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# BMJ Open

## Service delivery models for enhancing linkage to and retention in HIV care services for adolescent girls and young women and adolescent boys and young men: A protocol for an overview of systematic reviews

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Complete List of Authors:	Jonas, Kim; South African Medical Research Council, Health Systems Research; University of Cape Town Zani, Babalwa; University of Cape Town Lung Institute, Knowledge Translation Unit Ramraj, Trisha; South African Medical Research Council Durban, Health Systems Research Unit; South African Medical Research Council Durban, HIV Prevention Research Unit Chirinda, W.; South African Medical Research Council Jama, N.; South African Medical Research Council Basera, W.; South African Medical Research Council; University of Cape Town Govindasamy, D.; South African Medical Research Council Mukumbang, Ferdinand; University of the Western Cape, School of Public Health McClinton Appollis, Tracy; South African Medical Research Council Pass, Desiree; South African Medical Research Council Mathews, C.; South African Medical Research Council; University of Cape Town Nicol, Edward; South African Medical Research Council; University of Stellenbosch
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Manuscripts

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3 **Service delivery models for enhancing linkage to and retention in HIV care services for adolescent girls**  
4 **and young women and adolescent boys and young men: A protocol for an overview of systematic**  
5 **reviews**  
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9 **Authors:**  
10

11 <sup>1,2\*</sup>Jonas K. [kim.jonas@mrc.ac.za](mailto:kim.jonas@mrc.ac.za)  
12 <sup>3</sup>Zani B. [Babalwa.Zani@gmail.com](mailto:Babalwa.Zani@gmail.com)  
13 <sup>1</sup>Ramraj T. [trisha.ramraj@mrc.ac.za](mailto:trisha.ramraj@mrc.ac.za)  
14 <sup>1</sup>Chirinda W. [witchirinda@gmail.com](mailto:witchirinda@gmail.com)  
15 <sup>3</sup>Jama N. [ngcwalisa.jama@mrc.ac.za](mailto:ngcwalisa.jama@mrc.ac.za)  
16 <sup>3,4</sup>Basera W. [wisdom.basera@mrc.ac.za](mailto:wisdom.basera@mrc.ac.za)  
17 <sup>1,2</sup>McClinton Appollis T. [tracy.mcclintonappollis@mrc.ac.za](mailto:tracy.mcclintonappollis@mrc.ac.za)  
18 <sup>3</sup>Pass D. [desiree.pass@mrc.ac.za](mailto:desiree.pass@mrc.ac.za)  
19 <sup>1</sup>Govindasamy D. [darshini.govindasamy@mrc.ac.za](mailto:darshini.govindasamy@mrc.ac.za)  
20 <sup>3</sup>Mukumbang F. [mukumbang@gmail.com](mailto:mukumbang@gmail.com)  
21 <sup>1,2</sup>Mathews C. [Catherine.mathews@mrc.ac.za](mailto:Catherine.mathews@mrc.ac.za)  
22 <sup>3,5</sup>Nicol E. [Edward.nicol@mrc.ac.za](mailto:Edward.nicol@mrc.ac.za)  
23  
24  
25  
26  
27

28 **Author Affiliations**  
29

30 <sup>1</sup>Health Systems Research Unit, South Africa Medical Research Council, Cape Town, South Africa  
31 <sup>2</sup>Adolescent Health Research Unit, Division of Child and Adolescent Psychiatry, Faculty of Health  
32 Sciences, University of Cape Town, Cape Town, South Africa  
33 <sup>3</sup>Burden of Disease Research Unit, South African Medical Research Council, Cape Town, South Africa  
34 <sup>4</sup>School of Public Health and Family Medicine, Faculty of Health Sciences, University of Cape Town, Cape  
35 Town, South Africa  
36 <sup>5</sup>Health Systems and Public Health Division, Faculty of Medicine and Health Sciences, Stellenbosch  
37 University, Cape Town, South Africa  
38  
39

40 **\*Corresponding author:**  
41

42 Kim Jonas  
43 Health Systems Research Unit, South African Medical Research Council  
44 Francie van Zijl Drive, Parow Valley, Tygerberg, Cape Town, South Africa  
45 Email: [kim.jonas@mrc.ac.za](mailto:kim.jonas@mrc.ac.za)  
46 Tel: +27 21 938 0344  
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## Abstract

**Introduction:** Recent advances in the HIV care continuum have shown that an individual diagnosed with HIV should be initiated on antiretroviral therapy (ART) as soon as possible regardless of the CD4 count levels and retained in HIV care services. Studies have reported large losses in the HIV continuum of care, before and after the era of universal test and treat (UTT). Several systematic reviews have reported on the strategies for improving linkage to and retention in HIV treatment and care. The purpose of this overview of systematic reviews is to synthesize evidence on the effects of HIV care interventions or service delivery models (SDMs) to link adolescent girls and young women (AGYW) and adolescent boys and young men (ABYM) to care and retain them in care.

**Methods and analysis:** An electronic search of four online databases: PubMed, Cochrane Database of Systematic Reviews, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Web of Science, will be performed to identify systematic reviews on the effects of linkage to and retention in HIV care interventions or SDMs for AGYW aged 15-24 years and ABYM aged 15-35 years. Our findings on the effects of interventions and SDMs will be interpreted considering the intervention and or SDMs' effectiveness by the time period, setting, and population of interest. Two or more authors will independently screen articles for inclusion using *a priori* criteria.

**Ethics and dissemination:** Ethics approval is not required for this study as only published secondary data will be used. Our findings will be disseminated through peer-reviewed publication, conference abstracts and through presentations to stakeholders and other community fora. The findings from this overview of systematic reviews will inform mixed-methods operations research on HIV intervention programming and delivery of HIV care services for AGYW and ABYW in South Africa.

**Protocol registration: PROSPERO registration:** CRD42020177933

**Keywords:** HIV care, service delivery models, Linkage to care, Retention in care, adolescents, young people

## Article Summary

### *Strengths and limitations of this study*

- This is the first overview of systematic reviews exploring different service delivery models to enhance linkage to and retention in HIV care services for adolescents and young people.
- An exhaustive and comprehensive search strategy.
- To fulfil high-quality standards, all steps are carried out independently by two or more reviewers.
- Our review only includes systematic reviews written in English language.

## Background (3620 words)

HIV/AIDS remains one of the most serious public health challenges, with 37.9 million people living with HIV (PLHIV) and 770 000 deaths attributed to AIDS globally.<sup>1</sup> There were over 23 million people accessing antiretroviral therapy (ART) in 2018, which is 62% of all PLHIV.<sup>1</sup> Advances in the HIV care continuum now recommend that an individual diagnosed with HIV be initiated on ART as soon as possible regardless of the CD4 count levels and retained in HIV care services.<sup>2</sup> Early ART initiation is associated with improved viral suppression, improved chances of having undetectable viral load, reduced risk of disease progression and death, and improved quality of life.<sup>3-4</sup> Having an undetectable viral load leads to reduced transmission at population level as PLWH with an undetectable viral load are less likely to transmit the virus.<sup>5-7</sup> Immediate ART initiation is dependent on successful linkage to HIV care services, however, gaps in successful linkage to care continue to prevail. For example, in 2018, among those who knew their HIV status globally, 78% were accessing ART and among those on ART, 87% were virally suppressed.<sup>1</sup> Once initiated on ART, retention in HIV care is also important. Poor retention in HIV care services increases the risks of suboptimal ART adherence, which increases the risks of drug resistance and treatment failure.<sup>8</sup>

To increase the linkage to and retention in HIV care services, differentiated care models such as HIV testing and point of care CD4 testing modalities, where CD4 count results are obtained near real time at a place of treatment, and ART adherence clubs, have been implemented.<sup>9-10</sup> However, several studies have reported substantial loss-to-follow-up between HIV diagnosis and receiving CD4 count results or between CD4 testing and ART initiation.<sup>11-14</sup> While universal test and treat (UTT) sought to address these losses, delays in initiating ART and loss to follow-up continue to be reported.<sup>15-16</sup> This leads to late ART initiation and poorer health outcomes among PLWH. Consequently, AIDS-related deaths are decreasing at a slower rate, but this varies by region and population, as well as by linkage to care programming.<sup>17-18</sup>

Adolescent girls and young women (AGYW) (15-24 years) are a critical population in HIV care. Although the number of new infections is declining in the general population, new infections among AGYW are decreasing at a slower rate than the general population globally and even slower in Sub-Saharan Africa, with some parts remaining stagnant.<sup>1,17-18</sup> The slow decrease of new infections among AGYW has prompted a global reaction for AGYW-focused interventions to reduce the HIV infection rates and facilitate their access to HIV treatment and care services. Globally, adolescent girls form the majority (56%) of PLWH, a number higher than in adolescent boys (44%).<sup>17-18</sup> AIDS-related deaths among

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3 adolescent girls aged 15–19 years are declining at a slower rate compared to other age groups.<sup>1</sup>  
4 Additionally, access to and uptake of treatment is often reported to be lower among adolescents than it  
5 is among older age groups.<sup>17-18</sup> There is an increasing need to improve the care pathway from HIV  
6 diagnosis to linkage to and retention in HIV care services for adolescents, including AGYW, as several  
7 studies highlight substantial losses in the continuum of care from HIV testing to ART initiation.<sup>19-20</sup>  
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11 While AGYW are disproportionately affected by HIV, heterosexual men remain a critical population in HIV  
12 prevention. An estimated 75% of men living with HIV (aged 15 years and older) in eastern and southern  
13 Africa knew their HIV status, compared to 83% of women living with HIV of the same age in 2017.<sup>21</sup> In  
14 2017 an estimated 300 000 men in sub-Saharan Africa died of AIDS-related complications compared to  
15 270 000 women. This observation may be explained by differences in treatment coverage between men  
16 and women. Men are less likely than women to test for HIV, engage in care in a timely way, and remain  
17 in care.<sup>22-24</sup>  
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21 In South Africa in 2018, 93% of women living with HIV were aware of their status compared to 88% of HIV-  
22 positive men.<sup>1</sup> Recently, there has been an increased in HIV prevalence among adolescent boys and young  
23 men (ABYM).<sup>25</sup> In 2017, HIV prevalence among South African adolescent girls (15-19 years) and young  
24 women (20-24 years) was 5.8% and 15.6% respectively.<sup>26</sup> While HIV prevalence amongst males, in 2017  
25 was 4.7% (15-19 years), 4.8% (20-24 years), 12.4% (25-29 years) and 18.4% (30-24 years). Further, HIV  
26 incidence was 0.49% amongst South African males aged 15-24 years compared to 1.51% amongst females  
27 of the same age.<sup>26</sup>  
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30  
31 Several systematic reviews and meta-analyses of interventions or service delivery models (SDMs) to  
32 improve linkage to and retention in HIV care services have been conducted indicating varying effects to  
33 promote linkage to and retention in HIV care for PLWH. However, these reviews do not specifically focus  
34 on AGYW and ABYM, despite the increasing infection rates and slow declining death rates among these  
35 subpopulations. To better utilize existing evidence, an examination of a broader scope of interventions  
36 and SDMs to promote linkage to and retention in HIV care services for AGYW and ABYM is needed. This  
37 study will conduct an overview of systematic reviews to find, assess, and synthesize/summarize all  
38 published peer-reviewed systematic reviews and meta-analyses of studies that examined the effects of  
39 interventions or SDMs to improve linkage to and retention in HIV care services among AGYW and  
40 ABYM. The interventions or SDMs will be classified into health facility-based, community-based, school-  
41 based, and various hybrid combinations of aforementioned groups of models. The proposed overview of  
42 reviews will seek to answer the question: Which interventions, strategies, or service delivery models for  
43 linking AGYW and ABYM to HIV care and improving their retention in care are effective?  
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### 49 *Objectives*

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51 1. To identify interventions and SDMs that are effective at linking AGYW and ABYM to HIV care  
52 services and retaining them in HIV care.  
53
- 54 2. To synthesize the evidence on the effects of interventions and SDMs to link AGYW and ABYM to  
55 HIV care services and retain them in HIV care.  
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3. To highlight gaps in the evidence on interventions and SDMs to improve linkage and retention in HIV care of AGYW and ABYM.

## Methods

This study proposes a narrative overview of systematic reviews of interventions and SDMs to link AGYW and ABYM to HIV care services and retain them in HIV care.

### *Protocol and registration*

Methods for this overview have been developed based on the criteria for conducting overviews of reviews in the *Cochrane Handbook of Systematic Reviews of Interventions*. This protocol has been registered on the International prospective register of systematic reviews (PROSPERO: CRD42020177933). Ethics approval is not required for this review as we will analyze published literature only.

### Eligibility criteria

#### *Setting*

The overview will include systematic reviews that include studies conducted anywhere in the world.

#### *Study design*

Due to the relatively large body of evidence from individual experimental studies in the field of HIV care and treatment and the large number of reviews of this evidence, the current overview aims to review published, peer-reviewed systematic reviews of original studies with at least one included study. Systematic reviews that include any of the following types of studies that involve interventions or programmes or service delivery models to improve linkage to and retention in care will be eligible for inclusion in the overview: randomized controlled trials, non-randomized controlled trials, controlled before and after studies, interrupted time series studies, and other mixed-methods studies. This study will exclude abstracts that do not have full text articles available, non-systematic reviews and other overviews. We will not limit publication dates or location of studies.

Systematic reviews will be defined according to Higgins as follows: a systematic review includes, (a) a clearly stated set of objectives with an explicit, reproducible methodology; (b) a systematic search that attempts to identify all studies that would meet the eligibility criteria; (c) an assessment of the validity of the findings of the included studies (e.g., assessment of risk of bias and confidence in cumulative estimates); and (d) systematic presentation, and synthesis, of the characteristics and findings of the included studies.<sup>27</sup> We will therefore consider a review to be a systematic review if it includes the following:

- 1) Clearly stated objectives and eligibility criteria of studies
- 2) A systematic search that attempts to identify all studies that would meet the eligibility criteria

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3 3) Assessed the risk of bias of included studies  
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7 *Participants*

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9 The World Health Organization (WHO) definition of AGYW includes adolescent girls aged 10-19 years old  
10 and young women aged 20-24 years old; while the definition of ABYM includes adolescent boys aged 10-  
11 19 years old and young men include men aged 15-35 years old. For the purposes of this overview, AGYW  
12 are defined as adolescent girls aged 15-19 years and young women aged 20-24 years old; and ABYM are  
13 defined as adolescent boys aged 15-19 years and young men aged 15-35 years old. Thus, this overview  
14 will include studies that comprise of AGYW and ABYM diagnosed with HIV. In cases where the systematic  
15 review includes both paediatric and older adult populations, it will only be included if the data can be  
16 disaggregated by age for the population of interest in this overview. As interventions and models may  
17 differ for different groups, and relevant outcomes may be different by age, we will consider categorising  
18 the evidence based on the following groupings:  
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21 For AGYW the groupings will be 1= (10–14 years), 2= (11–18 years), 3= (15–19 years) 4= (15–24 years), 5=  
22 (19–24 years); and ABYM, 1= (15–19 years), 2= (20–24 years), 3= (25–30 years), 4= (31–35 years), 5= (15–  
23 24), 6= (25–35 years).  
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27 *Interventions*

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29 This overview will include systematic reviews of studies evaluating interventions or SDMs to improve  
30 linkage to and retention in HIV care. These interventions or SDMs might include services promoting ART  
31 initiation, facilitating CD4 count testing at point of care, or promoting universal test and treat strategies.  
32 They might include community-based, school-based or health facility-based interventions and hybrid  
33 models with more than one service delivery points (SDPs). It will include reviews including studies  
34 conducted in any settings and delivered by any provider (for example, healthcare providers, educators  
35 [within and outside of school settings], or lay providers).  
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39 *Comparison*

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41 This overview will include reviews of studies in which the interventions or SDMs to promote linkage to  
42 and retention in HIV care are compared with any alternative intervention or no intervention, or a standard  
43 care package.  
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46 *Outcomes*

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48 This overview will only include systematic reviews that identify linkage to and retention in HIV care as pre-  
49 specified outcomes. Linkage to HIV care is defined as successful linkage to HIV care services within 3  
50 months of HIV positive diagnosis.<sup>28-30</sup> However, according to the universal test and treat (UTT) strategy, a  
51 shorter period between testing HIV positive and initiating ART is necessary to indicate successful initiation  
52 onto ART. Therefore, we will include all reviews with the definitions covering the period before and the  
53 introduction of UTT strategy. For the purposes of this study, “linkage to HIV care” will be defined as having  
54 been linked to HIV care services either by having their CD4 count done (for older reviews) or by having  
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3 been initiated into ART (for relatively recent reviews) within a specified period after an HIV positive test  
4 result.  
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7 Retention in care is defined as remaining in contact with HIV care services, once linked to the services,  
8 collecting treatment, based on the frequency of clinic visits (varying from 2 weeks to 1 year), or the  
9 number of viral load tests conducted each year.<sup>31-32</sup> This study defines “retention in HIV care” as being  
10 alive and on ART, collecting repeat treatment, based on the frequency of clinic visits (varying from 2 weeks  
11 to 1 year), or the number of viral load tests conducted each year after being linked to HIV care.  
12  
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#### 14 *Exclusion criteria*

15 We will exclude systematic reviews that:

- 16 • Are not in English
- 17 • Include only key populations, for example, men who have sex with men, sex worker, intravenous
- 18 drug users and transgender people.
- 19 • Report adherence without our outcomes of interest in the HIV continuum of care
- 20 • Describe factors affecting barriers/facilitators or associated factors to linkage and retention in
- 21 HIV care
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#### 30 **Search methods for identification of studies**

31 This study will not limit the search period by date of publication. It will search four databases: PubMed,  
32 Cochrane Database of Systematic Reviews (the Cochrane Library), CINAHL, and Web of Science. In general,  
33 MEDLINE/PubMed and EMBASE index most systematic reviews.<sup>33</sup> EMBASE is a subscription-based  
34 database which we do not have access to. We will search additional regional and subject-specific  
35 databases such as CINAHL and Web of Science. The initial search strategy (Table 1 and 2) will be developed  
36 for one of the databases, PubMed database, using subject headings and free-text words that describe  
37 linkage to HIV care service delivery models. Search strategies for the other databases will be adapted from  
38 the initial strategy accordingly to each database’s specific requirements. Language will be restricted to  
39 English. References will be managed using Endnote X7.<sup>34</sup>  
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45 **Table 1. Developing the search strategy for the overview of systematic reviews**

46 <b>Time period</b>	No filter
47 <b>Language</b>	The search strategy will not be filtered by language, however, only systematic 48 reviews published in English will be included.
49 <b>Setting</b>	Any setting
50 <b>Study design</b>	Systematic reviews or meta-analyses of any study design (quantitative, qualitative).
51 <b>Search terms</b>	See Table below (search strategy)
52 <b>No filter</b>	All content related to linkages and service delivery models to HIV care services for 53 AGYW and ABYM for linkage to and retention in HIV care
54 <b>Databases</b>	PubMed ( <a href="https://www.ncbi.nlm.nih.gov/pubmed/">https://www.ncbi.nlm.nih.gov/pubmed/</a> )

	Cochrane library ( <a href="https://www.cochranelibrary.com/">https://www.cochranelibrary.com/</a> ) Cumulative Index to Nursing and Allied Health Literature (CINAHL) Web of Science Grey literature (e.g. Google Scholar)
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**Table 2. Search strategy for the overview of systematic reviews (PubMed example)**

SET		SEARCH TERMS
1	<b>HIV</b>	HIV OR human immune-deficiency virus OR human immunodeficiency virus
2	<b>ART</b>	antiretroviral therapy OR antiretrovirals OR antiretroviral treatment OR Highly Active Antiretroviral Therapy OR ART OR HAART
3	<b>Linkage or retention in care</b>	Linkage OR "Linkage to care" OR "Linkage to HIV care" OR "Referral to care" OR retention OR "retention in HIV care" OR "remaining in HIV care" OR "remaining in care" OR "continuing in care" OR "continuing in HIV care" OR "continuity of patient care" OR Attrition OR dropouts OR "loss to follow-up" OR "lost to care" OR "lost in care" OR initiat* OR start* OR uptake OR "ART initiation" OR modalities
4	<b>Study design</b>	systematic[tiab] OR "systematic review"[tiab] OR meta-analysis [tiab] OR systematic review[pt] OR meta-analysis[pt]
5		Sets 1-4 will be combined with "AND"

### Selection of studies

Search results will be imported into EndNote X7 and duplicates will be removed.<sup>34</sup> The remaining abstracts will be imported into Rayyan and two or more authors will independently screen titles and abstracts to identify relevant studies for full-text review. Rayyan is a web tool designed to speed up the process of screening and selecting studies.<sup>35</sup> Abstracts that are relevant, but reviewers have an unclear (unsure) inclusion status and where two authors have disagreed on inclusion will be moved to full-text screening so that the article can be thoroughly examined for its eligibility status. Two authors will independently screen full text articles for final inclusion using a standardized eligibility screening form. The outcomes of the independent multiple screening will be discussed and if two authors disagree and consensus cannot be reached a third author who is not part of the initial screening team will arbitrate. Reviewers will meet regularly to discuss and resolve any discrepancies arising from the screening of abstracts and full-text articles until consensus is reached.

### Data extraction and management

Two or more reviewers will independently perform data extraction for each review and populate a predefined table (Appendix 1). Discrepancies in the data extracted will be resolved by discussion to reach a consensus. If necessary, a third reviewer will be invited to arbitrate.

We will record the following information for each included review: details of the review including the title of the publication, first author's name, year of publication; details of the population included; specific country and settings where the intervention or modalities were implemented; a description and

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3 classification of the intervention or SDM (including healthcare provider, implementers of the intervention,  
4 lay providers, within or outside of a health facility or school or other details, healthcare context); study  
5 designs and a description of the outcome measures. We will also extract number of included participants;  
6 median or mean sample size; description of participants (i.e., median, or mean ages, average percent of  
7 AGYW and ABYM); and effect measures. We will pilot a data extraction form with two reviewers on three  
8 eligible reviews.  
9

10  
11 We will obtain additional information from the original reports of included studies in the reviews where  
12 necessary. These results will be published in appendices in the final manuscript.  
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### 15 16 **Assessment of methodological quality of included reviews**

17 The methodological quality of each included systematic review will be independently assessed by two  
18 reviewers using the validated Risk of Bias In Systematic reviews (ROBIS) tool.<sup>36</sup> A guidance document will  
19 be used to ensure consistency between reviewers.  
20

21  
22 Every domain will be given a rating of Y= “yes”, PY= “probably yes”, PN= “probably no”, N= “no”, NI= “no  
23 information”. Domains that are rated as “no information” will be removed from the denominator in the  
24 overall quality ranking. Discrepancies in the ratings of the methodological reviews will be resolved by  
25 consensus between the reviewers and, if necessary, arbitration by another reviewer not part of the  
26 original quality assessment team. In addition to the quality assessment, we will report on the tools used  
27 for quality of evidence in each specific review and record the quality score or assessment.  
28  
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### 30 31 **Data synthesis and presentation**

32 This study proposes a narrative overview of systematic reviews of interventions and SDMs to link AGYW  
33 and ABYM to HIV care services and retain them in HIV care. The primary outcomes for this study are  
34 linkage to and retention in HIV care, defined by one or more of the following:  
35  
36

37 For linkage to HIV care service

- 38  
39  
40 1. AGYW and ABYM diagnosed with HIV who are initiated on ART after HIV diagnosis, or who had a  
41 CD4 count performed after HIV diagnosis, or AGYW and ABYM initiated on ART within a specified  
42 time period after receiving CD4 count results  
43

44 For retention in HIV care services

- 45  
46 2. AGYW and ABYM who return for routine HIV care checkup after 1 month, 3 months and/ or 6  
47 months since being initiated on ART
- 48 3. AGYW and ABYM who return monthly or regularly for their ART refill
- 49 4. AGYW and ABYM retained in HIV care after 1 month, 3 months and/ or 6 months of an HIV positive  
50 diagnosis  
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53 We will report outcomes according to the effect measures reported in the included reviews and will  
54 describe the results with respect to the following characteristics: setting (country, facility e.g. school or  
55 health facility or community), age groups: 15–19 years, 20–24 years for AGYW and same for ABYM with  
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3 additional 25-30 years and 31-35 years, whether the interventions are biomedical, behavioral or other,  
4 details regarding the intervention using the template for intervention description and replication (TIDieR)  
5 checklist and guide, number of trials included for each comparison.<sup>37</sup> Presentation of results will align with  
6 guidelines in the *Cochrane Handbook of Systematic Reviews of Interventions* and the *Preferred Reporting*  
7 *Items for Systematic Reviews and Meta-Analysis* (PRISMA) statement.<sup>27,38</sup> Further, a PRISMA-P reporting  
8 checklist was used for this protocol.<sup>39</sup> A PRISMA flow diagram will be used to summarize the process of  
9 study selection. Summary tables will be used to present data in a structured format. All descriptive  
10 explanations of heterogeneity provided will be reported by the review authors and highlight cases where  
11 descriptive explorations of heterogeneity are not provided.  
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15 Data will be presented graphically to visually demonstrate the data in terms of quality of evidence, quality  
16 of reviews and the effect sizes where provided. In addition, a section on 'implications for policy and  
17 practice' summarizing the results and evidence base will be presented.  
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19

### 20 **Subgroup analysis**

21 In the descriptive analysis, subgroup analyses based on the subgroups described above will be explored  
22 to understand which interventions or service delivery models are most effective in linking and retaining  
23 AGYW and ABYM to HIV care services and which models are not effective.  
24  
25

### 26 **Potential limitations**

27 It is possible that relevant studies may be missed despite using robust search strategies of multiple  
28 databases because of the language restrictions and the restrictions on study type and type of reviews.  
29 Despite these limitations, this overview of systematic reviews will undoubtedly provide rich and useful  
30 information as the selected databases offers a wide scope of fields covering all facets of the review  
31 objectives.  
32  
33

### 34 **Ethics and dissemination**

35 Ethics approval is not required for this study as only published secondary data will be used. Our findings  
36 will be disseminated through peer reviewed publication, conference abstracts and through presentations  
37 to public health communities and other community fora.  
38  
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40

### 41 **Discussion**

42 This is a proposed narrative overview of systematic reviews on interventions or service models that aimed  
43 to increase or enhance linkage to and retention in HIV care services for AGYW and ABYM. It will identify  
44 effective, evidence-based interventions and SDMs to linked AGYW and ABYM to care and retained them  
45 in HIV care. The findings will inform research into the current SDMs which may require adaptations. Our  
46 findings will be of value to healthcare managers, intervention implementers, service providers and  
47 policymakers in HIV care service to improve the current SDMs used to link AGYW and ABYM to HIV care  
48 services and retain them in these services. This research will also identify gaps in the evidence which will  
49 inform suggestions for future research priorities.  
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53  
54 The results of this overview will help establish an effective SDM for increasing linkage to HIV care services  
55 for AGYW and ABYM and may enhance quality of life. The results will also help inform programmes that  
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3 aim to reduce ongoing HIV transmission and reinfection among AGYW and ABYM living with HIV either  
4 through early ART initiation or through immediate identification of HIV related complications, including  
5 early detection of drug resistance or poor adherence. Establishing the effective SDMs for linkage to and  
6 retention in HIV care for AGYW and ABYM will help inform the design of future interventions aiming to  
7 increase uptake of HIV care services, as well as help improve the linkage to care pathways to facilitate  
8 linkage and retention in care among AGYW and ABYM living with HIV. The identified effective SDMs for  
9 linkage to and retention in HIV care services will be key in reducing HIV transmission and reinfection,  
10 thereby reducing the burden of HIV, and improving quality of life and wellbeing among these sub-  
11 populations. Evidence shows that being initiated to ART and retained in HIV care improves health related  
12 quality of life of HIV positive individuals to equate that of HIV negative individuals.<sup>40-42</sup>  
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16 We acknowledge that some studies not published in English may be missed in this overview. However, we  
17 are hopeful that we will find useful and relevant studies with this language restriction because of the  
18 global focus of the overview, (i.e., through its wider geographical coverage as opposed to a restricted  
19 location or region).  
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### 22 **Author Contributions**

23 KJ developed the first draft of the manuscript. KJ, BZ, TR, WC, NJ, WB, TMA, DP, DG, FM, CM, EN  
24 reviewed the draft manuscript and provided significant input.  
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26  
27

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32  
33

34 Funders only provided financial support to the review protocol.  
35  
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### 38 **Competing interests**

39 None declared  
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### 43 **Patient consent**

44 Not required  
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### 48 **Patient and Public Involvement:**

49 No patient involved  
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### 53 **Ethics approval**

54 Not required. Only published secondary data will be used in this study.  
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For peer review only

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# Reporting checklist for protocol of a systematic review and meta analysis.

Based on the PRISMA-P guidelines.

## Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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**Protocol title: Service delivery models for enhancing linkage to and retention in HIV care services for adolescent girls and young women and adolescent boys and young men: A protocol for an overview of systematic reviews**

		Reporting Item	Page Number
<b>Title</b>			
Identification	<a href="#">#1a</a>	Identify the report as a protocol of a systematic review	Page 1
Update	<a href="#">#1b</a>	If the protocol is for an update of a previous systematic review, identify as such	N/A
<b>Registration</b>			
	<a href="#">#2</a>	If registered, provide the name of the registry (such as PROSPERO) and registration number	Page 2

## Authors

1	Contact	<a href="#">#3a</a>	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	Page 1
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6	Contribution	<a href="#">#3b</a>	Describe contributions of protocol authors and identify the guarantor of the review	Page 11
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10	<b>Amendments</b>			
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12		<a href="#">#4</a>	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	N/A
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19	<b>Support</b>			
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21	Sources	<a href="#">#5a</a>	Indicate sources of financial or other support for the review	Page 12
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25	Sponsor	<a href="#">#5b</a>	Provide name for the review funder and / or sponsor	Page 12
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27	Role of sponsor or funder	<a href="#">#5c</a>	Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol	Page 12
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31	<b>Introduction</b>			
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34	Rationale	<a href="#">#6</a>	Describe the rationale for the review in the context of what is already known	Page 3-4
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38	Objectives	<a href="#">#7</a>	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	Page 5
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43	<b>Methods</b>			
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45	Eligibility criteria	<a href="#">#8</a>	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	Page 5-7
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52	Information sources	<a href="#">#9</a>	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	Page 7
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1	Search strategy	<a href="#">#10</a>	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	Page 8 & additional file
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6	Study records -	<a href="#">#11a</a>	Describe the mechanism(s) that will be used to manage records and data throughout the review	Page 7-8
7	data management			
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10	Study records -	<a href="#">#11b</a>	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	Page 8-9
11	selection process			
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17	Study records -	<a href="#">#11c</a>	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	Page 9
18	data collection			
19	process			
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24	Data items	<a href="#">#12</a>	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	Page 9-10
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29	Outcomes and	<a href="#">#13</a>	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	Page 10
30	prioritization			
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34	Risk of bias in	<a href="#">#14</a>	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	Page 9
35	individual studies			
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41	Data synthesis	<a href="#">#15a</a>	Describe criteria under which study data will be quantitatively synthesised	N/A. This is a narrative synthesis
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46	Data synthesis	<a href="#">#15b</a>	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I <sup>2</sup> , Kendall's $\tau$ )	N/A
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55	Data synthesis	<a href="#">#15c</a>	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	N/A
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1	Data synthesis	<a href="#">#15d</a>	If quantitative synthesis is not appropriate, describe the type of summary planned	Page 10
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4	Meta-bias(es)	<a href="#">#16</a>	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	N/A
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10	Confidence in cumulative evidence	<a href="#">#17</a>	Describe how the strength of the body of evidence will be assessed (such as GRADE)	N/A
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15 None The PRISMA-P elaboration and explanation paper is distributed under the terms of the Creative  
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17 <https://www.goodreports.org/>, a tool made by the [EQUATOR Network](#) in collaboration with  
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# BMJ Open

## Service delivery models for enhancing linkage to and retention in HIV care services for adolescent girls and young women and adolescent boys and young men: A protocol for an overview of systematic reviews

Journal:	<i>BMJ Open</i>
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Date Submitted by the Author:	27-May-2022
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<b>Primary Subject Heading</b>:	HIV/AIDS
Secondary Subject Heading:	Public health
Keywords:	HIV & AIDS < INFECTIOUS DISEASES, Public health < INFECTIOUS DISEASES, PRIMARY CARE, PUBLIC HEALTH

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5 **reviews**  
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9 **Authors:**  
10

11 <sup>1,2\*</sup>Jonas K. [kim.jonas@mrc.ac.za](mailto:kim.jonas@mrc.ac.za)  
12 <sup>3</sup>Zani B. [Babalwa.Zani@gmail.com](mailto:Babalwa.Zani@gmail.com)  
13 <sup>1</sup>Ramraj T. [trisha.ramraj@mrc.ac.za](mailto:trisha.ramraj@mrc.ac.za)  
14 <sup>1</sup>Chirinda W. [witchirinda@gmail.com](mailto:witchirinda@gmail.com)  
15 <sup>3</sup>Jama N. [ngcwalisa.jama@mrc.ac.za](mailto:ngcwalisa.jama@mrc.ac.za)  
16 <sup>3,4</sup>Basera W. [wisdom.basera@mrc.ac.za](mailto:wisdom.basera@mrc.ac.za)  
17 <sup>1,2</sup>McClinton Appollis T. [tracy.mcclintonappollis@mrc.ac.za](mailto:tracy.mcclintonappollis@mrc.ac.za)  
18 <sup>3</sup>Pass D. [desiree.pass@mrc.ac.za](mailto:desiree.pass@mrc.ac.za)  
19 <sup>1</sup>Govindasamy D. [darshini.govindasamy@mrc.ac.za](mailto:darshini.govindasamy@mrc.ac.za)  
20 <sup>3</sup>Mukumbang F. [mukumbang@gmail.com](mailto:mukumbang@gmail.com)  
21 <sup>1,2</sup>Mathews C. [Catherine.mathews@mrc.ac.za](mailto:Catherine.mathews@mrc.ac.za)  
22 <sup>3,5</sup>Nicol E. [Edward.nicol@mrc.ac.za](mailto:Edward.nicol@mrc.ac.za)  
23  
24  
25  
26  
27

28 **Author Affiliations**  
29

30 <sup>1</sup>Health Systems Research Unit, South Africa Medical Research Council, Cape Town, South Africa  
31 <sup>2</sup>Adolescent Health Research Unit, Division of Child and Adolescent Psychiatry, Faculty of Health  
32 Sciences, University of Cape Town, Cape Town, South Africa  
33 <sup>3</sup>Burden of Disease Research Unit, South African Medical Research Council, Cape Town, South Africa  
34 <sup>4</sup>School of Public Health and Family Medicine, Faculty of Health Sciences, University of Cape Town, Cape  
35 Town, South Africa  
36 <sup>5</sup>Health Systems and Public Health Division, Faculty of Medicine and Health Sciences, Stellenbosch  
37 University, Cape Town, South Africa  
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40 **\*Corresponding author:**  
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42 Kim Jonas  
43 Health Systems Research Unit, South African Medical Research Council  
44 Francie van Zijl Drive, Parow Valley, Tygerberg, Cape Town, South Africa  
45 Email: [kim.jonas@mrc.ac.za](mailto:kim.jonas@mrc.ac.za)  
46 Tel: +27 21 938 0344  
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## Abstract

**Introduction:** Recent advances in the HIV care continuum have shown that an individual diagnosed with HIV should be initiated on antiretroviral therapy (ART) as soon as possible regardless of the CD4 count levels and retained in HIV care services. Studies have reported large losses in the HIV continuum of care, before and after the era of universal test and treat (UTT). Several systematic reviews have reported on the strategies for improving linkage to and retention in HIV treatment and care. The purpose of this overview of systematic reviews is to synthesize evidence on the effects of HIV care interventions or service delivery models (SDMs) to link adolescent girls and young women (AGYW) and adolescent boys and young men (ABYM) to care and retain them in care.

**Methods and analysis:** An electronic search of four online databases: PubMed, Cochrane Database of Systematic Reviews, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Web of Science, will be performed to identify systematic reviews on the effects of linkage to and retention in HIV care interventions or SDMs for AGYW aged 15-24 years and ABYM aged 15-35 years. Our findings on the effects of interventions and SDMs will be interpreted considering the intervention and or SDMs' effectiveness by the time period, setting, and population of interest. Two or more authors will independently screen articles for inclusion using *a priori* criteria.

**Ethics and dissemination:** Ethics approval is not required for this study as only published secondary data will be used. Our findings will be disseminated through peer-reviewed publication, conference abstracts and through presentations to stakeholders and other community fora. The findings from this overview of systematic reviews will inform mixed-methods operations research on HIV intervention programming and delivery of HIV care services for AGYW and ABYM in South Africa.

**Protocol registration: PROSPERO registration:** CRD42020177933

**Keywords:** HIV care, service delivery models, Linkage to care, Retention in care, adolescents, young people

## Article Summary

### *Strengths and limitations of this study*

- In the times of Universal Test and Treat (UTT), it is important to identify and consolidate the evidence-based interventions to improve linkage to and retention in HIV care services for young people.
- We will use validated guidelines and assessment tools for search methods, data extraction, methodological quality and reporting of included studies.
- We will include all systematic reviews of randomized controlled trials, non-randomized controlled trials, controlled before and after studies, interrupted time series studies and other mixed-methods studies.
- We will include only published systematic reviews and reviews written in English which is a potential limitation of this review.

### Background (3939 words)

HIV/AIDS remains one of the most serious public health challenges, with 37.9 million people living with HIV (PLHIV) and 770 000 deaths attributed to AIDS globally.<sup>1</sup> There were over 23 million people accessing antiretroviral therapy (ART) in 2018, which is 62% of all PLHIV.<sup>1</sup> Advances in the HIV care continuum now recommend that an individual diagnosed with HIV be initiated on ART as soon as possible regardless of their CD4 count levels and retained in HIV care services.<sup>2</sup> Early ART initiation is associated with improved viral suppression, improved chances of having undetectable viral load, reduced risk of disease progression and death, and improved quality of life.<sup>3-4</sup> Having an undetectable viral load leads to reduced transmission at population level as PLHIV with an undetectable viral load are less likely to transmit the virus.<sup>5-7</sup> Immediate ART initiation is dependent on successful linkage to HIV care services, however, gaps in successful linkage to care continue to prevail. For example, in 2018, among those who knew their HIV status globally, 78% were accessing ART and among those on ART, 87% were virally suppressed.<sup>1</sup> Once initiated on ART, retention in HIV care is also important.

Poor retention in HIV care services increases the risk of suboptimal ART adherence, which increases the risk of drug resistance and treatment failure.<sup>8</sup> Although most PLHIV know their HIV status, retention in HIV care services is a challenge. For example, in South Africa only 70% of those who knew their HIV status were on ART in 2017.<sup>9</sup> Bisnauth et al. (2021) found that mobility, such as moving house or relocation, ART side effects or pill burden, and time constraints were some of the most common reasons reported for disengagement from care or loss to follow-up by PLHIV.<sup>10</sup> Retention in HIV care for ART services for vulnerable populations, such as adolescents, is particularly challenging and has been noted as a global priority for action.<sup>11-13</sup> Previous studies also confirmed that retention in care, treatment adherence, and treatment outcomes for adolescents in southern Africa are worse, compared with other age groups.<sup>13-16</sup>

To increase the linkage to and retention in HIV care services, differentiated care models such as HIV testing and point of care CD4 testing modalities, where CD4 count results are obtained near real time at a place of treatment, and ART adherence clubs, have been implemented.<sup>17-18</sup> However, several studies have reported substantial loss-to-follow-up between HIV diagnosis and receiving CD4 count results or between CD4 testing and ART initiation.<sup>19-22</sup> While universal test and treat (UTT) sought to address these losses,

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3 delays in initiating ART and loss to follow-up continue to be reported.<sup>23-24</sup> This leads to late ART initiation  
4 and poorer health outcomes among PLHIV. Consequently, AIDS-related deaths are decreasing at a slower  
5 rate, but this varies by region and population, as well as by linkage to care programming.<sup>17-18</sup>  
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9 Adolescent girls and young women (AGYW) (15-24 years) are a critical population in HIV care. Although  
10 the number of new infections are declining in the general population, new infections among AGYW are  
11 decreasing at a slower rate than the general population globally and even slower in Sub-Saharan Africa,  
12 with some parts remaining stagnant.<sup>1,17-18</sup> The slow decrease of new infections among AGYW has  
13 prompted a global reaction for AGYW-focused interventions to reduce the HIV infection rates and  
14 facilitate their access to HIV treatment and care services. Globally, adolescent girls form the majority  
15 (56%) of PLHIV, a number higher than in adolescent boys (44%).<sup>25-26</sup> AIDS-related deaths among  
16 adolescent girls aged 15–19 years are declining at a slower rate compared to other age groups.<sup>1</sup>  
17 Additionally, access to and uptake of treatment is often reported to be lower among adolescents  
18 compared to older age groups.<sup>25-26</sup> There is an increasing need to improve the care pathway from HIV  
19 diagnosis to linkage to and retention in HIV care services for adolescents, including AGYW, as several  
20 studies highlight substantial losses in the continuum of care from HIV testing to ART initiation.<sup>27-28</sup>  
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25 While AGYW are disproportionately affected by HIV, heterosexual men remain a critical population in HIV  
26 prevention. An estimated 75% of men living with HIV (aged 15 years and older) in eastern and southern  
27 Africa knew their HIV status, compared to 83% of women living with HIV of the same age in 2017.<sup>29</sup> In  
28 2017 an estimated 300 000 men in sub-Saharan Africa died of AIDS-related complications compared to  
29 270 000 women. This observation may be explained by differences in treatment coverage between men  
30 and women. Men are less likely than women to test for HIV, engage in care in a timely way, and remain  
31 in care.<sup>30-32</sup>  
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35 In South Africa in 2018, 93% of women living with HIV were aware of their status compared to 88% of HIV-  
36 positive men.<sup>1</sup> Recently, there has been an increase in HIV prevalence among adolescent boys and young  
37 men (ABYM).<sup>33</sup> In 2017, HIV prevalence among South African adolescent girls (15-19 years) and young  
38 women (20-24 years) was 5.8% and 15.6% respectively.<sup>26</sup> HIV prevalence amongst males, in 2017 was  
39 4.7% (15-19 years), 4.8% (20-24 years), 12.4% (25-29 years) and 18.4% (30-24 years). Further, HIV  
40 incidence was 0.49% amongst South African males aged 15-24 years compared to 1.51% amongst females  
41 of the same age.<sup>34</sup>  
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45 Several systematic reviews and meta-analyses of interventions or service delivery models (SDMs) to  
46 improve linkage to and retention in HIV care services have been conducted indicating varying effects to  
47 promote linkage to and retention in HIV care for PLHIV.<sup>13,35-36</sup> We identified one overview of systematic  
48 reviews. Mbugabaw et al. (2020) conducted an overview of systematic reviews focusing on treatment  
49 initiation, adherence to ART and retention in care for vulnerable populations, but their overview did not  
50 explore the results of reviews among adolescent and young populations.<sup>37</sup> Our proposed overview of  
51 systematic reviews will specifically focus on AGYW and ABYM, as the infection rates are increasing and  
52 death rates are declining slower among these subpopulations. AGYW and ABYM are a vulnerable group  
53 which recently emerged as a priority in the global fight against HIV/AIDS. Compared with older  
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3 populations, adolescents and young people experience different barriers to HIV treatment, such as less  
4 autonomy and more limited access to resources, and less independence.<sup>38</sup> The overview of systematic  
5 reviews we propose will fill in this gap and provide evidence synthesis specific to interventions or SDMs  
6 for linking and retaining adolescents and young people in HIV care services.  
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9 To better utilize existing evidence, an examination of a broader scope of interventions and SDMs to  
10 promote linkage to and retention in HIV care services for AGYW and ABYM is needed. This study will  
11 conduct an overview of systematic reviews to find, assess, and synthesize/summarize all published peer-  
12 reviewed systematic reviews and meta-analyses of studies that examined the effects of interventions or  
13 SDMs to improve linkage to and retention in HIV care services among AGYW and ABYM. The interventions  
14 or SDMs will be classified into health facility-based, community-based, school-based, and various hybrid  
15 combinations of aforementioned groups of models. The proposed overview of reviews will seek to answer  
16 the question: Which interventions, strategies, or service delivery models for linking AGYW and ABYM to  
17 HIV care and improving their retention in care are effective?  
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### 21 *Objectives*

- 22  
23 1. To identify interventions and SDMs that are effective at linking AGYW and ABYM to HIV care  
24 services and retaining them in HIV care.  
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27 2. To synthesize the evidence on the effects of interventions and SDMs to link AGYW and ABYM to  
28 HIV care services and retain them in HIV care.  
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- 30  
31 3. To highlight gaps in the evidence on interventions and SDMs to improve linkage and retention in  
32 HIV care of AGYW and ABYM.  
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### 34 **Methods**

35 This study proposes a narrative overview of systematic reviews of interventions and SDMs to link AGYW  
36 and ABYM to HIV care services and retain them in HIV care.  
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#### 39 *Protocol and registration*

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41 Methods for this overview have been developed based on the criteria for conducting overviews of reviews  
42 in the *Cochrane Handbook of Systematic Reviews of Interventions*. This protocol has been registered on  
43 the International prospective register of systematic reviews (PROSPERO: CRD42020177933). Ethics  
44 approval is not required for this review as we will analyze published literature only.  
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#### 50 *Eligibility criteria*

#### 51 *Setting*

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53 The overview will include systematic reviews that include studies conducted anywhere in the world.  
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### *Study design*

Due to the relatively large body of evidence from individual experimental studies in the field of HIV care and treatment and the large number of reviews of this evidence, the current overview aims to review published, peer-reviewed systematic reviews of original studies with at least one included study. Systematic reviews that include any of the following types of studies that involves interventions or programmes or service delivery models to improve linkage to and retention in care will be eligible for inclusion in the overview: randomized controlled trials, non-randomized controlled trials, controlled before and after studies, interrupted time series studies, and other mixed-methods studies. This study will exclude abstracts that do not have full text articles available, non-systematic reviews and other overviews.

We will not limit publication dates or location of studies to capture all relevant systematic reviews published covering all the HIV/AIDS treatment and management guideline strategies. The international guidelines for HIV treatment and management has changed over the years where initially, only advanced AIDS clinical stages were used as criteria to initiate treatment. Following this, guidelines were updated and CD4 count, and viral load levels were revised to allow treatment initiation much earlier in the disease progression. Recently, the UTT strategy is being implemented. Therefore, our overview of systematic reviews will capture evidence covering the period of these varying HIV treatment policies.

Systematic reviews will be defined according to Higgins as follows: a systematic review includes, (a) a clearly stated set of objectives with an explicit, reproducible methodology; (b) a systematic search that attempts to identify all studies that would meet the eligibility criteria; (c) an assessment of the validity of the findings of the included studies (e.g., assessment of risk of bias and confidence in cumulative estimates); and (d) systematic presentation, and synthesis, of the characteristics and findings of the included studies.<sup>39</sup> We will therefore consider a review to be a systematic review if it includes the following:

- 1) Clearly stated objectives and eligibility criteria of studies
- 2) A systematic search that attempts to identify all studies that would meet the eligibility criteria
- 3) Assessed the risk of bias of included studies

### *Population*

The World Health Organization (WHO) definition of AGYW includes adolescent girls aged 10-19 years old and young women aged 20-24 years old; while the definition of ABYM includes adolescent boys aged 10-19 years old and young men include men aged 15-35 years old. For the purposes of this overview, AGYW are defined as adolescent girls aged 15-19 years and young women aged 20-24 years old; and ABYM are defined as adolescent boys aged 15-19 years and young men aged 15-35 years old. Thus, this overview will include studies that comprise of AGYW and ABYM diagnosed with HIV. In cases where the systematic review includes both paediatric and older adult populations, it will only be included if the data can be disaggregated by age for the population of interest in this overview. As interventions and models may

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3 differ for different groups, and relevant outcomes may be different by age, we will consider categorising  
4 the evidence based on the following groupings:  
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6 For AGYW the groupings will be 1= (10–14 years), 2= (11–18 years), 3= (15–19 years) 4= (15–24 years), 5=  
7 (19–24 years); and ABYM, 1= (15–19 years), 2= (20–24 years), 3= (25–30 years), 4= (31–35 years), 5= (15–  
8 24), 6= (25–35 years).  
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### 10 11 12 *Interventions*

13 This overview will include systematic reviews of studies evaluating interventions or SDMs to improve  
14 linkage to and retention in HIV care. These interventions or SDMs might include services promoting ART  
15 initiation, facilitating CD4 count testing at point of care, or promoting universal test and treat strategies.  
16 They might include community-based, school-based or health facility-based interventions and hybrid  
17 models with more than one service delivery points (SDPs). It will include reviews that include studies  
18 conducted in any setting and delivered by any provider (for example, healthcare providers, educators  
19 [within and outside of school settings], or lay providers).  
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### 23 24 *Comparison*

25 This overview will include reviews of studies in which the interventions or SDMs to promote linkage to  
26 and retention in HIV care are compared with any alternative intervention or no intervention, or a standard  
27 of care package.  
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### 31 *Outcomes*

32 This overview will only include systematic reviews that identify linkage to and retention in HIV care as pre-  
33 specified outcomes. Linkage to HIV care is defined as successful linkage to HIV care services within 3  
34 months of HIV positive diagnosis.<sup>36,40-41</sup> However, according to the universal test and treat (UTT) strategy,  
35 a shorter period between testing HIV positive and initiating ART is necessary to indicate successful  
36 initiation onto ART which can be immediately or within 2 weeks of diagnosis. Therefore, we will include  
37 all reviews with the definitions covering the period before and including the period when UTT strategy  
38 was introduced. For the purposes of this study, “linkage to HIV care” will be defined as having been linked  
39 to HIV care services either by having their CD4 count done (for older reviews) or by having been initiated  
40 into ART (for relatively recent reviews) within a specified period after an HIV positive test result.  
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44 Retention in care is defined as remaining in contact with HIV care services, once linked to the services,  
45 collecting treatment, based on the frequency of clinic visits (varying from 1 month to 1 year), or the  
46 number of viral load tests conducted each year.<sup>42-43</sup> This study defines “retention in HIV care” as being  
47 alive and on ART, collecting repeat treatment, based on the frequency of clinic visits (varying from 2 weeks  
48 to 1 year), or the number of viral load tests conducted each year after being linked to HIV care.  
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### 52 *Exclusion criteria*

53 We will exclude systematic reviews that:  
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- Are not in English
- Include only key populations, for example, men who have sex with men, sex worker, intravenous drug users and transgender people.
- Report adherence without our outcomes of interest in the HIV continuum of care
- Describe factors affecting barriers/facilitators or associated factors to linkage and retention in HIV care

### Search methods for identification of studies

This study will not limit the search period by date of publication. We will search five databases: PubMed, Cochrane Database of Systematic Reviews (the Cochrane Library), CINAHL, Web of Science, and Google scholar for grey literature. In general, MEDLINE/PubMed and EMBASE index most systematic reviews.<sup>443</sup> EMBASE is a subscription-based database which we do not have access to. We will search additional regional and subject-specific databases such as CINAHL and Web of Science. The initial search strategy (Table 1 and 2) will be developed for one of the databases, PubMed database, using subject headings and free-text words that describe linkage to HIV care service delivery models. Search strategies for the other databases will be adapted from the initial strategy accordingly to each database's specific requirements. Language will be restricted to English. References will be managed using Endnote X7.<sup>45</sup> The search strategies were first applied on 01 March 2022 and the data collection is expected to conclude on 30 June 2022.

**Table 1. Developing the search strategy for the overview of systematic reviews**

<b>Time period</b>	No filter
<b>Language</b>	The search strategy will not be filtered by language, however, only systematic reviews published in English will be included.
<b>Setting</b>	Any setting
<b>Study design</b>	Systematic reviews or meta-analyses including randomized controlled trials, non-randomized controlled trials, controlled before and after studies, interrupted time series studies, and other mixed-methods studies (quantitative, qualitative, or mixed).
<b>Search terms</b>	See Table below (search strategy)
<b>No filter</b>	All content related to linkages and service delivery models to HIV care services for AGYW and ABYM for linkage to and retention in HIV care
<b>Databases</b>	PubMed ( <a href="https://www.ncbi.nlm.nih.gov/pubmed/">https://www.ncbi.nlm.nih.gov/pubmed/</a> ) Cochrane library ( <a href="https://www.cochranelibrary.com/">https://www.cochranelibrary.com/</a> ) Cumulative Index to Nursing and Allied Health Literature (CINAHL) Web of Science Grey literature (e.g. Google Scholar)

**Table 2. Search strategy for the overview of systematic reviews (PubMed example)**

SET		SEARCH TERMS
1	<b>HIV</b>	HIV OR human immune-deficiency virus OR human immunodeficiency virus
2	<b>ART</b>	antiretroviral therapy OR antiretrovirals OR antiretroviral treatment OR Highly Active Antiretroviral Therapy OR ART OR HAART
3	<b>Linkage or retention in care</b>	Linkage OR "Linkage to care" OR "Linkage to HIV care" OR "Referral to care" OR retention OR "retention in HIV care" OR "remaining in HIV care" OR "remaining in care" OR "continuing in care" OR "continuing in HIV care" OR "continuity of patient care" OR Attrition OR dropouts OR "loss to follow-up" OR "lost to care" OR "lost in care" OR initiat* OR start* OR uptake OR "ART initiation" OR modalities
4	<b>Study design</b>	systematic[tiab] OR "systematic review"[tiab] OR meta-analysis [tiab] OR systematic review[pt] OR meta-analysis[pt]
5		Sets 1-4 will be combined with "AND"

### Selection of studies

Search results will be imported into EndNote X7 and duplicates will be removed.<sup>45</sup> The remaining abstracts will be imported into Rayyan and two or more authors will independently screen titles and abstracts to identify relevant studies for full-text review. Rayyan is a web tool designed to speed up the process of screening and selecting studies.<sup>46</sup> Abstracts that are relevant, but reviewers have an unclear (unsure) inclusion status and where two authors have disagreed on inclusion will be moved to full-text screening so that the article can be thoroughly examined for its eligibility status. Two authors will independently screen full text articles for final inclusion using a standardized eligibility screening form. The outcomes of the independent multiple screening will be discussed and if two authors disagree and consensus cannot be reached a third author who is not part of the initial screening team will arbitrate. Reviewers will meet regularly to discuss and resolve any discrepancies arising from the screening of abstracts and full-text articles until consensus is reached.

### Data extraction and management

Two or more reviewers will independently perform data extraction for each review and populate a predefined table (Appendix 1). The predefined table is an excel table developed by the review team to standardize data extraction by the multiple reviewers who will extract the data.

Discrepancies in the data extracted will be resolved by discussion to reach a consensus. If necessary, a third reviewer will be invited to arbitrate.

We will record the following information for each included review: details of the review including the title of the publication, first author's name, year of publication; details of the population included; specific country and settings where the intervention or modalities were implemented; a description and classification of the intervention or SDM (including healthcare provider, implementers of the intervention, lay providers, within or outside of a health facility or school or other details, healthcare context); study designs and a description of the outcome measures. We will also extract number of included participants; median or mean sample size; description of participants (i.e., median, or mean ages, average percent of



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3 AGYW and ABYM); and effect measures. We will pilot a data extraction form with two reviewers on three  
4 eligible reviews.  
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7 We will obtain additional information from the original reports of included studies in the reviews where  
8 necessary. These results will be published in appendices in the final manuscript.  
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## 11 **Assessment of methodological quality of included reviews**

12 The methodological quality of each included systematic review will be independently assessed by two  
13 reviewers using the validated Risk of Bias In Systematic reviews (ROBIS) tool.<sup>47</sup> A guidance document will  
14 be used to ensure consistency between reviewers.  
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17 Every domain will be given a rating of Y= “yes”, PY= “probably yes”, PN= “probably no”, N= “no”, NI= “no  
18 information”. Domains that are rated as “no information” will be removed from the denominator in the  
19 overall quality ranking. Discrepancies in the ratings of the methodological reviews will be resolved by  
20 consensus between the reviewers and, if necessary, arbitration by another reviewer not part of the  
21 original quality assessment team. In addition to the quality assessment, we will report on the tools used  
22 for quality of evidence in each specific review and record the quality score or assessment.  
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## 27 **Data synthesis and presentation**

28 This study proposes a narrative overview of systematic reviews of interventions and SDMs to link AGYW  
29 and ABYM to HIV care services and retain them in HIV care. The primary outcomes for this study are  
30 linkage to and retention in HIV care, defined by one or more of the following:  
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33 For linkage to HIV care service

- 34 1. AGYW and ABYM diagnosed with HIV who are initiated on ART after HIV diagnosis, or who had a  
35 CD4 count performed after HIV diagnosis, or AGYW and ABYM initiated on ART within a specified  
36 time period after receiving CD4 count results.  
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39 For retention in HIV care services

- 40 2. AGYW and ABYM who return for routine HIV care checkup after 1 month, 3 months and/ or 6  
41 months since being initiated on ART.  
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- 43 3. AGYW and ABYM who return monthly or regularly for their ART refill.  
44
- 45 4. AGYW and ABYM retained in HIV care after 1 month, 3 months and/ or 6 months of an HIV positive  
46 diagnosis.  
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49 We will present the summary using tables and figures as ‘Overview of reviews table’, including the  
50 characteristics of included systematic reviews. We will denote systematic reviews that contain  
51 overlapping outcomes using appropriate footnotes. We will report outcomes according to the effect  
52 measures reported in the included reviews and will describe the results with respect to the following  
53 characteristics: setting (country, facility e.g. school or health facility or community), age groups: 15–19  
54 years, 20–24 years for AGYW and same for ABYM with additional 25-30 years and 31-35 years, whether  
55 the interventions are biomedical, behavioral or other, details regarding the intervention using the  
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3 template for intervention description and replication (TIDieR) checklist and guide, number of trials  
4 included for each comparison.<sup>48</sup> Presentation of results will align with guidelines in the *Cochrane*  
5 *Handbook of Systematic Reviews of Interventions* and the *Preferred Reporting Items for Systematic*  
6 *Reviews and Meta-Analysis* (PRISMA) statement.<sup>39,49</sup> Further, a PRISMA-P reporting checklist was used for  
7 this protocol.<sup>50</sup> A PRISMA flow diagram will be used to summarize the process of study selection. Summary  
8 tables will be used to present data in a structured format. All descriptive explanations of heterogeneity  
9 provided will be reported by the review authors and highlight cases where descriptive explorations of  
10 heterogeneity are not provided.  
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14 Data will be presented graphically to visually demonstrate the data in terms of quality of evidence, quality  
15 of reviews and the effect sizes where provided. In addition, a section on 'implications for policy and  
16 practice' summarizing the results and evidence base will be presented.  
17

### 18 **Subgroup analysis**

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20 In the descriptive analysis, subgroup analyses based on the subgroups described above will be explored  
21 to understand which interventions or service delivery models are most effective in linking and retaining  
22 AGYW and ABYM to HIV care services and which models are not effective.  
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### 25 **Potential limitations**

26  
27 It is possible that relevant studies may be missed despite using robust search strategies of multiple  
28 databases because of the language restrictions, the restrictions on study type and type of reviews, and  
29 the limited use of grey literature. Despite these limitations, this overview of systematic reviews will  
30 undoubtedly provide rich and useful information as the selected databases offers a wide scope of fields  
31 covering all facets of the review objectives.  
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### 34 **Ethics and dissemination**

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36 Ethics approval is not required for this study as only published secondary data will be used. Our findings  
37 will be disseminated through peer reviewed publication, conference abstracts and through presentations  
38 to public health communities and other community fora.  
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### 41 **Discussion**

42  
43 This is a proposed narrative overview of systematic reviews on interventions or service models that aimed  
44 to increase or enhance linkage to and retention in HIV care services for AGYW and ABYM. It will identify  
45 effective, evidence-based interventions and SDMs to link AGYW and ABYM to care and retain them in HIV  
46 care. The findings will inform research into the current SDMs which may require adaptations. Our findings  
47 will be of value to healthcare managers, intervention implementers, service providers and policymakers  
48 in HIV care service to improve the current SDMs used to link AGYW and ABYM to HIV care services and  
49 retain them in these services. This research will also identify gaps in the evidence which will inform  
50 suggestions for future research priorities.  
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54 The results of this overview will help establish an effective SDM for increasing linkage to HIV care services  
55 for AGYW and ABYM and may enhance quality of life. The results will also help inform programmes that  
56 aim to reduce ongoing HIV transmission and reinfection among AGYW and ABYM living with HIV either  
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3 through early ART initiation or through immediate identification of HIV related complications, including  
4 early detection of drug resistance or poor adherence. Establishing the effective SDMs for linkage to and  
5 retention in HIV care for AGYW and ABYM will help inform the design of future interventions aiming to  
6 increase uptake of HIV care services, as well as help improve the linkage to care pathways to facilitate  
7 linkage and retention in care among AGYW and ABYM living with HIV. The identified effective SDMs for  
8 linkage to and retention in HIV care services will be key in reducing HIV transmission and reinfection,  
9 thereby reducing the burden of HIV, and improving quality of life and wellbeing among these sub-  
10 populations. Evidence shows that being initiated to ART and retained in HIV care improves health related  
11 quality of life of HIV positive individuals to equate that of HIV negative individuals.<sup>51-53</sup>  
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14  
15 We acknowledge that some studies not published in English may be missed in this overview. However, we  
16 are hopeful that we will find useful and relevant studies with this language restriction because of the  
17 global focus of the overview, (i.e., through its wider geographical coverage as opposed to a restricted  
18 location or region).  
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## 20 21 **Conclusion and limitations**

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23 Conclusions are not available as this is a protocol. Limitations of this protocol are described under the  
24 discussion section above.  
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## 26 27 **Author Contributions**

28  
29 KJ developed the first draft of the manuscript. KJ, BZ, TR, WC, NJ, WB, TMA, DP, DG, FM, CM, EN  
30 reviewed the draft manuscript and provided significant input.  
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35  
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39

40 Funders only provided financial support to the review protocol.  
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42

## 43 44 **Competing interests**

45  
46 None declared  
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## 49 50 **Patient consent**

51  
52 Not required  
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## 55 56 **Patient and Public Involvement:**

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2  
3 No patient involved  
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### 6 **Ethics approval**

7  
8 Not required. Only published secondary data will be used in this study.  
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15  
16 **Disclaimer:** The findings and conclusions in this paper are those of the author(s) and do not necessarily  
17 represent the official position of the funders.  
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# Reporting checklist for protocol of a systematic review and meta analysis.

Based on the PRISMA-P guidelines.

## Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the PRISMA-Preporting guidelines, and cite them as:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1.

**Protocol title: Service delivery models for enhancing linkage to and retention in HIV care services for adolescent girls and young women and adolescent boys and young men: A protocol for an overview of systematic reviews**

		Reporting Item	Page Number
<b>Title</b>			
Identification	<a href="#">#1a</a>	Identify the report as a protocol of a systematic review	Page 1
Update	<a href="#">#1b</a>	If the protocol is for an update of a previous systematic review, identify as such	N/A
<b>Registration</b>			
	<a href="#">#2</a>	If registered, provide the name of the registry (such as PROSPERO) and registration number	Page 2

## Authors

1	Contact	<a href="#">#3a</a>	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	Page 1
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6	Contribution	<a href="#">#3b</a>	Describe contributions of protocol authors and identify the guarantor of the review	Page 12
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10	<b>Amendments</b>			
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12		<a href="#">#4</a>	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	N/A
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19	<b>Support</b>			
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21	Sources	<a href="#">#5a</a>	Indicate sources of financial or other support for the review	Page 12
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25	Sponsor	<a href="#">#5b</a>	Provide name for the review funder and / or sponsor	Page 12
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27	Role of sponsor or funder	<a href="#">#5c</a>	Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol	Page 12
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31	<b>Introduction</b>			
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34	Rationale	<a href="#">#6</a>	Describe the rationale for the review in the context of what is already known	Page 3-5
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37	Objectives	<a href="#">#7</a>	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	Page 5
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43	<b>Methods</b>			
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45	Eligibility criteria	<a href="#">#8</a>	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	Page 5-7
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52	Information sources	<a href="#">#9</a>	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	Page 8
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1	Search strategy	<a href="#">#10</a>	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	Page 8-9 & additional file
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6	Study records -	<a href="#">#11a</a>	Describe the mechanism(s) that will be used to manage records and data throughout the review	Page 9
7	data management			
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10	Study records -	<a href="#">#11b</a>	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	Page 9-10
11	selection process			
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17	Study records -	<a href="#">#11c</a>	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	Page 10
18	data collection			
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24	Data items	<a href="#">#12</a>	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	Page 6-7
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29	Outcomes and	<a href="#">#13</a>	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	Page 10
30	prioritization			
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34	Risk of bias in	<a href="#">#14</a>	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	Page 10
35	individual studies			
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41	Data synthesis	<a href="#">#15a</a>	Describe criteria under which study data will be quantitatively synthesised	N/A. This is a narrative synthesis
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46	Data synthesis	<a href="#">#15b</a>	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I <sup>2</sup> , Kendall's $\tau$ )	N/A
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55	Data synthesis	<a href="#">#15c</a>	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	N/A
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1	Data synthesis	<a href="#">#15d</a>	If quantitative synthesis is not appropriate, describe the type of summary planned	Page 10-11
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4	Meta-bias(es)	<a href="#">#16</a>	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	N/A
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10	Confidence in cumulative evidence	<a href="#">#17</a>	Describe how the strength of the body of evidence will be assessed (such as GRADE)	N/A
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15 None The PRISMA-P elaboration and explanation paper is distributed under the terms of the Creative  
16 Commons Attribution License CC-BY. This checklist can be completed online using  
17 <https://www.goodreports.org/>, a tool made by the [EQUATOR Network](#) in collaboration with  
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# BMJ Open

## Service delivery models for enhancing linkage to and retention in HIV care services for adolescent girls and young women and adolescent boys and young men: A protocol for an overview of systematic reviews

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Complete List of Authors:	Jonas, Kim; South African Medical Research Council, Health Systems Research; University of Cape Town Zani, Babalwa; University of Cape Town Lung Institute, Knowledge Translation Unit Ramraj, Trisha; South African Medical Research Council Durban, Health Systems Research Unit; South African Medical Research Council Durban, HIV Prevention Research Unit Chirinda, W.; South African Medical Research Council Jama, N.; South African Medical Research Council Baseru, W.; South African Medical Research Council; University of Cape Town McClinton Appollis, Tracy; South African Medical Research Council Pass, Desiree; South African Medical Research Council Govindasamy, D.; South African Medical Research Council Mukumbang, Ferdinand; University of the Western Cape, School of Public Health Mathews, C.; South African Medical Research Council; University of Cape Town Nicol, Edward; South African Medical Research Council; University of Stellenbosch
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Manuscripts

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3 **Service delivery models for enhancing linkage to and retention in HIV care services for adolescent girls**  
4 **and young women and adolescent boys and young men: A protocol for an overview of systematic**  
5 **reviews**  
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9 **Authors:**  
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11 <sup>1,2\*</sup>Jonas K. [kim.jonas@mrc.ac.za](mailto:kim.jonas@mrc.ac.za)  
12 <sup>3</sup>Zani B. [Babalwa.Zani@gmail.com](mailto:Babalwa.Zani@gmail.com)  
13 <sup>1</sup>Ramraj T. [trisha.ramraj@mrc.ac.za](mailto:trisha.ramraj@mrc.ac.za)  
14 <sup>1</sup>Chirinda W. [witchirinda@gmail.com](mailto:witchirinda@gmail.com)  
15 <sup>3</sup>Jama N. [ngcwalisa.jama@mrc.ac.za](mailto:ngcwalisa.jama@mrc.ac.za)  
16 <sup>3,4</sup>Basera W. [wisdom.basera@mrc.ac.za](mailto:wisdom.basera@mrc.ac.za)  
17 <sup>1,2</sup>McClinton Appollis T. [tracy.mcclintonappollis@mrc.ac.za](mailto:tracy.mcclintonappollis@mrc.ac.za)  
18 <sup>3</sup>Pass D. [desiree.pass@mrc.ac.za](mailto:desiree.pass@mrc.ac.za)  
19 <sup>1</sup>Govindasamy D. [darshini.govindasamy@mrc.ac.za](mailto:darshini.govindasamy@mrc.ac.za)  
20 <sup>3</sup>Mukumbang F. [mukumbang@gmail.com](mailto:mukumbang@gmail.com)  
21 <sup>1,2</sup>Mathews C. [Catherine.mathews@mrc.ac.za](mailto:Catherine.mathews@mrc.ac.za)  
22 <sup>3,5</sup>Nicol E. [Edward.nicol@mrc.ac.za](mailto:Edward.nicol@mrc.ac.za)  
23  
24  
25  
26  
27

28 **Author Affiliations**  
29

30 <sup>1</sup>Health Systems Research Unit, South Africa Medical Research Council, Cape Town, South Africa  
31 <sup>2</sup>Adolescent Health Research Unit, Division of Child and Adolescent Psychiatry, Faculty of Health  
32 Sciences, University of Cape Town, Cape Town, South Africa  
33 <sup>3</sup>Burden of Disease Research Unit, South African Medical Research Council, Cape Town, South Africa  
34 <sup>4</sup>School of Public Health and Family Medicine, Faculty of Health Sciences, University of Cape Town, Cape  
35 Town, South Africa  
36 <sup>5</sup>Health Systems and Public Health Division, Faculty of Medicine and Health Sciences, Stellenbosch  
37 University, Cape Town, South Africa  
38  
39

40 **\*Corresponding author:**  
41

42 Kim Jonas  
43 Health Systems Research Unit, South African Medical Research Council  
44 Francie van Zijl Drive, Parow Valley, Tygerberg, Cape Town, South Africa  
45 Email: [kim.jonas@mrc.ac.za](mailto:kim.jonas@mrc.ac.za)  
46 Tel: +27 21 938 0344  
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## Abstract

**Introduction:** Recent advances in the HIV care continuum have shown that an individual diagnosed with HIV should be initiated on antiretroviral therapy (ART) as soon as possible regardless of the CD4 count levels and retained in HIV care services. Studies have reported large losses in the HIV continuum of care, before and after the era of universal test and treat (UTT). Several systematic reviews have reported on the strategies for improving linkage to and retention in HIV treatment and care. The purpose of this overview of systematic reviews is to identify HIV care interventions or service delivery models (SDMs) and synthesize evidence on the effects of these to link adolescent girls and young women (AGYW) and adolescent boys and young men (ABYM) to care and retain them in care. We also aim to highlight gaps in the evidence on interventions and SDMs to improve linkage and retention in HIV care of AGYW and ABYM.

**Methods and analysis:** An electronic search of four online databases: PubMed, Cochrane Database of Systematic Reviews, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Web of Science, will be performed to identify systematic reviews on the effects of linkage to and retention in HIV care interventions or SDMs for AGYW aged 15-24 years and ABYM aged 15-35 years. Our findings on the effects of interventions and SDMs will be interpreted considering the intervention and or SDMs' effectiveness by the time period, setting, and population of interest. Two or more authors will independently screen articles for inclusion using *a priori* criteria.

**Ethics and dissemination:** Ethics approval is not required for this study as only published secondary data will be used. Our findings will be disseminated through peer-reviewed publication, conference abstracts and through presentations to stakeholders and other community fora. The findings from this overview of systematic reviews will inform mixed-methods operations research on HIV intervention programming and delivery of HIV care services for AGYW and ABYM in South Africa.

**Protocol registration: PROSPERO registration:** CRD42020177933

**Keywords:** HIV care, service delivery models, Linkage to care, Retention in care, adolescents, young people



## Article Summary

### *Strengths and limitations of this study*

- In the times of Universal Test and Treat (UTT), it is important to identify and consolidate the evidence-based interventions to improve linkage to and retention in HIV care services for young people.
- We will use validated guidelines and assessment tools for search methods, data extraction, methodological quality and reporting of included studies.
- We will include all systematic reviews of randomized controlled trials, non-randomized controlled trials, controlled before and after studies, interrupted time series studies and other mixed-methods studies.
- We will include only published systematic reviews and reviews written in English which is a potential limitation of this review.

### Background (3939 words)

HIV/AIDS remains one of the most serious public health challenges, with 38.4 million people living with HIV (PLHIV) and 650 000 deaths attributed to AIDS globally in 2021.<sup>1</sup> There were over 28.7 million people accessing antiretroviral therapy (ART) in 2021, which is 75% of all PLHIV.<sup>1</sup> Advances in the HIV care continuum now recommend that an individual diagnosed with HIV be initiated on ART as soon as possible regardless of their CD4 count levels and retained in HIV care services.<sup>2</sup> Early ART initiation is associated with improved viral suppression, improved chances of having undetectable viral load, reduced risk of disease progression and death, and improved quality of life.<sup>3-4</sup> Having an undetectable viral load leads to reduced transmission at population level as PLHIV with an undetectable viral load are less likely to transmit the virus.<sup>5-7</sup> Immediate ART initiation is dependent on successful linkage to HIV care services, however, gaps in successful linkage to care continue to prevail. For example, in 2021 globally, 85% of those living with HIV knew their HIV status, 88% of those who knew their HIV status were accessing ART and among those on ART, and among these, 92% were virally suppressed.<sup>1</sup> Once initiated on ART, retention in HIV care is also important.

Poor retention in HIV care services increases the risk of suboptimal ART adherence, which increases the risk of drug resistance and treatment failure.<sup>8</sup> Although most PLHIV know their HIV status, retention in HIV care services is a challenge. For example, in South Africa only 70% of those who knew their HIV status were on ART in 2017.<sup>9</sup> Bisnauth et al. (2021) found that mobility, such as moving house or relocation, ART side effects or pill burden, and time constraints were some of the most common reasons reported for disengagement from care or loss to follow-up by PLHIV.<sup>10</sup> Retention in HIV care for ART services for vulnerable populations, such as adolescents, is particularly challenging and has been noted as a global priority for action.<sup>11-13</sup> Previous studies also confirmed that retention in care, treatment adherence, and treatment outcomes for adolescents in southern Africa are worse, compared with other age groups.<sup>13-16</sup>

To increase the linkage to and retention in HIV care services, differentiated care models exist such as HIV testing and point of care CD4 testing modalities, where CD4 count results are obtained near real time at a place of treatment, and ART adherence clubs and support groups. However, these models are mainly focused on the general population while AGYW and ABYM require special attention as access and uptake

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3 of health services is typically lower among young people.<sup>17-18</sup> Several studies have reported substantial  
4 loss-to-follow-up between HIV diagnosis and receiving CD4 count results or between CD4 testing and ART  
5 initiation.<sup>19-22</sup> While universal test and treat (UTT) sought to address these losses, delays in initiating ART  
6 and loss to follow-up continue to be reported.<sup>23-24</sup> This leads to late ART initiation and poorer health  
7 outcomes among PLHIV. Consequently, AIDS-related deaths are decreasing at a slower rate, but this varies  
8 by region and population, as well as by linkage to care programming.<sup>17-18</sup>  
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12 Adolescent girls and young women (AGYW) (15-24 years) are a critical population in HIV care. Although  
13 the number of new infections are declining in the general population, new infections among AGYW are  
14 decreasing at a slower rate than the general population globally and even slower in Sub-Saharan Africa,  
15 with some parts remaining stagnant.<sup>1,17-18</sup> The slow decrease of new infections among AGYW has  
16 prompted a global reaction for AGYW-focused interventions to reduce the HIV infection rates and  
17 facilitate their access to HIV treatment and care services. Globally, adolescent girls form the majority  
18 (56%) of PLHIV, a number higher than in adolescent boys (44%).<sup>25-26</sup> AIDS-related deaths among  
19 adolescent girls aged 15-19 years are declining at a slower rate compared to other age groups.<sup>1</sup>  
20 Additionally, access to HIV care services and uptake of ART treatment in particular is often reported to be  
21 lower among adolescents compared to older age groups.<sup>25-26</sup> There is an increasing need to improve the  
22 care pathway from HIV diagnosis to linkage to and retention in HIV care services for adolescents, including  
23 AGYW, as several studies highlight substantial losses in the continuum of care from HIV testing to ART  
24 initiation.<sup>27-28</sup>  
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30 While AGYW are disproportionately affected by HIV, heterosexual men remain a critical population in HIV  
31 prevention. An estimated 75% of men living with HIV (aged 15 years and older) in eastern and southern  
32 Africa knew their HIV status, compared to 83% of women living with HIV of the same age in 2017.<sup>29</sup> In  
33 2017 an estimated 300 000 men in sub-Saharan Africa died of AIDS-related complications compared to  
34 270 000 women. This observation may be explained by differences in treatment coverage between men  
35 and women. Men are less likely than women to test for HIV, engage in care in a timely way, and remain  
36 in care.<sup>30-32</sup>  
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40 In South Africa in 2018, 93% of women living with HIV were aware of their status compared to 88% of HIV-  
41 positive men.<sup>1</sup> Recently, there has been an increase in HIV prevalence among adolescent boys and young  
42 men (ABYM).<sup>33</sup> In 2017, HIV prevalence among South African adolescent girls (15-19 years) and young  
43 women (20-24 years) was 5.8% and 15.6% respectively.<sup>26</sup> HIV prevalence amongst males, in 2017 was  
44 4.7% (15-19 years), 4.8% (20-24 years), 12.4% (25-29 years) and 18.4% (30-24 years). Further, HIV  
45 incidence was 0.49% amongst South African males aged 15-24 years compared to 1.51% amongst females  
46 of the same age.<sup>34</sup>  
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50 Several systematic reviews and meta-analyses of interventions or service delivery models (SDMs) to  
51 improve linkage to and retention in HIV care services have been conducted indicating varying effects to  
52 promote linkage to and retention in HIV care for PLHIV.<sup>13,35-36</sup> We identified one overview of systematic  
53 reviews. Mbuagbaw et al. (2020) conducted an overview of systematic reviews focusing on treatment  
54 initiation, adherence to ART and retention in care for vulnerable populations, but their overview did not  
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3 explore the results of reviews among adolescent and young populations.<sup>37</sup> Our proposed overview of  
4 systematic reviews will specifically focus on AGYW and ABYM, as the infection rates are increasing and  
5 death rates are declining slower among these subpopulations. AGYW and ABYM are a vulnerable group  
6 which recently emerged as a priority in the global fight against HIV/AIDS. Compared with older  
7 populations, adolescents and young people experience different barriers to HIV treatment, such as less  
8 autonomy and more limited access to resources, and less independence.<sup>38</sup> The overview of systematic  
9 reviews we propose will fill in this gap and provide evidence synthesis specific to interventions or SDMs  
10 for linking and retaining adolescents and young people in HIV care services.  
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13 To better utilize existing evidence, an examination of a broader scope of interventions and SDMs to  
14 promote linkage to and retention in HIV care services for AGYW and ABYM is needed. This study will  
15 conduct an overview of systematic reviews to find, assess, and synthesize/summarize all published peer-  
16 reviewed systematic reviews and meta-analyses of studies that examined the effects of interventions or  
17 SDMs to improve linkage to and retention in HIV care services among AGYW and ABYM. The interventions  
18 or SDMs will be classified into health facility-based, community-based, school-based, and various hybrid  
19 combinations of aforementioned groups of models. The proposed overview of reviews will seek to answer  
20 the question: Which interventions, strategies, or service delivery models for linking AGYW and ABYM to  
21 HIV care and improving their retention in care are effective?  
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### 26 *Objectives*

- 27 1. To identify interventions and SDMs that are effective at linking AGYW and ABYM to HIV care  
28 services and retaining them in HIV care.
- 29 2. To synthesize the evidence on the effects of interventions and SDMs to link AGYW and ABYM to  
30 HIV care services and retain them in HIV care.
- 31 3. To highlight gaps in the evidence on interventions and SDMs to improve linkage and retention in  
32 HIV care of AGYW and ABYM.  
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### 39 **Methods**

40 This study proposes a narrative overview of systematic reviews of interventions and SDMs to link AGYW  
41 and ABYM to HIV care services and retain them in HIV care.  
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#### 44 *Protocol and registration*

45 Methods for this overview have been developed based on the criteria for conducting overviews of reviews  
46 in the *Cochrane Handbook of Systematic Reviews of Interventions*. This protocol has been registered on  
47 the International prospective register of systematic reviews (PROSPERO: CRD42020177933). Ethics  
48 approval is not required for this review as we will analyze published literature only.  
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#### 54 Eligibility criteria

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### Setting

The overview will include systematic reviews that include studies conducted anywhere in the world.

### Study design

Due to the relatively large body of evidence from individual experimental studies in the field of HIV care and treatment and the large number of reviews of this evidence, the current overview aims to review published, peer-reviewed systematic reviews of original studies with at least one included study. Systematic reviews that include any of the following types of studies that involves interventions or programmes or service delivery models to improve linkage to and retention in care will be eligible for inclusion in the overview: randomized controlled trials, non-randomized controlled trials, controlled before and after studies, interrupted time series studies, and other mixed-methods studies. This study will exclude abstracts that do not have full text articles available, non-systematic reviews and other overviews.

We will not limit publication dates or location of studies to capture all relevant systematic reviews published covering all the HIV/AIDS treatment and management guideline strategies. The international guidelines for HIV treatment and management has changed over the years where initially, only advanced AIDS clinical stages were used as criteria to initiate treatment. Following this, guidelines were updated and CD4 count, and viral load levels were revised to allow treatment initiation much earlier in the disease progression. Recently, the UTT strategy is being implemented. Therefore, our overview of systematic reviews will capture evidence covering the period of these varying HIV treatment policies.

Systematic reviews will be defined according to Higgins as follows: a systematic review includes, (a) a clearly stated set of objectives with an explicit, reproducible methodology; (b) a systematic search that attempts to identify all studies that would meet the eligibility criteria; (c) an assessment of the validity of the findings of the included studies (e.g., assessment of risk of bias and confidence in cumulative estimates); and (d) systematic presentation, and synthesis, of the characteristics and findings of the included studies.<sup>39</sup> We will therefore consider a review to be a systematic review if it includes the following:

- 1) Clearly stated objectives and eligibility criteria of studies
- 2) A systematic search that attempts to identify all studies that would meet the eligibility criteria
- 3) Assessed the risk of bias of included studies

### Population

The World Health Organization (WHO) definition of AGYW includes adolescent girls aged 10-19 years old and young women aged 20-24 years old; while the definition of ABYM includes adolescent boys aged 10-19 years old and young men include men aged 15-35 years old. For the purposes of this overview, AGYW are defined as adolescent girls aged 15-19 years and young women aged 20-24 years old; and ABYM are defined as adolescent boys aged 15-19 years and young men aged 15-35 years old. We have defined and

distinguished the ages of young women and men to able to capture interventions and SDMs that specifically address these age groups rather than the general youth or young adults as that may be treated similar to adults in some clinical settings. Thus, this overview will include studies that comprise of AGYW and ABYM diagnosed with HIV. In cases where the systematic review includes both paediatric and older adult populations, it will only be included if the data can be disaggregated by age for the population of interest in this overview. As interventions and models may differ for different groups, and relevant outcomes may be different by age, we will consider categorising the evidence based on the following groupings:

For AGYW the groupings will be 1= (10–14 years), 2= (11–18 years), 3= (15–19 years) 4= (15–24 years), 5= (19–24 years); and ABYM, 1= (15–19 years), 2= (20–24 years), 3= (25–30 years), 4= (31–35 years), 5= (15–24), 6= (25–35 years).

### *Interventions*

This overview will include systematic reviews of studies evaluating interventions or SDMs to improve linkage to and retention in HIV care. These interventions or SDMs might include services promoting ART initiation, facilitating CD4 count testing at point of care, or promoting universal test and treat strategies. They might include community-based, school-based or health facility-based interventions and hybrid models with more than one service delivery points (SDPs). It will include reviews that include studies conducted in any setting and delivered by any provider (for example, healthcare providers, educators [within and outside of school settings], or lay providers).

### *Comparison*

This overview will include reviews of studies in which the interventions or SDMs to promote linkage to and retention in HIV care are compared with any alternative intervention or no intervention, or a standard of care package.

### *Outcomes*

This overview will only include systematic reviews that identify linkage to and retention in HIV care as pre-specified outcomes. Linkage to HIV care is defined as successful linkage to HIV care services within 3 months of HIV positive diagnosis.<sup>36,40-41</sup> However, according to the universal test and treat (UTT) strategy, a shorter period between testing HIV positive and initiating ART is necessary to indicate successful initiation onto ART which can be immediately or within 2 weeks of diagnosis. Therefore, we will include all reviews with the definitions covering the period before and including the period when UTT strategy was introduced. For the purposes of this study, “linkage to HIV care” will be defined as having been linked to HIV care services either by having their CD4 count done (for older reviews) or by having been initiated into ART (for relatively recent reviews) within a specified period after an HIV positive test result.

Retention in care is defined as remaining in contact with HIV care services, once linked to the services, collecting treatment, based on the frequency of clinic visits (varying from 1 month to 1 year), or the number of viral load tests conducted each year.<sup>42-43</sup> This study defines “retention in HIV care” as being

alive and on ART, collecting repeat treatment, based on the frequency of clinic visits (varying from 2 weeks to 1 year), or the number of viral load tests conducted each year after being linked to HIV care.

### Exclusion criteria

We will exclude systematic reviews that:

- Are not in English
- Include only key populations, for example, men who have sex with men, sex worker, intravenous drug users and transgender people.
- Report adherence without our outcomes of interest in the HIV continuum of care
- Describe factors affecting barriers/facilitators or associated factors to linkage and retention in HIV care

### Search methods for identification of studies

This study will not limit the search period by date of publication. We will search five databases: PubMed, Cochrane Database of Systematic Reviews (the Cochrane Library), CINAHL, Web of Science, and Google scholar for grey literature. In general, MEDLINE/PubMed and EMBASE index most systematic reviews.<sup>443</sup> EMBASE is a subscription-based database which we do not have access to. We will search additional regional and subject-specific databases such as CINAHL and Web of Science. The initial search strategy (Table 1 and 2) will be developed for one of the databases, PubMed database, using subject headings and free-text words that describe linkage to HIV care service delivery models. Full search strategy for all databases is included in Supplementary file 1. Search strategies for the other databases will be adapted from the initial strategy accordingly to each database's specific requirements. Language will be restricted to English. References will be managed using Endnote X7.<sup>45</sup> The search strategies were first applied on 01 March 2022 and the data collection is expected to conclude on 30 June 2022.

**Table 1. Developing the search strategy for the overview of systematic reviews**

<b>Time period</b>	No filter
<b>Language</b>	The search strategy will not be filtered by language, however, only systematic reviews published in English will be included.
<b>Setting</b>	Any setting
<b>Study design</b>	Systematic reviews or meta-analyses including randomized controlled trials, non-randomized controlled trials, controlled before and after studies, interrupted time series studies, and other mixed-methods studies (quantitative, qualitative, or mixed).
<b>Search terms</b>	<u>See Table below (search strategy)</u>
<b>No filter</b>	All content related to linkages and service delivery models to HIV care services for AGYW and ABYM for linkage to and retention in HIV care
<b>Databases</b>	PubMed ( <a href="https://www.ncbi.nlm.nih.gov/pubmed/">https://www.ncbi.nlm.nih.gov/pubmed/</a> ) Cochrane library ( <a href="https://www.cochranelibrary.com/">https://www.cochranelibrary.com/</a> ) Cumulative Index to Nursing and Allied Health Literature (CINAHL)

	Web of Science Grey literature (e.g. Google Scholar)
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**Table 2. Search strategy for the overview of systematic reviews (PubMed example, full strategy appended)**

SET		SEARCH TERMS
1	<b>HIV</b>	HIV OR human immune-deficiency virus OR human immunodeficiency virus
2	<b>ART</b>	antiretroviral therapy OR antiretrovirals OR antiretroviral treatment OR Highly Active Antiretroviral Therapy OR ART OR HAART
3	<b>Linkage or retention in care</b>	Linkage OR "Linkage to care" OR "Linkage to HIV care" OR "Referral to care" OR retention OR "retention in HIV care" OR "remaining in HIV care" OR "remaining in care" OR "continuing in care" OR "continuing in HIV care" OR "continuity of patient care" OR Attrition OR dropouts OR "loss to follow-up" OR "lost to care" OR "lost in care" OR initiat* OR start* OR uptake OR "ART initiation" OR modalities
4	<b>Study design</b>	systematic[tiab] OR "systematic review"[tiab] OR meta-analysis [tiab] OR systematic review[pt] OR meta-analysis[pt]
5		Sets 1-4 will be combined with "AND"

### Selection of studies

Search results will be imported into EndNote X7 and duplicates will be removed.<sup>45</sup> The remaining abstracts will be imported into Rayyan and two or more authors will independently screen titles and abstracts to identify relevant studies for full-text review. Rayyan is a web tool designed to speed up the process of screening and selecting studies.<sup>46</sup> Abstracts that are relevant, but reviewers have an unclear (unsure) inclusion status and where two authors have disagreed on inclusion will be moved to full-text screening so that the article can be thoroughly examined for its eligibility status. Two authors will independently screen full text articles for final inclusion using a standardized eligibility screening form. The outcomes of the independent multiple screening will be discussed and if two authors disagree and consensus cannot be reached a third author who is not part of the initial screening team will arbitrate. Reviewers will meet regularly to discuss and resolve any discrepancies arising from the screening of abstracts and full-text articles until consensus is reached.

### Data extraction and management

Two or more reviewers will independently perform data extraction for each review and populate a predefined table (Appendix 1). The predefined table is an excel table developed by the review team to standardize data extraction by the multiple reviewers who will extract the data.

Discrepancies in the data extracted will be resolved by discussion to reach a consensus. If necessary, a third reviewer will be invited to arbitrate.

We will record the following information for each included review: details of the review including the title of the publication, first author's name, year of publication; details of the population included; specific country and settings where the intervention or modalities were implemented; a description and classification of the intervention or SDM (including healthcare provider, implementers of the intervention, lay providers, within or outside of a health facility or school or other details, healthcare context); study designs and a description of the outcome measures. We will also extract number of included participants; median or mean sample size; description of participants (i.e., median, or mean ages, average percent of AGYW and ABYM); and effect measures. We will pilot a data extraction form with two reviewers on three eligible reviews.

We will obtain additional information from the original reports of included studies in the reviews where necessary. These results will be published in appendices in the final manuscript.

### Assessment of methodological quality of included reviews

The methodological quality of each included systematic review will be independently assessed by two reviewers using the validated Risk of Bias In Systematic reviews (ROBIS) tool.<sup>47</sup> A guidance document will be used to ensure consistency between reviewers.

Every domain will be given a rating of Y= "yes", PY= "probably yes", PN= "probably no", N= "no", NI= "no information". Domains that are rated as "no information" will be removed from the denominator in the overall quality ranking. Discrepancies in the ratings of the methodological reviews will be resolved by consensus between the reviewers and, if necessary, arbitration by another reviewer not part of the original quality assessment team. In addition to the quality assessment, we will report on the tools used for quality of evidence in each specific review and record the quality score or assessment.

### Data synthesis and presentation

This study proposes a narrative overview of systematic reviews of interventions and SDMs to link AGYW and ABYM to HIV care services and retain them in HIV care. The primary outcomes for this study are linkage to and retention in HIV care, defined by one or more of the following:

For linkage to HIV care service

1. AGYW and ABYM diagnosed with HIV who are initiated on ART after HIV diagnosis, or who had a CD4 count performed after HIV diagnosis, or AGYW and ABYM initiated on ART within a specified time period after receiving CD4 count results.

For retention in HIV care services

2. AGYW and ABYM who return for routine HIV care checkup after 1 month, 3 months and/ or 6 months since being initiated on ART.
3. AGYW and ABYM who return monthly or regularly for their ART refill.
4. AGYW and ABYM retained in HIV care after 1 month, 3 months and/ or 6 months of an HIV positive diagnosis.



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3 We will present the summary using tables and figures as 'Overview of reviews table', including the  
4 characteristics of included systematic reviews. We will denote systematic reviews that contain  
5 overlapping outcomes using appropriate footnotes. We will report outcomes according to the effect  
6 measures reported in the included reviews and will describe the results with respect to the following  
7 characteristics: setting (country, facility e.g. school or health facility or community), age groups: 15–19  
8 years, 20–24 years for AGYW and same for ABYM with additional 25-30 years and 31-35 years, whether  
9 the interventions are biomedical, behavioral or other, details regarding the intervention using the  
10 template for intervention description and replication (TIDieR) checklist and guide, number of trials  
11 included for each comparison.<sup>48</sup> Presentation of results will align with guidelines in the *Cochrane*  
12 *Handbook of Systematic Reviews of Interventions* and the *Preferred Reporting Items for Systematic*  
13 *Reviews and Meta-Analysis* (PRISMA) statement.<sup>39,49</sup> Further, a PRISMA-P reporting checklist was used for  
14 this protocol.<sup>50</sup> A PRISMA flow diagram will be used to summarize the process of study selection. Summary  
15 tables will be used to present data in a structured format. All descriptive explanations of heterogeneity  
16 provided will be reported by the review authors and highlight cases where descriptive explorations of  
17 heterogeneity are not provided.  
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21 Data will be presented graphically to visually demonstrate the data in terms of quality of evidence, quality  
22 of reviews and the effect sizes where provided. In addition, a section on 'implications for policy and  
23 practice' summarizing the results and evidence base will be presented.  
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### 26 **Subgroup analysis**

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28 In the descriptive analysis, subgroup analyses based on the subgroups described above will be explored  
29 to understand which interventions or service delivery models are most effective in linking and retaining  
30 AGYW and ABYM to HIV care services and which models are not effective.  
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### 33 **Potential limitations**

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35 It is possible that relevant studies may be missed despite using robust search strategies of multiple  
36 databases because of the language restrictions, the restrictions on study type and type of reviews, and  
37 the limited use of grey literature. Despite these limitations, this overview of systematic reviews will  
38 undoubtedly provide rich and useful information as the selected databases offers a wide scope of fields  
39 covering all facets of the review objectives.  
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### 42 **Ethics and dissemination**

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44 Ethics approval is not required for this study as only published secondary data will be used. Our findings  
45 will be disseminated through peer reviewed publication, conference abstracts and through presentations  
46 to public health communities and other community fora.  
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### 49 **Discussion**

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51 This is a proposed narrative overview of systematic reviews on interventions or service models that aimed  
52 to increase or enhance linkage to and retention in HIV care services for AGYW and ABYM. It will identify  
53 effective, evidence-based interventions and SDMs to link AGYW and ABYM to care and retain them in HIV  
54 care. The findings will inform research into the current SDMs which may require adaptations. Our findings  
55 will be of value to healthcare managers, intervention implementers, service providers and policymakers  
56 in HIV care service to improve the current SDMs used to link AGYW and ABYM to HIV care services and  
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3 retain them in these services. This research will also identify gaps in the evidence which will inform  
4 suggestions for future research priorities.  
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7 The results of this overview will help establish an effective SDM for increasing linkage to HIV care services  
8 for AGYW and ABYM and may enhance quality of life. The results will also help inform programmes that  
9 aim to reduce ongoing HIV transmission and reinfection among AGYW and ABYM living with HIV either  
10 through early ART initiation or through immediate identification of HIV related complications, including  
11 early detection of drug resistance or poor adherence. Establishing the effective SDMs for linkage to and  
12 retention in HIV care for AGYW and ABYM will help inform the design of future interventions aiming to  
13 increase uptake of HIV care services, as well as help improve the linkage to care pathways to facilitate  
14 linkage and retention in care among AGYW and ABYM living with HIV. The identified effective SDMs for  
15 linkage to and retention in HIV care services will be key in reducing HIV transmission and reinfection,  
16 thereby reducing the burden of HIV, and improving quality of life and wellbeing among these sub-  
17 populations. Evidence shows that being initiated to ART and retained in HIV care improves health related  
18 quality of life of HIV positive individuals to equate that of HIV negative individuals.<sup>51-53</sup>  
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22 We acknowledge that some studies not published in English may be missed in this overview. However, we  
23 are hopeful that we will find useful and relevant studies with this language restriction because of the  
24 global focus of the overview, (i.e., through its wider geographical coverage as opposed to a restricted  
25 location or region).  
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27  
28

### 29 **Author Contributions**

30 KJ developed the first draft of the manuscript. KJ, BZ, TR, WC, NJ, WB, TMA, DP, DG, FM, CM, EN  
31 reviewed the draft manuscript and provided significant input.  
32  
33

### 34 **Funding**

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36 the Centers for Disease Control and Prevention (CDC) under the terms of the fund number:  
37 NU2GGH002193-01-00.  
38  
39

40 Funders only provided financial support to the review protocol.  
41  
42  
43

### 44 **Competing interests**

45 None declared  
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### 50 **Patient consent**

51 Not required  
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### 54 **Patient and Public Involvement:**

55 No patient involved  
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### Ethics approval

Not required. Only published secondary data will be used in this study.

### Acknowledgement

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**Disclaimer:** The findings and conclusions in this paper are those of the author(s) and do not necessarily represent the official position of the funders.

For peer review only

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# Search Strategy

Database	Search strategy
<b>PubMed</b>	<p>((((((((HIV) OR HIV positive) OR HIV patient) OR HIV-1) OR AIDS)) AND            (((((((Antiretroviral therapy) OR Antiretroviral medication) OR AIDS            medication) OR AIDS treatment) OR ART) OR HAART) OR HIV            treatment)) AND (((((((ART initiation) OR Linkage) OR Linkage to care)            OR Linkage to HIV care) OR Referral to care) OR Intervention) OR            Modalities)) AND (((((((Retention) OR Retention in care) OR Retention            in HIV care) OR ART initiation) OR ART uptake) OR ART retention)) AND            ((Systematic review) OR Meta-analysis)</p>
<b>The Cochrane Library</b>	<p>(HIV OR HIV positive OR HIV patient OR HIV-1 OR AIDS):ti,ab,kw AND            (HIV treatment OR Antiretroviral medication OR AIDS medication OR            AIDS treatment OR ART OR HAART OR HIV treatment):ti,ab,kw AND            (ART initiation OR Linkage OR Linkage to care OR Linkage to HIV care            OR Referral to care OR ART uptake):ti,ab,kw AND (Retention OR            Retention in care OR Retention in HIV care OR ART retention HIV            services OR HIV care modalities OR Linkage to care modalities OR            Retention in care modalities OR Service delivery care modalities OR            Interventions):ti,ab,kw AND (Systematic review OR Meta-            analysis):ti,ab,kw" (Word variations have been searched)</p>



<b>CINHAL</b>	HIV OR human immune-deficiency virus AND antiretroviral therapy OR antiretrovirals OR antiretroviral treatment AND "Linkage to care" OR "Linkage to HIV care" OR "Referral to care" OR "retention in HIV care" AND "systematic review"
<b>Web of Science</b>	((TS=(HIV-1 OR HIV ) AND TS=( antiretroviral therapy OR antiretrovirals OR antiretroviral treatment)) AND TS=( Linkage OR "Linkage to care" OR "Linkage to HIV care" OR "Referral to care")) AND TS=( systematic OR "systematic review" OR meta-analysis ).



# Reporting checklist for protocol of a systematic review and meta analysis.

Based on the PRISMA-P guidelines.

## Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the PRISMA-Preporting guidelines, and cite them as:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1.

**Protocol title: Service delivery models for enhancing linkage to and retention in HIV care services for adolescent girls and young women and adolescent boys and young men: A protocol for an overview of systematic reviews**

		Reporting Item	Page Number
<b>Title</b>			
Identification	<a href="#">#1a</a>	Identify the report as a protocol of a systematic review	Page 1
Update	<a href="#">#1b</a>	If the protocol is for an update of a previous systematic review, identify as such	N/A
<b>Registration</b>			
	<a href="#">#2</a>	If registered, provide the name of the registry (such as PROSPERO) and registration number	Page 2

## Authors

1	Contact	<a href="#">#3a</a>	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	Page 1
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6	Contribution	<a href="#">#3b</a>	Describe contributions of protocol authors and identify the guarantor of the review	Page 12
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10	<b>Amendments</b>			
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12		<a href="#">#4</a>	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	N/A
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19	<b>Support</b>			
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21	Sources	<a href="#">#5a</a>	Indicate sources of financial or other support for the review	Page 12
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25	Sponsor	<a href="#">#5b</a>	Provide name for the review funder and / or sponsor	Page 12
26				
27	Role of sponsor or funder	<a href="#">#5c</a>	Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol	Page 12
28				
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31	<b>Introduction</b>			
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34	Rationale	<a href="#">#6</a>	Describe the rationale for the review in the context of what is already known	Page 3-5
35				
36				
37	Objectives	<a href="#">#7</a>	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	Page 5
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43	<b>Methods</b>			
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45	Eligibility criteria	<a href="#">#8</a>	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	Page 5-7
46				
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52	Information sources	<a href="#">#9</a>	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	Page 8
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1	Search strategy	<a href="#">#10</a>	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	Page 8-9 & additional file
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6	Study records -	<a href="#">#11a</a>	Describe the mechanism(s) that will be used to manage records and data throughout the review	Page 9
7	data management			
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10	Study records -	<a href="#">#11b</a>	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	Page 9-10
11	selection process			
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17	Study records -	<a href="#">#11c</a>	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	Page 10
18	data collection			
19	process			
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24	Data items	<a href="#">#12</a>	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	Page 6-7
25				
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29	Outcomes and	<a href="#">#13</a>	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	Page 10
30	prioritization			
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34	Risk of bias in	<a href="#">#14</a>	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	Page 10
35	individual studies			
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41	Data synthesis	<a href="#">#15a</a>	Describe criteria under which study data will be quantitatively synthesised	N/A. This is a narrative synthesis
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46	Data synthesis	<a href="#">#15b</a>	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I <sup>2</sup> , Kendall's $\tau$ )	N/A
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55	Data synthesis	<a href="#">#15c</a>	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	N/A
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1	Data synthesis	<a href="#">#15d</a>	If quantitative synthesis is not appropriate, describe the type of summary planned	Page 10-11
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3				
4	Meta-bias(es)	<a href="#">#16</a>	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	N/A
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10	Confidence in cumulative evidence	<a href="#">#17</a>	Describe how the strength of the body of evidence will be assessed (such as GRADE)	N/A
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15 None The PRISMA-P elaboration and explanation paper is distributed under the terms of the Creative  
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17 <https://www.goodreports.org/>, a tool made by the [EQUATOR Network](#) in collaboration with  
18 [Penelope.ai](#)  
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