigma, discrimination, poverty, limited access to healthcare services and the challenges of coping with a

chronic and stigmatized condition [10-11]. These mental health issues can have far-reaching consequences, including poor treatment adherence, increased risk-taking behaviours, impaired social and academic functioning, and overall well-being of ALHIV [2,12-13]. Despite the evident need for mental health support, access to appropriate services and interventions is limited in many resource-constrained settings in SSA.

Over the past two decades, various mental health interventions have been developed and implemented to address the unique needs of adolescents living with HIV/AIDS [13-14]. These interventions range from social support programs to evidence-based psychotherapies, such as cognitive-behavioural therapy (CBT) and interpersonal therapy (IPT) [15-17]. However, most of these interventions have been developed, implemented and evaluated in high-income countries, raising questions about their effectiveness or appropriateness in resource-constrained and sociocultural diverse contexts of sub-Saharan Africa [18]. Furthermore, existing systematic reviews and meta-analyses on mental health interventions for people living with HIV/AIDS have primarily focused on adult populations, overlooking the unique developmental needs and challenges faced by adolescents [19-20]. Systematic reviews focusing on ALHIV have predominantly been conducted within a global context, particularly in low- and middle-income countries [14,21-22], with a notable lack of emphasis on SSA where the burden of HIV is reportedly high.

Nevertheless, these reviews highlight the need for interventions tailored to the developmental stage, cultural context, and lived experiences of ALHIV in SSA. Moreover, while some mental health interventions have been implemented for ALHIV in SSA [23-24], studies are yet to comprehensively synthesize their effectiveness in improving mental health outcomes, such as depression, anxiety, and suicide as well as their impact on adherence to antiretroviral therapy

(ART), which is often influenced by mental health challenges. To address these gaps, we propose to conduct a systematic review of the literature on existing mental health interventions for ALHIV in SSA. This review aims to synthesize the available evidence on the types, effectiveness, implementation approaches and challenges and cultural relevance of these interventions. The review will also examine the strengths, weaknesses, and gaps in the current literature, to help inform future research efforts and the development of innovative, context-specific, and culturally appropriate mental health interventions for this vulnerable population.

The specific objectives of the systematic review are:

1. Identify and describe the types of mental health interventions that have been developed, implemented and evaluated for ALHIV in SSA.
2. Assess the effectiveness of these interventions in improving mental health outcomes, such as depression, anxiety, and suicide, as well as adherence to ART among ALHIV.
3. Describe the implementation approaches of these interventions and document the implementation gaps.

METHODS AND ANALYSIS

Design

This systematic review will adhere to the reporting standards outlined in the revised 2020 edition of the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) [25]. We refined our review question and criteria for inclusion and exclusion by following the guidelines set forth in the Cochrane Handbook for Systematic Reviews of Interventions [26]. The PICO acronym, as developed by the Cochrane Collaboration guidelines, was employed to structure the key concepts for review. Additionally, following the Cochrane Collaboration guideline, the

primary outcome measures of interest will be limited to changes in depression, anxiety and suicide score while the secondary outcome of interest will be limited to adherence to antiretroviral therapy (ART).

Review question

What mental health interventions have proven effective in improving the mental health outcomes of ALHIV in SSA (see Table 1)?

Table 1. Review question in PICO format

<i>PICO criteria</i>	<i>Concepts</i>
Population	Adolescents living with HIV/AIDS in Sub-Sahara Africa.
Intervention	Interventions designed to improve mental health and wellbeing.
Comparison	Adolescents with HIV not receiving the intervention or in standard care.
Outcome (Primary)	Changes in depression, anxiety and suicide score between baseline and follow-up.
Outcome (Secondary)	Adherence to anti-retroviral therapy.

Eligibility criteria

The eligibility criteria were informed by the PICO acronym and the guidelines outlined in the Cochrane Handbook Collaboration. Additional criteria considered for this review were the types of studies, study setting/context, publication period and language.

Inclusion criteria

Population

Studies involving 10-19 years ALHIV in SSA countries will be considered. This criterion specifies the target population of interest for this systematic review, which is adolescents between the ages of 10 and 19 years who have been diagnosed with HIV/AIDS and reside in sub-Saharan African countries. The age range of 10-19 years aligns with the World Health Organization's definition of adolescence [27] and captures the unique developmental stage and experiences of this age group. Limiting the population to those living in SSA ensures that the interventions and findings are relevant to the specific socio-cultural, economic, and healthcare contexts of this region.

Intervention

Studies evaluating psychosocial or mental health interventions aimed at improving mental health outcomes (depression, anxiety and suicide) for ALHIV will be selected for inclusion in this systematic review. The secondary outcome is adherence to ART. This criterion focuses on interventions that are specifically designed to address mental health issues in ALHIV. These interventions may include cognitive-behavioural therapy, interpersonal therapy, family-based interventions, peer support programs, psychoeducation, and stress management techniques. While we aim to include interventions grounded in evidence-based frameworks, we also recognize the importance of emerging or community-informed interventions that may not yet have strong evidence base but are relevant in the SSA context. The primary and secondary outcomes reflect the common challenges faced by ALHIV [28-29].

Comparison/control

Studies that include a control group will be eligible for inclusion in the systematic review. A control group typically receives no intervention, a placebo, or treatment as usual, and serves as a

baseline or reference point for comparison with the intervention group [30]. The presence of a control group allows researchers to determine if any observed changes or outcomes are due to the intervention itself [31], rather than other factors. Studies that include a comparison group will also be eligible for inclusion. A comparison group may receive a different intervention, an alternative treatment, or a variation of the intervention being studied. Comparing the outcomes between the intervention group and the comparison group can provide insights into the relative effectiveness or superiority of the intervention under investigation. Including studies with control or comparison groups enhances the methodological rigour and internal validity of systematic reviews. In comparing the outcomes between groups that received different conditions (intervention vs. control/comparison), the review can more reliably assess the true effects of the mental health interventions being evaluated. This approach also helps account for potential confounding factors and biases that may influence the outcomes, strengthening the conclusions that will be drawn from the review.

Outcomes of interest

The studies that will be included in this review must report on quantitative measures or scores related to depression, anxiety, and suicidal ideation or behaviour. These measures include standardized scales, questionnaires, or other validated assessment tools used to evaluate the presence and severity of these mental health conditions. The studies should also report on the changes in these mental health scores from baseline (pre-intervention) to the last available follow-up timepoint after the intervention was implemented. This allows for the evaluation of the potential impact or effectiveness of the intervention on improving mental health outcomes over time. Furthermore, the studies must have used validated and reliable instruments or tools relevant to our study population and context. For depressive symptoms, these includes Patient Health

Questionnaire (PHQ-9), Children's Depression Inventory (CDI), Hamilton Depression Rating Scale for Children, Beck Depression Inventory (BDI), and Center for Epidemiologic Studies Depression Scale (CES-D); for anxiety symptoms, these include the Generalized Anxiety Disorder Scale (GAD-7), Multidimensional Anxiety Scale for Children (MASC), Hamilton Anxiety Rating Scale (HAM-A), Beck Anxiety Inventory (BAI), and Child and Adolescent Anxiety Measure (CAAM); and for suicidality, these include the Columbia-Suicide Severity Rating Scale (C-SSRS), Scale for Suicide Ideation (SSI), Suicide Behaviors Questionnaire-Revised (SBQ-R), Ask Suicide-Screening Questions (ASQ), and Suicide Intent Scale (SIS). This ensures that the mental health outcomes are assessed using standardized and psychometrically sound measures, increasing the validity and comparability of the findings. The review will also consider validated culturally adapted versions of these measures for African contexts, and any additional validated measures that emerge during the systematic search process. In addition to mental health outcomes, the studies should also report on measures or indicators, including self-reported adherence scales, pharmacy refill records, electronic monitoring devices, and viral load measurements as indirect indicators of adherence to ART among ALHIV. Adherence to ART is a crucial aspect of HIV/AIDS management [32], and mental health interventions may potentially impact treatment adherence, hence the need to focus attention on adherence.

Study designs

This criterion specifies the types of study designs that will be included in the review, focusing on studies that evaluate the effectiveness or feasibility of mental health interventions. Randomized controlled trials, quasi-experimental studies, pilot interventions, and pre-post studies evaluating mental health interventions will be considered for inclusion. Randomized controlled trials (RCTs) are considered the gold standard for evaluating interventions [33]. Quasi-experimental studies,

pilot interventions, and pre-post studies will also be included to capture a broader range of evidence and interventions that may be in earlier stages of development or implementation.

Setting

Only studies conducted in sub-Saharan African countries will be included in the review. We will define sub-Saharan Africa according to the World Bank classification, including Eastern African countries (such as Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, Zambia, and Zimbabwe), Western African countries (including Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, and Sierra Leone), Central African countries (such as Cameroon, Central African Republic, Chad, Republic of the Congo, Democratic Republic of the Congo, Equatorial Guinea, and Gabon), and Southern African countries (including Angola, Botswana, Eswatini, Lesotho, Namibia, and South Africa). This criterion ensures that the included studies are specific to the context of SSA countries, where the HIV/AIDS epidemic has had a significant impact and where resources for mental health interventions are limited.

Language

Studies published in English. This criterion limits the included studies to those published in the English Language due to resource constraints (cost of translation) and the need for consistent data extraction and synthesis. While this may introduce some language bias, English is a commonly used language for academic publications in SSA.

Publication period

This criterion establishes a time frame for the literature search, focusing on studies published from the year 2004 onwards. This time frame captures a significant period of research and intervention development in the field of HIV/AIDS and mental health, particularly in the context of SSA.

Including studies from 2004 onwards ensures that the findings and recommendations are relevant to current practices and context.

Exclusion criteria

- Studies focusing solely on adults (>19 years) or children (<10 years) living with HIV/AIDS. The rationale for this exclusion is to maintain a clear focus on the unique developmental needs and experiences of adolescents, which may differ from those of adults or younger children.
- Studies reporting data on participants with different ages in which it is difficult to separate data on adolescents for analysis.
- Studies evaluating solely biomedical or pharmacological interventions without a psychosocial/mental health component. The rationale for this exclusion is to align the review with its primary objective of examining mental health interventions for ALHIV.
- Reviews, editorials, commentaries, case reports, and qualitative studies without an intervention component.
- Studies for which the full text is not available or accessible either through online databases or other means. This exclusion criterion is based on practical considerations related to the systematic review process and to ensure that the reviewers have access to the complete information and details necessary for data extraction and quality assessment.

Search strategy

For this review, we identified the PICO components and cross-referenced them with search terms utilized in comparable previous reviews to ensure completeness [14,21]. The authors have developed composite search terms that included controlled vocabulary for the selected databases

(eg, Mesh terms for PubMed) and keywords for the population, intervention types, and outcomes of interest. To ensure that the search strategy retrieved studies evaluating mental health interventions focused on depression, anxiety and suicidal thoughts/ suicide, Mesh terms or the controlled vocabulary for each database and keywords/test words of these mental disorders were infused in the search strategy as shown in Table 2.

Table 2. Sample, Search strategy for PubMed using Boolean Operators (OR & AND)

PICO criteria	Combined MeSH Terms and Text Words
Population	"Adolescent"[MeSH Terms] OR Adolescent[Text Word] OR Adolescen*[Text Word] OR "young adult"[Text Word] OR teen[Text Word] OR youth[Text Word] OR "young people" [Text Word] OR "young women" [Text Word] OR "young men" [Text Word] OR teenager*[Text Word] OR "young person" [Text Word] OR "10-19 year olds" AND "hiv"[MeSH Terms] OR HIV[Text Word] OR "human immunodeficiency virus" [Text Word] OR AIDS[Text Word] OR "HIV/AIDS" [Text Word] OR "HIV and AIDS"[Text Word] OR "acquired immunodeficiency syndrome" [Text Word] OR "immune failure" [Text Word] OR "HIV-positive"[Text Word] OR SADA[Text Word]
Intervention	"Mental health intervention*"[Text Word] OR "school-based intervention*"[Text Word] OR "community-based intervention*"[Text Word] OR "peer intervention*"[Text Word] OR "church-based intervention*"[Text Word] OR "family-based intervention*" [Text Word] OR "health facility based intervention" [Text Word] OR "group based intervention" [Text Word] OR "cognitive behavioural therap*"[Text Word]OR Psychosocial intervention*[Text Word] OR "Psychological intervention*"[Text Word] OR "interpersonal therap*"[Text Word] AND

Comparison

Outcome

"Mental disorders"[MeSH Terms] OR Mental Disorders[Text Word] OR "Mental disorder"[Text Word] OR "psychiatric disorder" [Text Word] OR "mental illness"[Text Word] OR "psychiatric illness" [Text Word] OR "mood disorder"[Text Word] OR "affective disorder"[Text Word] OR "emotional distress"[Text Word] OR depression[Text Word] OR "depressive disorder"[Text Word] OR "depressive symptom"[Text Word] OR "depressive symptomatology" [Text Word] OR anxiety[Text Word] OR "anxiety disorder"[Text Word] OR suicide[Text Word] OR "suicidal ideation" [Text Word] AND adherence[Mesh] OR adheren* [Text Word] OR complian*[Text Word] OR noncomplian*[Text Word] OR non-complian*[Text Word] OR concordance[Text Word] OR persisten*[Text Word] OR discontinu*[Text Word] OR retention[Text Word] AND ART [Text Word] OR HAART [Text Word] OR "anti-retroviral"[Text Word] OR "antiretroviral drug*" [Text Word] OR "antiretroviral agents"[Mesh] OR "highly active antiretroviral therapy"[Text Word]

"Africa"[Mesh] OR Africa [Text Word] OR "Sub Saharan Africa" [Text Word]

Information sources

Six (6) major Cochrane-recommended electronic databases will be searched using the predetermined customized search strategy: PubMed, Scopus, MEDLINE, CINAHL, PsycINFO, and Health Source: Nursing academic edition. To limit the potential risk of publication bias, the reviewers will conduct additional searches in Google Scholar, Library catalogues, Conference Proceedings, Clinical Trials databases, such as ClinicalTrials.gov, dissertation abstracts and institutional databases, such as UNAIDS, and WHO reports for additional papers. Hand searches

of relevant journals and reference lists of included studies will be conducted to identify potentially relevant studies. Researchers and study authors will be contacted for additional papers.

Data records, management and screening

The search results will be imported into a reference management software, specifically Rayyan, to first identify and remove duplicates. Two independent reviewers will screen the titles and abstracts of the identified records against the inclusion and exclusion criteria. Any disagreements will be resolved through discussion or consultation with a third reviewer. Full-text articles of potentially eligible studies will be retrieved and further assessed for inclusion by two independent reviewers. A third reviewer will be consulted in case of disagreement. The process will be summarized using PRISMA flow diagram.

Data extraction

A standardized data extraction form (Supplementary file) similar to those used in previous systematic reviews [14,21] will be used to capture relevant information from the included studies. Two reviewers will conduct a pilot test of the data extraction form, engage in discussions, and iteratively refine the form based on their deliberations. Two independent reviewers will conduct data extraction, and any discrepancies will be resolved through discussion and the involvement of a third reviewer. The extracted data will include study characteristics (eg, author, year, country, study design), population details, intervention details, key findings on the effectiveness of the intervention and implementation approaches and challenges.

Data synthesis

A qualitative content analysis approach [34] will be used to collate the extracted data. The data will be categorized and compared for similarities differences, and relationships in respect of the mental health interventions and their impact on mental health outcomes, and adherence to ART. The data will be synthesized through the identification of themes and concepts relevant to the review question. The thematic analysis will follow a rigorous seven-stage process. Initially, two independent reviewers will conduct data familiarization through multiple readings of included studies, documenting key findings, patterns, and contextual factors using a standardized extraction form. This will be followed by initial coding, where reviewers will conduct line-by-line coding of relevant findings, develop codes inductively, and establish coding consistency through independent review of 20% of studies, resolving discrepancies through consensus. Theme development will involve grouping similar codes into potential themes using concept mapping, with relationships between codes visually mapped and themes reviewed against original data to ensure representativeness. The theme review and refinement stage will involve a two-level review process: examining coded extracts for coherent patterns and reviewing themes against the entire dataset. A third reviewer will independently verify themes, with regular team meetings to ensure alignment with research objectives. The final reporting stage will include clear theme definitions, visual representations of theme relationships, detailed description of the analytical process, and acknowledgment of limitations and potential biases. If possible, meta-analyses will be performed to estimate the overall effect sizes of interventions on mental health outcomes.

Risk of bias assessment

Eligible studies will undergo quality assessment using standardized criteria appropriate for each respective study design. Two reviewers will independently review each included study for

methodological quality. Discrepancies in this assessment will be resolved through discussion among the two reviewers. Where necessary, a third reviewer will be included to make a final judgement of the rating of an included study. Randomized Controlled Trials will be appraised using the Cochrane Risk of Bias tool which provides opportunity to examine randomization, allocation concealment, and selective reporting among others as potential sources of bias [35]. The modified version of the Newcastle–Ottawa Scale [36] will be used to appraise nonrandomized studies. The mixed method appraisal tool (MMAT) version 2018 [37] will be used to evaluate considerations unique to mixed methods studies and to appraise article quality. This tool was chosen over other quality appraisal tools because it is explicitly applied to mixed methods research and makes provision to assess the individual methods (quantitative and qualitative) within the design.

When study reports lack adequate information, a judgement of "UNCLEAR" will be assigned to specific risk of bias items within the assessment tools. Following this, each study will be given a final quality rating—classified as "low," "moderate," or "high"—based on the comprehensive evaluation of bias risk.

Patient and public involvement

None.

ETHICS AND DISSEMINATION

Since no primary data will be collected, ethical approval is not needed. The review's findings will be disseminated through publication in a peer-reviewed journal and presented at relevant conferences.

DISCUSSION

While previous reviews have examined mental health interventions for people living with HIV/AIDS [19-20], the proposed review is focused on and unique to ALHIV in SSA. By narrowing the scope to this vulnerable population and geographic region, the review aims to address a critical gap in the existing literature. Furthermore, this protocol incorporates rigorous methodological approaches, such as the use of standardized quality assessment tools (eg, Cochrane Risk of Bias Tool). These methodological considerations align with best practices in conducting systematic reviews and meta-analyses, ensuring a high level of transparency and scientific rigour.

The findings of this systematic review will have significant implications for research, practice, and policy related to the mental health care of ALHIV in SSA. First, it will identify gaps and limitations in the existing literature that require further investigation and intervention development. This insight can inform future research priorities and funding allocations, ensuring that resources are directed towards addressing the most pressing needs of this vulnerable population. Second, the review will provide evidence-based insights into the effectiveness, feasibility, and cultural appropriateness of various mental health interventions in SSA context. This information can guide healthcare practitioners, policymakers, and program implementers in selecting and adapting interventions that are most likely to be effective and sustainable in resource-limited settings.

Second, previous reviews have highlighted the paucity of research on mental health interventions specifically tailored for ALHIV [6,12]. This systematic review is likely to corroborate these findings, underscoring the need for more research in this area. Secondly, existing studies have primarily focused on psychosocial support interventions and cognitive-behavioural therapy (CBT) for this population [38-39]. The review may reveal a limited diversity of intervention types, suggesting the need for exploring alternative or culturally adapted approaches. Lastly, previous reviews have identified challenges in implementing mental health interventions in resource-limited

settings, such as shortages of trained healthcare professionals, stigma, and logistical barriers [14,40]. This systematic review may provide further evidence of these challenges and highlight the need for sustainable and scalable intervention models.

The review faces several limitations that may impact its findings. First, the potential for substantial heterogeneity among the included studies, due to diverse settings, interventions, and study designs, could limit the feasibility of conducting meta-analyses or drawing robust conclusions. Additionally, the protocol includes only studies published in English, which may result in the exclusion of relevant non-English studies and potentially introduce language bias. Furthermore, mental health interventions for adolescents living with HIV/AIDS in sub-Saharan Africa represent a rapidly evolving field, meaning new studies and interventions may emerge, quickly rendering the review outdated and necessitating periodic updates. Lastly, while the review focuses on sub-Saharan Africa, its findings may have limited generalizability to other regions or contexts due to cultural, socioeconomic, and healthcare system differences.

Contributors

Conceptualization of study: S.A, D.S.B, E.X, V.V.A, P.K.A, Y.Y.B, A.F.B, L.O.K. Methods and design: S.A, D.S.B, E.X, V.V.A, P.K.A, Y.Y.B, A.F.B, L.O.K, & C.Y. Original Draft Preparation: D.S.B, E.X, V.V.A, P.K.A, Y.Y.B, A.F.B, L.O.K, & C.Y. Review and Editing: S.A & D.S.B.

S.A is the guarantor responsible for the overall content of the protocol. All authors have read and agreed to the published version of the protocol.

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Competing interests

None declared.

Patient consent for publication

Not applicable.

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