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## Effectiveness of school-based interventions in delaying sexual debut among adolescents in sub-Saharan Africa: A protocol for a systematic review and meta-analysis

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3 1 Effectiveness of school-based interventions in delaying sexual debut among adolescents in sub-  
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5 2 Saharan Africa: A protocol for a systematic review and meta-analysis  
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10 4 Short Title: School-based interventions and sexual debut  
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**Target journal: BMJ open****19 Abstract**

20 **Introduction:** Early sexual debut is associated with poor sexual and reproductive health outcomes  
21 across the life course. A majority of interventions aimed at delaying sexual debut among  
22 adolescents in sub-Saharan Africa (SSA) have been implemented in schools with mixed findings  
23 on the effectiveness of such interventions. This systematic review will summarize and synthesize  
24 existing evidence on the effectiveness of school-based interventions in delaying sexual debut  
25 among adolescents aged 10 – 19 years.

26 **Methods and analysis:** We will conduct a comprehensive database search of peer-reviewed  
27 studies published in PubMed, Scopus, Science Direct, Web of Science, HINARI and EBSCO  
28 (PsycINFO, Global Health, CINAHL), and in Cochrane library, National Institute of Health (NIH),  
29 and Turning Research into Practice (TRIP) databases for ongoing studies yet to be published. All  
30 studies conducted in SSA between January 2009 and December 2019, regardless of the study  
31 design, will be considered. Two authors will independently screen all retrieved records and  
32 relevant data on sexual debut extracted.

33 Data will be pooled using the random effects model. Dichotomous outcomes will be reported as  
34 risk ratios and continuous data as mean difference at 95% confidence interval. Heterogeneity will  
35 be assessed using the  $I^2$  statistic. Findings will be presented in tables and charts, while providing a  
36 description of all included studies, themes and concepts drawn from literature.

37 **Ethics and dissemination:** Ethical approval is not required. The findings will be disseminated  
38 through peer-reviewed publications, presentations at relevant conferences, and other convening  
39 focusing on adolescent sexual and reproductive health.

**40 Strengths and limitations of this study**

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3 41       • This review will synthesise evidence of school-based interventions on delaying sexual  
4  
5 42       debut among adolescents in sub-Saharan Africa.  
6  
7  
8 43       • The systematic review will adhere to the Preferred Reporting Items for Systematic Reviews  
9  
10 44       and Meta-Analyses (PRISMA) guidelines  
11  
12 45       • There is a possibility only a small number of diverse studies will be eligible for inclusion  
13  
14 46       in this review, and thus, limited and heterogeneous data for meta-analysis.  
15  
16  
17 47       • This review will be limited to peer-reviewed studies, published in English between January  
18  
19 48       2009 and December 2019  
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51 Adolescents aged 10-19 years in sub-Saharan Africa's (SSA) have a high prevalence of risky  
52 sexual behaviours including early sexual debut and unsafe sexual practices ([1](#), [2](#)). Consequently,  
53 they are most-at-risk for poor sexual and reproductive health (SRH) outcomes ([3-5](#)).  
54 Early sexual debut, described as having had the first sexual intercourse at or before the age of 14  
55 years, increases the period in which an adolescent girl is at risk of getting pregnant ([6](#), [7](#)) and is  
56 predominantly driven by individual, familial, contextual and socio-cultural factors ([8-10](#)). Early  
57 sexual debut is also associated with occurrence of sexual violence, unsafe abortions, unplanned  
58 pregnancies, early child marriages, sexually transmitted infections, and HIV infection ([11-13](#)),  
59 elevated risk of cervical cancer ([14](#), [15](#)) and poor schooling outcomes ([11](#), [16](#), [17](#)).

60 Implications of early sexual debut disproportionately affect women and girls, impacting on  
61 their health, socio-economic lives and overall wellbeing across the life course ([18-26](#)). For  
62 instance, young girls who get pregnant at an early age are likely to drop out of school increasing  
63 their risk of poor educational and other socio-economic outcomes ([27](#), [28](#)). Young girls are also at  
64 greater risk of poor maternal outcomes compared with older women. A review of maternal  
65 mortality among adolescents compared with women of other ages in 144 countries revealed a  
66 three-fold higher mortality risk among adolescent mothers compared to women above 30 years  
67 ([2](#)). Similarly, adolescents have higher risk of adverse perinatal outcomes, including low  
68 birthweight, preterm delivery, and perinatal death ([29-31](#)). The strong association between poor  
69 maternal education and poor child-health outcomes such as experiencing severe acute  
70 malnutrition, infections as well as poor cognitive growth ([32-34](#)), implies that the consequences  
71 of early sexual debut transcends generations. Delaying sexual debut is, therefore, a key strategy in  
72 averting poor SRH outcomes during and after adolescence.

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3 73 School is one institution where most adolescents spend most of their time, learning and  
4  
5 74 interacting with peers and adults. Critical thinking developed in schools can be useful for  
6  
7  
8 75 questioning unhealthy behaviours. Schools thus offer a platform for socialization into healthy and  
9  
10 76 unhealthy behaviours (35). As attention turns towards meeting the Sustainable Development Goals  
11  
12 77 (SDGs), the global health community is increasingly committed to adolescent SRH as a  
13  
14  
15 78 prerequisite for improving lives and health of young people (36). This commitment is exemplified  
16  
17 79 by the vast number of diverse school-based interventions targeted at promoting adolescent SRH  
18  
19 80 across the globe, with limited but growing interest in SSA. For instance, schools are being targeted  
20  
21  
22 81 as sites for provision of age-appropriate comprehensive sexuality education that facilitates  
23  
24 82 improved self-efficacy, knowledge and life skills (37-39). Other related school-based interventions  
25  
26 83 such as school fees waivers, supply of menstrual products for girls, school feeding programs for  
27  
28 84 vulnerable populations are also being implemented (40, 41).

30  
31 85 However, impact evaluations of school-based interventions on delaying sexual debut suggest  
32  
33 86 mixed findings (40, 42-44). Within high-income countries, the majority of school-based  
34  
35 87 interventions have shown effectiveness in delaying sexual debut (42-44). Similarly, a systematic  
36  
37 88 review and meta-analysis on school based sex education and HIV prevention in low-and middle-  
38  
39 89 income countries globally found that students who received the interventions were less likely to  
40  
41 90 initiate sexual activity (45). In a cluster randomized controlled trial assessing the effects of teacher-  
42  
43 91 led school HIV prevention programs on adolescent sexual risk behaviour in Dar es Salaam,  
44  
45 92 Tanzania and Cape town and Mankweng, South Africa students in Tanzania reported delay in  
46  
47 93 initiating sexual activity during the study while there was no effect of the intervention among  
48  
49 94 students in South Africa (46). Other studies found no significant effects of school-based  
50  
51 95 interventions on delaying sexual debut (47, 48) while others found significant effects (49, 50) found  
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96 significant effects. These conflicting findings suggests a need for a comprehensive review of  
97 school-based interventions to assess their effectiveness on delaying sexual debut.

98 Taken together, these factors underscore the need to synthesize existing studies, and explore  
99 the linkages between school-based interventions and early sexual debut in an attempt to inform  
100 future adolescent health policies and programing. This systematic review will provide a critical  
101 synthesis of existing literature on school-based interventions aimed at delaying early sexual debut  
102 among adolescents in SSA, to inform programs, policy and research. The objective of the review  
103 is to evaluate the effects of school-based interventions on delaying sexual debut among adolescents  
104 in SSA.

**105 Methods and design**

106 This systematic review and meta-analysis will be developed in accordance with the Preferred  
107 Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) ([51](#)). Criteria  
108 for considering studies will include study population, type of interventions, type of outcome  
109 measures, and type of studies, and study setting, as described in the sections that follow. Important  
110 amendments made to this protocol will be documented and published alongside the results of the  
111 systematic review.

*112 Study population*

113 The study targets adolescent students aged 10 – 19 years in primary or secondary levels of  
114 education or their equivalents who participated in a school-based intervention to delay sexual  
115 debut. Studies with students younger than 10 years and/or older than 19 years, as maybe in some  
116 settings, will be included if the majority of participants (i.e. above 50%) are aged between 10 and  
117 19 years. Studies that do not include students aged 10 – 19 years will be excluded from the review.

*118 Types of interventions*

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119 All interventions with a school-based component irrespective of intervention content and  
 120 instruction mode will be considered as long as they assessed sexual debut as a primary or secondary  
 121 outcome. This includes interventions that are school-based only and delivered in primary and  
 122 secondary schools, and those that have multiple components, one of which must be a school-based  
 123 component while the other components are delivered elsewhere (e.g. health care facilities). The  
 124 intervention must have reported on sexual debut as a primary or secondary outcome. Interventions  
 125 that target students outside the school setting will be excluded.

126 *Types of outcome*

127 The primary outcome of interest is delayed sexual debut, defined as postponement of sexual  
 128 intercourse among participants who had not engaged in sexual intercourse prior to the school-  
 129 based intervention. Secondary outcomes shown in Table 1 will be considered:

130 **Table 1: Secondary outcomes**

Secondary outcomes	Definitions
Intention to delay sex	Planning to wait to have sexual intercourse until older
Lifetime sexual activity	Ever engaged in sexual intercourse
Sexually active	Having engaged in sexual intercourse in the last 30 days
Current sexual activity	Having engaged in sexual intercourse in the last six months
Sexual health knowledge	Knowledge of key SRH topics and issues
Sexual attitude	Attitudes towards sexuality and sexual behaviour
Self-efficacy for safe sex practices	Confidence to say no to unsafe sex practices
Consistent condom use	Condom use at every sexual intercourse

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Number of sex-partners	Number of sex partners (regular and casual) in a specified period of time
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131

132 *Types of studies*

133 The review will not be limited to studies using a specific design and meta-analytical approaches  
 134 that take into consideration different study designs will be used in the analysis. We will also  
 135 compare the effectiveness of the interventions by study design. Eligible studies will have been  
 136 published in peer reviewed journals between January 2009 and December 2019. Only studies  
 137 published in English will be considered.

138 *Study setting*

139 Only studies conducted in SSA will be considered. Given the population of interest, the review  
 140 will focus on interventions implemented in primary and secondary schools or their equivalents.  
 141 This review focuses on the period after the global momentum on the need for comprehensive  
 142 sexuality education began. In 2008, Latin America and the Caribbean signed the Preventing  
 143 through Education Declaration for the delivery of sexuality education and health services ([52](#)). In  
 144 2013, there was a Ministerial Commitment on CSE and SRH services for adolescents and young  
 145 people in 20 countries across Eastern and Southern Africa ([53](#)).

146 *Search strategy*

147 Our search strategy will involve three methods:

- 148 • Electronic searches - four researchers will search five electronic databases including  
 149 PubMed, Scopus, Science Direct, Web of Science and EBSCO (PsycINFO, Global Health,  
 150 CINAHL) for published peer-reviewed journal articles. Cochrane library, National

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2  
3 151 Institute of Health (NIH), and Turning Research into Practice (TRIP) databases will be  
4  
5 152 searched for ongoing studies that are yet to be published.

- 6  
7  
8 153 • Hand-searches – An iterative process to obtain additional studies not yet retrieved with our  
9  
10 154 initial online database using the reference list of retrieved articles  
11  
12 155 • Contacting authors and experts - Where published data are not sufficient, authors will be  
13  
14 156 contacted for additional information  
15  
16

17 157 While the exact search terms will vary by database, the four search components included will be  
18  
19 158 (1) adolescents (2) sexual debut (3) school-based interventions (4) and sub-Saharan Africa. Search  
20  
21 159 terms will be adapted for each bibliographic database in combination with database-specific filters.  
22  
23 160 Boolean operators ‘OR’, ‘NOT’ and ‘AND’ will be used to maximize or narrow the specificity for  
24  
25 161 the search. Wildcards will be used to search for variations or alternate spellings of key concepts.  
26  
27 162 As an example, we present a draft of search strategy to be used in PubMed below:  
28  
29

- 30  
31 163 1. (intervention[Title/Abstract]) OR (program\*[Title/Abstract])  
32  
33 164 2. (school[Title/Abstract]) OR (institution[Title/Abstract]) OR (academic[Title/Abstract])  
34  
35 165 OR (education[Title/Abstract])  
36  
37 166 3. (sexual debut[Title/Abstract]) OR (sexual initiation[Title/Abstract]) OR (sexual  
38  
39 167 delay[Title/Abstract]) OR (sexual activity [Title/Abstract])  
40  
41 168 4. (adolesce\*[Title/Abstract]) OR ("young people"[Title/Abstract]) OR  
42  
43 169 (youth[Title/Abstract]) OR (teenage\*[Title/Abstract]) OR (learner[Title/Abstract]) OR  
44  
45 170 (children[Title/Abstract])  
46  
47 171 5. (Africa south of the Sahara [MeSH Terms]) OR (Africa [MeSH Terms])  
48  
49 172 6. ("2009/01/01"[Date - Publication]: "2019/12/31"[Date - Publication])  
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**Target journal: BMJ open****174 Data collection****175 Selection of studies**

176 Four reviewers, paired, will independently screen retrieved titles and abstracts of potential articles  
177 to determine their eligibility for inclusion in the review. Rayyan, a web application tool will be  
178 used to manage the screening process (54). Full article texts of included studies will then be  
179 obtained and reviewed to ascertain eligibility. Any disagreements during title and abstract review  
180 or during the full text review will be resolved by consensus. A third reviewer will be involved if a  
181 consensus is not reached by the two pairs of reviewers.

**182 Data extraction and management**

183 Two reviewers will use a standardized data extraction form to independently extract data on  
184 background or process-oriented information from each included study to provide a basis for data  
185 charting, themes and variables for use in answering the research question. Reviewers will pilot the  
186 data extraction form with a sample of included papers and amendments will be made as necessary.  
187 All information will be drawn from the studies highly scored based on the quality of their  
188 methodology, robustness of results and level of evidence. From each relevant study, data will be  
189 extracted on the following domains:

- 190 • General information on the study: authors, date of publication, publication type, country,  
191 and funding source
- 192 • Study characteristics: study setting, location, study design, sampling frame and sampling  
193 methods, and year(s) of study implementation
- 194 • Participant characteristics: age, gender, number of participants, participants lost to follow-  
195 up, length of follow-up

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196 • Intervention: detailed description of the intervention, composition of intervention and  
197 control groups

198 Outcomes: for primary outcome (delay in sexual debut), data on the number of participants  
199 experiencing delayed sexual debut on both intervention versus control arms will be extracted. If a  
200 summary estimate (e.g., risk ratio) is reported instead of raw numbers, these will be extracted. A  
201 similar approach will be used for secondary outcomes. Where more than one article described the  
202 same intervention, data will be extracted from all papers. The eligible studies will be exported into  
203 the comprehensive meta-analysis (CMA) software.

*Risk of bias assessment*

205 Two independent reviewers will assess the methodological quality of studies depending on study  
206 design. For RCTs, the reviewers will judge each quality domain based on the following three-point  
207 scale as suggested in Cochrane Handbook for Systematic Reviews of Interventions (55): Yes (low  
208 risk of bias: plausible bias unlikely to seriously alter the results if all criteria were met); No (high  
209 risk of bias: plausible bias that seriously weakens confidence in the results if one or more criteria  
210 were not met); and Unclear (plausible bias that raises some doubt about the results if one or more  
211 criteria were assessed as unclear. The following items in the risk of bias assessment for RCTs will  
212 be included:

- 213 • Sequence generation (whether allocation sequence was adequately generated)
- 214 • Allocation concealment (whether allocation was adequately concealed)
- 215 • Masking/ blinding (whether knowledge of the allocated intervention was adequately  
216 prevented during the study, i.e., whether participants, personnel, outcome assessors and/or  
217 data analysts are blinded)

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2  
3 218 • Incomplete outcome reporting (whether incomplete outcome data was adequately  
4  
5 219 addressed)  
6  
7  
8 220 • Selective reporting (whether reports of the study were free of selective outcome reporting)  
9  
10 221 • Other sources of data (e.g., whether reports of the study included sample size computation,  
11  
12 222 alpha error, etc.)  
13  
14

15 223 For non-RCT studies, the following items will be included in the risk of bias assessment as  
16  
17 224 suggested by [Viswanathan, Berkman, Dryden et al. \(56\)](#):  
18

- 19 225 • Selection bias – do the inclusion/exclusion criteria vary across the comparison groups (for  
20  
21 226 multiple-arm studies) or within groups (for single arm/cross-sectional studies)?  
22  
23 227 Performance bias – does the study fail to account for important variations in the execution  
24  
25 228 of the study from the proposed protocol?  
26  
27  
28 229 • Detection bias - was the assessor not blinded to the outcome, exposure, or intervention  
29  
30 230 status of the participants? Were valid and reliable measures not used or not implemented  
31  
32 231 consistently across all study participants to assess inclusion/exclusion criteria,  
33  
34 232 intervention/exposure outcomes, participant benefits and harms?  
35  
36  
37 233 • Attrition bias – was the length of follow-up different across study groups? In cases of  
38  
39 234 missing data was the impact not assessed (e.g., through sensitivity analysis or other  
40  
41 235 adjustment method)?  
42  
43  
44 236 • Selective outcome reporting - Are any important primary outcomes missing from the  
45  
46 237 results?  
47  
48  
49 238 • Overall assessment: Are the results believable taking study limitations into consideration?  
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239 Discussions and consensus will be used to crosscheck the extracted information and to  
240 resolve disagreements. The level of risk of bias in each of these domains will be presented  
241 separately for each study in tables in the final review publication.

*242 Risk of bias in individual studies*

243 Methodological quality of each individual article will be appraised using a checklist adapted from  
244 Critical Appraisals Skills Programme (CASP). Two authors will independently appraise each  
245 article.

*246 Measures of intervention effect*

247 Dichotomous outcomes such as sexual debut (initiated versus not initiated sexual activity during  
248 the study period) will be summarized as risk ratios or odds ratio with 95% confidence intervals for  
249 each study. Continuous outcomes such as number of sex partners will be summarized as  
250 (unstandardized) mean differences and standard errors. In cases where sexual debut may be  
251 reported as a median age at sexual debut, published procedures for transforming median to mean  
252 and standard deviation to facilitate computation of relevant statistics will be used. If enough  
253 information is not provided to calculate an effect size, study authors will be contacted for  
254 clarification or to provide additional statistics. If the authors do not provide this information after  
255 one month, this study will be removed from the analysis but this effort will be reported.

256 If results of a repeated measure analysis are reported, authors will need to provide the  
257 correlation between pre-post measurements or provide enough information to calculate the  
258 correlation between measurements. If these statistics are not available, either in publication or after  
259 request, and the study was a controlled design, an effect size will be generated using post-  
260 intervention statistics provided groups are similar at baseline with respect to the outcome of  
261 interest and other relevant covariates.



**Target journal: BMJ open**262 *Unit of analysis*

263 Data will be extracted from each included study (unit of analysis) as follows. For dichotomous  
264 variables, number of participants in the intervention group and the number of participants in the  
265 standard/control group will be used. For continuous variables, the mean, standard deviation, and  
266 the number of participants in the intervention and control groups will be used. For studies with  
267 multiple intervention groups, each pair-wise comparison will be included separately. Moreover,  
268 for dichotomous outcomes, we will divide both the number of events and the total number of  
269 participants. For continuous outcomes, means and standard deviations will not be changed but will  
270 be divided by the total number of participants.

271 *Assessment of heterogeneity*

272 Heterogeneity among studies and between subgroups will be assessed using a Chi<sup>2</sup> test with a  
273 significance level at  $p < 0.10$ . The degree of heterogeneity among studies and between subgroups  
274 will be assessed using the I<sup>2</sup> statistic using the following guide: I<sup>2</sup> = 0% to 40% as heterogeneity  
275 that might not be important, I<sup>2</sup> = 30% to 60% as moderate heterogeneity, I<sup>2</sup> = 50% to 90% as  
276 substantial heterogeneity, and I<sup>2</sup> = 75% to 100% as considerable heterogeneity ([57](#))

277 *Assessment of reporting bias*

278 Publication bias will be assessed if at least 10 studies are included in the review. A funnel plot will  
279 be used to assess the magnitude of reporting bias as per Cochrane guidelines.

280 **Data synthesis**

281 Data will be pooled using the random effects model according to Chapter 9 of the *Cochrane*  
282 *Handbook for Systematic Reviews of Interventions* ([57](#)). Dichotomous outcomes' data (e.g.,  
283 number of participants who experience sexual debut) will be reported as risk ratios and continuous  
284 data (e.g., number of sexual partners) as mean differences. All analyses will be done at 95%

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3 285 confidence intervals. Data will be analysed using the statistical software Comprehensive Meta-  
4  
5 286 Analysis (CMA). In studies where the effects of clustering have not been taken into account,  
6  
7  
8 287 standard deviations will be adjusted for the design effect, using intra-class coefficients, if they are  
9  
10 288 provided in the study reports, or alternatively using external estimates obtained from similar  
11  
12 289 studies. Stratifications will be done by school level (primary or secondary (or age, if applicable),  
13  
14 290 grade level, instructor (e.g., teacher or peer), intervention type (e.g. behaviour change  
15  
16  
17 291 communication, study setting)

18  
19 292 Findings will be organised in tables and charts, while presenting a description of the themes  
20  
21 293 and concepts found in literature reflecting the review objectives. A summary narrative that  
22  
23 294 synthesizes the information across tables and charts will be developed, critically highlighting the  
24  
25  
26 295 advances and gaps in research, with a focus to draw implications for future research.

**296 Patient and public involvement**

27  
28  
29  
30  
31 297 Patients and public will not be involved in the design and conduct of this review  
32

**33 Ethics and dissemination**

34  
35 299 Ethics approval is not required. The findings of this systematic review will be disseminated  
36  
37 300 through peer-reviewed publications as well as in relevant stakeholders' fora. In case of any  
38  
39 301 amendments to the protocol following its publication, the date of each amendment will be  
40  
41 302 provided, change(s) described, and report the rationale for the change(s) in future publications  
42  
43  
44 303 arising from this protocol.  
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**Target journal: BMJ open**

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3 459 **Author contribution:** BWM, KJ, EKI and JO contributed to the conceptualization, and  
4  
5 460 development of the protocol. BWM and KJ provided the initial draft of the protocol. HW and  
6  
7 461 CWK provided a critical review of protocol. All authors read and approved the final draft of the  
8  
9 462 protocol.

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19 466 **Competing interests:** None declared

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21 467 **Patients consent for publication:** Not required

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26 469 contributions and references

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## PRISMA-P 2015 Checklist

This checklist has been adapted for use with protocol submissions to *Systematic Reviews* from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>ADMINISTRATIVE INFORMATION</b>					
<b>Title</b>					
Identification	1a	Identify the report as a protocol of a systematic review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1 - 2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
<b>Registration</b>	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not registered
<b>Authors</b>					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	<input checked="" type="checkbox"/>	<input type="checkbox"/>	6 - 15
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	447 - 450
<b>Amendments</b>	4	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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	98 - 100
<b>Support</b>					
Sources	5a	Indicate sources of financial or other support for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	451 - 452
Sponsor	5b	Provide name for the review funder and/or sponsor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	451 - 452
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	<input checked="" type="checkbox"/>	<input type="checkbox"/>	451 - 452
<b>INTRODUCTION</b>					
<b>Rationale</b>	6	Describe the rationale for the review in the context of what is already known	<input checked="" type="checkbox"/>	<input type="checkbox"/>	74 - 91
<b>Objectives</b>	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	91 - 93

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>METHODS</b>					
<b>Eligibility criteria</b>	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	95 - 134
<b>Information sources</b>	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	135 - 151
<b>Search strategy</b>	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	<input checked="" type="checkbox"/>	<input type="checkbox"/>	152 - 161
<b>STUDY RECORDS</b>					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	164 - 192
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	164 - 170
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	<input checked="" type="checkbox"/>	<input type="checkbox"/>	172 - 177
<b>Data items</b>	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	177 - 192
<b>Outcomes and prioritization</b>	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	<input checked="" type="checkbox"/>	<input type="checkbox"/>	115 - 119
<b>Risk of bias in individual studies</b>	14	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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	193- 230
<b>DATA</b>					
<b>Synthesis</b>	15a	Describe criteria under which study data will be quantitatively synthesized	<input checked="" type="checkbox"/>	<input type="checkbox"/>	270 - 285
	15b	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 (e.g., $I^2$ , Kendall's tau)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	235 - 265
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	275 - 277
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	<input checked="" type="checkbox"/>	<input type="checkbox"/>	282 - 285
<b>Meta-bias(es)</b>	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	276 - 281
<b>Confidence in cumulative evidence</b>	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	231 - 234

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For peer review only

# BMJ Open

## Effectiveness of school-based interventions in delaying sexual debut among adolescents in sub-Saharan Africa: A protocol for a systematic review and meta-analysis

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2020-044398.R1
Article Type:	Protocol
Date Submitted by the Author:	12-Mar-2021
Complete List of Authors:	Maina, Beatrice; African Population and Health Research Center, Population Dynamics and Reproductive Health; University of the Witwatersrand Faculty of Health Sciences, School of Public Health Juma, Kenneth ; African Population and Health Research Center, Population Dynamics and Sexual Reproductive Health Igonya, Emmy; African Population and Health Research Center, PDRH Osindo, Jane; African Population and Health Research Center Wao, Hesborn; African Population and Health Research Center Kabiru, Caroline; African Population and Health Research Center
<b>Primary Subject Heading</b>:	Public health
Secondary Subject Heading:	Sexual health, Global health
Keywords:	PUBLIC HEALTH, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Community child health < PAEDIATRICS

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3 1 Effectiveness of school-based interventions in delaying sexual debut among adolescents in sub-  
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10 4 Short Title: School-based interventions and sexual debut  
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14 6 Authors: Beatrice W. Maina<sup>1</sup>, Kenneth Juma<sup>1</sup>, Emmy Kageha Igonya<sup>1</sup>, Jane Osindo<sup>1</sup>, Hesborn  
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## 19 **Abstract**

20 **Introduction:** Early sexual debut is associated with poor sexual and reproductive health outcomes  
21 across the life course. A majority of interventions aimed at delaying sexual debut among  
22 adolescents in sub-Saharan Africa (SSA) have been implemented in schools with mixed findings  
23 on the effectiveness of such interventions. This systematic review will summarize and synthesize  
24 existing evidence on the effectiveness of school-based interventions in delaying sexual debut  
25 among adolescents aged 10 – 19 years.

26 **Methods and analysis:** We will conduct a comprehensive database search of peer-reviewed  
27 studies published in PubMed, Scopus, Science Direct, Web of Science, HINARI and EBSCO  
28 (PsycINFO, Global Health, CINAHL), and in Cochrane library, National Institute of Health (NIH),  
29 and Turning Research into Practice (TRIP) databases for ongoing studies yet to be published. All  
30 studies conducted in SSA between January 2009 and December 2020, regardless of the study  
31 design, will be included. Two authors will independently screen all retrieved records and relevant  
32 data on sexual debut extracted.

33 Data will be pooled using the random effects model. Dichotomous outcomes will be reported as  
34 risk ratios and continuous data as mean difference at 95% confidence interval. Heterogeneity will  
35 be assessed using the  $I^2$  statistic. Findings will be presented in tables and charts, while providing a  
36 description of all included studies, themes and concepts drawn from literature.

37 **Ethics and dissemination:** Ethical approval is not required. The findings will be disseminated  
38 through peer-reviewed publications, presentations at relevant conferences, and other convening  
39 focusing on adolescent sexual and reproductive health.

40 **Strengths and limitations of this study**

- 1  
2  
3 41 • To the best of our knowledge, this is the first systematic review and meta-analysis to focus  
4  
5 42 on the effectiveness of school-based interventions on delaying sexual debut among  
6  
7 43 adolescents in sub-Saharan Africa.  
8  
9  
10 44 • The systematic review and meta-analysis includes all interventions with a school-based  
11  
12 45 component regardless of the study design used in the study.  
13  
14  
15 46 • The systematic review and meta-analysis will adhere to the Preferred Reporting Items for  
16  
17 47 Systematic Reviews and Meta Analyses (PRISMA) guidelines.  
18  
19  
20 48 • To minimise the likelihood of reviewer bias, two reviewers will screen for study eligibility  
21  
22 49 and perform the quality assessment.  
23  
24 50 • This review will be limited to peer-reviewed studies, published in English between January  
25  
26 51 2009 and December 2020  
27  
28  
29 52

## 53 **Background**

54 Adolescents aged 10-19 years in sub-Saharan Africa's (SSA) have a high prevalence of risky  
55 sexual behaviours including early sexual debut and unsafe sexual practices ([1](#), [2](#)). Consequently,  
56 they are most-at-risk for poor sexual and reproductive health (SRH) outcomes ([3-5](#)).

57 Early sexual debut, described as having had the first sexual intercourse at or before the age of 14  
58 years, increases the period in which an adolescent girl is at risk of getting pregnant ([6](#), [7](#)) and is  
59 predominantly driven by individual, familial, contextual and socio-cultural factors ([8-10](#)). Early  
60 sexual debut is also associated with occurrence of sexual violence, unsafe abortions, unplanned  
61 pregnancies, early child marriages, sexually transmitted infections, and HIV infection ([11-13](#)),  
62 elevated risk of cervical cancer ([14](#), [15](#)) and poor schooling outcomes ([11](#), [16](#), [17](#)).

63 Implications of early sexual debut disproportionately affect women and girls, impacting on  
64 their health, socio-economic lives and overall wellbeing across the life course ([18-26](#)). For  
65 instance, young girls who get pregnant at an early age are likely to drop out of school increasing  
66 their risk of poor educational and other socio-economic outcomes ([27](#), [28](#)). Young girls are also at  
67 greater risk of poor maternal outcomes compared with older women. A review of maternal  
68 mortality among adolescents compared with women of other ages in 144 countries revealed a  
69 three-fold higher mortality risk among adolescent mothers compared to women above 30 years  
70 ([2](#)). Similarly, adolescents have higher risk of adverse perinatal outcomes, including low  
71 birthweight, preterm delivery, and perinatal death ([29-31](#)). The strong association between poor  
72 maternal education and poor child-health outcomes such as experiencing severe acute  
73 malnutrition, infections as well as poor cognitive growth ([32-34](#)), implies that the consequences  
74 of early sexual debut transcends generations. Delaying sexual debut is, therefore, a key strategy in  
75 averting poor SRH outcomes during and after adolescence.

1  
2  
3 76 School is one institution where most adolescents spend most of their time, learning and  
4  
5 77 interacting with peers and adults. Critical thinking developed in schools can be useful for  
6  
7 78 questioning unhealthy behaviours. Schools thus offer a platform for socialization into healthy and  
8  
9 79 unhealthy behaviours (35). As attention turns towards meeting the Sustainable Development Goals  
10  
11 80 (SDGs), the global health community is increasingly committed to adolescent SRH as a  
12  
13 81 prerequisite for improving lives and health of young people (36). This commitment is exemplified  
14  
15 82 by the vast number of diverse school-based interventions targeted at promoting adolescent SRH  
16  
17 83 across the globe, with limited but growing interest in SSA. For instance, schools are being targeted  
18  
19 84 as sites for provision of age-appropriate comprehensive sexuality education that facilitates  
20  
21 85 improved self-efficacy, knowledge and life skills (37-39). Other related school-based interventions  
22  
23 86 such as school fees waivers, supply of menstrual products for girls, school feeding programs for  
24  
25 87 vulnerable populations are also being implemented (40, 41).

26  
27  
28  
29  
30  
31 88 However, impact evaluations of school-based interventions on delaying sexual debut suggest  
32  
33 89 mixed findings (40, 42-44). Within high-income countries, the majority of school-based  
34  
35 90 interventions have shown effectiveness in delaying sexual debut (42-44). Similarly, a systematic  
36  
37 91 review and meta-analysis on school based sex education and HIV prevention in low-and middle-  
38  
39 92 income countries globally found that students who received the interventions were less likely to  
40  
41 93 initiate sexual activity (45). In a cluster randomized controlled trial assessing the effects of teacher-  
42  
43 94 led school HIV prevention programs on adolescent sexual risk behaviour in Dar es Salaam,  
44  
45 95 Tanzania and Cape town and Mankweng, South Africa students in Tanzania reported delay in  
46  
47 96 initiating sexual activity during the study while there was no effect of the intervention among  
48  
49 97 students in South Africa (46). Other studies found no significant effects of school-based  
50  
51 98 interventions on delaying sexual debut (47, 48) while others found significant effects (49, 50) found  
52  
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1  
2  
3 99 significant effects. These conflicting findings suggests a need for a comprehensive review of  
4  
5 100 school-based interventions to assess their effectiveness on delaying sexual debut.  
6

7  
8 101 Taken together, these factors underscore the need to synthesize existing studies, and explore  
9  
10 102 the linkages between school-based interventions and early sexual debut in an attempt to inform  
11  
12 103 future adolescent health policies and programing. This systematic review will provide a critical  
13  
14 104 synthesis of existing literature on school-based interventions aimed at delaying early sexual debut  
15  
16 105 among adolescents in SSA, to inform programs, policy and research. The objective of the review  
17  
18 106 is to evaluate the effects of school-based interventions on delaying sexual debut among adolescents  
19  
20  
21 107 in SSA.  
22

## 23 24 108 **Methods and design**

25  
26 109 This systematic review and meta-analysis will be developed in accordance with the Preferred  
27  
28 110 Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) ([51](#)). Criteria  
29  
30 111 for considering studies will include study population, type of interventions, type of outcome  
31  
32 112 measures, and type of studies, and study setting, as described in the sections that follow. Important  
33  
34 113 amendments made to this protocol will be documented and published alongside the results of the  
35  
36 114 systematic review.  
37

### 38 39 40 115 *Study population*

41  
42 116 The study targets adolescent students aged 10 – 19 years in primary or secondary levels of  
43  
44 117 education or their equivalents who participated in a school-based intervention to delay sexual  
45  
46 118 debut. Studies with students younger than 10 years and/or older than 19 years, as maybe in some  
47  
48 119 settings, will be included if the majority of participants (i.e. above 50%) are aged between 10 and  
49  
50 120 19 years. Studies that do not include students aged 10 – 19 years will be excluded from the review.  
51

### 52 53 54 121 *Types of interventions*

1  
2  
3 122 All interventions with a school-based component irrespective of intervention content and  
4  
5 123 instruction mode will be included as long as they assessed sexual debut as a primary or secondary  
6  
7 124 outcome. This includes interventions that are school-based only and delivered in primary and  
8  
9 125 secondary schools, and those that have multiple components, one of which must be a school-based  
10  
11 126 component while the other components are delivered elsewhere (e.g. health care facilities). The  
12  
13 127 intervention must have reported on sexual debut as a primary or secondary outcome. Interventions  
14  
15 128 that target students outside the school setting will be excluded.

16  
17  
18  
19 129 *Types of outcome*

20  
21 130 The primary outcome of interest is delayed sexual debut, defined as postponement of sexual  
22  
23 131 intercourse among participants who had not engaged in sexual intercourse prior to the school-  
24  
25 132 based intervention. While secondary outcomes shown in Table 1 will be considered as a first step,  
26  
27 133 other SRH outcomes reported by at least two studies will also be considered. Such may include  
28  
29 134 contraceptive use, pregnancy and history of STIs:

30  
31  
32  
33 135 **Table 1: Secondary outcomes**

Secondary outcomes	Definitions
Intention to delay sex	Planning to wait to have sexual intercourse until older
Lifetime sexual activity	Ever engaged in sexual intercourse
Sexually active	Having engaged in sexual intercourse in the last 30 days
Current sexual activity	Having engaged in sexual intercourse in the last six months
Sexual health knowledge	Knowledge of key SRH topics and issues
Sexual attitude	Attitudes towards sexuality and sexual behaviour
Self-efficacy for safe sex practices	Confidence to say no to unsafe sex practices

Consistent condom use	Condom use at every sexual intercourse
Number of sex-partners	Number of sex partners (regular and casual) in a specified period of time

136

137 *Types of studies*

138 The review will include all studies focused on delaying sexual debut, regardless of the study design  
 139 employed. Meta-analytical approaches that take into consideration different study designs will  
 140 be used in the analysis, and where meta-analysis is not possible, other methods of analysing the  
 141 effect measures outlined by [McKenzie and Brennan \(52\)](#) will be employed . We will also compare  
 142 the effectiveness of the interventions by study design. Eligible studies will have been published in  
 143 peer reviewed journals between January 2009 and December 2020. Only studies published in  
 144 English will be included.

145 *Study setting*

146 Only studies conducted in SSA will be included. Given the population of interest, the review will  
 147 focus on interventions implemented in primary and secondary schools or their equivalents. The  
 148 review focuses on studies published since 2009, the period after the global momentum on the need  
 149 for comprehensive sexuality education began. In 2008, Latin America and the Caribbean signed  
 150 the Preventing through Education Declaration for the delivery of sexuality education and health  
 151 services ([53](#)). In 2013, there was a Ministerial Commitment on CSE and SRH services for  
 152 adolescents and young people in 20 countries across Eastern and Southern Africa ([54](#)).

153 *Search strategy*

154 Our search strategy will involve three methods:

- 1  
2  
3 155 • Electronic searches - four researchers will search five electronic databases including  
4  
5 156 PubMed, Scopus, Science Direct, Web of Science and EBSCO (PsycINFO, Global Health,  
6  
7 157 CINAHL) for published peer-reviewed journal articles. Cochrane library, National  
8  
9 158 Institute of Health (NIH), and Turning Research into Practice (TRIP) databases will be  
10  
11  
12 159 searched for ongoing studies that are yet to be published.  
13  
14  
15 160 • Hand-searches – An iterative process to obtain additional studies not yet retrieved with our  
16  
17 161 initial online database using the reference list of retrieved articles  
18  
19 162 • Contacting authors and experts - Where published data are not sufficient, authors will be  
20  
21  
22 163 contacted for additional information  
23

24 164 While the exact search terms will vary by database, the four search components included will be  
25  
26 165 (1) adolescents (2) sexual debut (3) school-based interventions (4) and sub-Saharan Africa. Search  
27  
28 166 terms will be adapted for each bibliographic database in combination with database-specific filters.  
29  
30 167 Boolean operators ‘OR’, ‘NOT’ and ‘AND’ will be used to maximize or narrow the specificity for  
31  
32 168 the search. Wildcards will be used to search for variations or alternate spellings of key concepts.  
33  
34 169 Below, and in the supplementary document, we present a search strategy to be used in PubMed  
35  
36 170 below:  
37

- 38  
39  
40 171 1. (intervention[Title/Abstract]) OR (program\*[Title/Abstract])  
41  
42 172 2. (school[Title/Abstract]) OR (institution[Title/Abstract]) OR (academic[Title/Abstract])  
43  
44 173 OR (education[Title/Abstract])  
45  
46 174 3. (sexual debut[Title/Abstract]) OR (sexual initiation[Title/Abstract]) OR (sexual  
47  
48 175 delay[Title/Abstract]) OR (sexual activity [Title/Abstract])  
49  
50  
51  
52  
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59  
60



- 1  
2  
3 176 4. (adolesce\*[Title/Abstract]) OR ("young people"[Title/Abstract]) OR  
4  
5 177 (youth[Title/Abstract]) OR (teenage\*[Title/Abstract]) OR (learner[Title/Abstract]) OR  
6  
7 178 (children[Title/Abstract])  
8  
9  
10 179 5. (Africa south of the Sahara [MeSH Terms]) OR (Africa [MeSH Terms])  
11  
12 180 6. ("2009/01/01"[Date - Publication]: "2020/12/31"[Date - Publication])  
13  
14  
15 181 7. #1 AND #2 AND #3 AND #4 AND #5 AND #6  
16  
17 182 ("intervention"[Title/Abstract] OR "program\*[Title/Abstract]) AND  
18  
19 183 ("school"[Title/Abstract] OR "institution"[Title/Abstract] OR "academic"[Title/Abstract]  
20  
21 184 OR "education"[Title/Abstract]) AND ("sexual debut"[Title/Abstract] OR "sexual  
22  
23 185 initiation"[Title/Abstract] OR "sexual delay"[Title/Abstract] OR "sexual  
24  
25 186 activity"[Title/Abstract]) AND ("adolesce\*[Title/Abstract] OR "young  
26  
27 187 people"[Title/Abstract] OR "youth"[Title/Abstract] OR "teenage\*[Title/Abstract] OR  
28  
29 188 "learner"[Title/Abstract] OR "children"[Title/Abstract]) AND ("africa south of the  
30  
31 189 sahara"[MeSH Terms] OR "africa"[MeSH Terms]) AND 2009/01/01:2020/12/31[Date -  
32  
33 190 Publication]  
34  
35  
36  
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38  
39

## 192 **Data collection**

### 193 *Selection of studies*

194 Four reviewers, paired, will independently screen retrieved titles and abstracts of potential articles  
195 to determine their eligibility for inclusion in the review. Rayyan, a web application tool will be  
196 used to manage the screening process (55). Full article texts of included studies will then be  
197 obtained and reviewed to ascertain eligibility. Any disagreements during title and abstract review

1  
2  
3 198 or during the full text review will be resolved by consensus. A third reviewer will be involved if a  
4  
5 199 consensus is not reached by the two pairs of reviewers.  
6

7  
8 200 *Data extraction and management*  
9

10 201 Two reviewers will use a standardized data extraction form to independently extract data on  
11  
12 202 background or process-oriented information from each included study to provide a basis for data  
13  
14 203 charting, themes and variables for use in answering the research question. Reviewers will pilot the  
15  
16 204 data extraction form with a sample of included papers and amendments will be made as necessary.  
17  
18

19 205 From each relevant study, data will be extracted on the following domains:  
20

- 21  
22 206 • General information on the study: authors, date of publication, publication type, country,  
23  
24 207 and funding source  
25  
26 208 • Study characteristics: study setting, location, study design, sampling frame and sampling  
27  
28 209 methods, and year(s) of study implementation  
29  
30  
31 210 • Participant characteristics: age, gender, number of participants, participants lost to follow-  
32  
33 211 up, length of follow-up  
34  
35 212 • Intervention: detailed description of the intervention, composition of intervention and  
36  
37 213 control groups  
38  
39

40 214 Outcomes: for primary outcome (delay in sexual debut), data on the number of participants  
41  
42 215 experiencing delayed sexual debut on both intervention versus control arms will be extracted. If a  
43  
44 216 summary estimate (e.g., risk ratio) is reported instead of raw numbers, these will be extracted. A  
45  
46 217 similar approach will be used for secondary outcomes. Where more than one article described the  
47  
48 218 same intervention, data will be extracted from all papers. The eligible studies will be exported into  
49  
50 219 the Comprehensive Meta-Analysis ([56](#)) software.  
51  
52

53  
54 220 *Risk of bias assessment*  
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57  
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60

221 Two independent reviewers will assess the methodological quality of studies depending on study  
222 design. For RCTs, the reviewers will judge each quality domain based on the following three-point  
223 scale as suggested in Cochrane Handbook for Systematic Reviews of Interventions (57): Yes (low  
224 risk of bias: plausible bias unlikely to seriously alter the results if all criteria were met); No (high  
225 risk of bias: plausible bias that seriously weakens confidence in the results if one or more criteria  
226 were not met); and Unclear (plausible bias that raises some doubt about the results if one or more  
227 criteria were assessed as unclear. The following items in the risk of bias assessment for RCTs will  
228 be included:

- 229 • Sequence generation (whether allocation sequence was adequately generated)
- 230 • Allocation concealment (whether allocation was adequately concealed)
- 231 • Masking/ blinding (whether knowledge of the allocated intervention was adequately  
232 prevented during the study, i.e., whether participants, personnel, outcome assessors and/or  
233 data analysts are blinded)
- 234 • Incomplete outcome reporting (whether incomplete outcome data was adequately  
235 addressed)
- 236 • Selective reporting (whether reports of the study were free of selective outcome reporting)
- 237 • Other sources of data (e.g., whether reports of the study included sample size computation,  
238 alpha error, etc.)

239 For non-RCT studies, the following items will be included in the risk of bias assessment as  
240 suggested by [Viswanathan, Berkman, Dryden et al. \(58\)](#):

- 241 • Selection bias – do the inclusion/exclusion criteria vary across the comparison groups (for  
242 multiple-arm studies) or within groups (for single arm/cross-sectional studies)?

1  
2  
3 243 Performance bias – does the study fail to account for important variations in the execution  
4  
5 244 of the study from the proposed protocol?  
6  
7

8 245 • Detection bias - was the assessor not blinded to the outcome, exposure, or intervention  
9  
10 246 status of the participants? Were valid and reliable measures not used or not implemented  
11  
12 247 consistently across all study participants to assess inclusion/exclusion criteria,  
13  
14 248 intervention/exposure outcomes, participant benefits and harms?  
15  
16

17 249 • Attrition bias – was the length of follow-up different across study groups? In cases of  
18  
19 250 missing data was the impact not assessed (e.g., through sensitivity analysis or other  
20  
21 251 adjustment method)?  
22  
23

24 252 • Selective outcome reporting - Are any important primary outcomes missing from the  
25  
26 253 results?  
27  
28

29 254 • Overall assessment: Are the results believable taking study limitations into consideration?  
30

31 255 Discussions and consensus will be used to crosscheck the extracted information and to  
32  
33 256 resolve disagreements. The level of risk of bias in each of these domains will be presented  
34  
35 257 separately for each study in tables in the final review publication.  
36  
37

### 38 258 *Risk of bias in individual studies*

39  
40 259 Methodological quality of each individual article will be appraised using a checklist adapted from  
41  
42 260 Critical Appraisals Skills Programme (CASP). Two authors will independently appraise each  
43  
44 261 article.  
45  
46

### 47 262 *Measures of intervention effect*

48  
49 263 Dichotomous outcomes such as sexual debut (initiated versus not initiated sexual activity during  
50  
51 264 the study period) will be summarized as risk ratios or odds ratio with 95% confidence intervals for  
52  
53 265 each study. Continuous outcomes such as number of sex partners will be summarized as  
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55  
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1  
2  
3 266 (unstandardized) mean differences and standard errors. In cases where sexual debut may be  
4  
5 267 reported as a median age at sexual debut, published procedures for transforming median to mean  
6  
7  
8 268 and standard deviation to facilitate computation of relevant statistics will be used (59). If enough  
9  
10 269 information is not provided to calculate an effect size, study authors will be contacted for  
11  
12 270 clarification or to provide additional statistics. If the authors do not provide this information after  
13  
14  
15 271 one month, this study will be removed from the analysis but this effort will be reported.

16  
17 272 If results of a repeated measure analysis are reported, authors will need to provide the  
18  
19 273 correlation between pre-post measurements or provide enough information to calculate the  
20  
21 274 correlation between measurements. If these statistics are not available, either in publication or after  
22  
23  
24 275 request, and the study was a controlled design, an effect size will be generated using post-  
25  
26 276 intervention statistics provided groups are similar at baseline with respect to the outcome of  
27  
28 277 interest and other relevant covariates.

### 278 *Unit of analysis*

279 Data will be extracted from each included study (unit of analysis) as follows. For dichotomous  
30  
31  
32  
33 279 Data will be extracted from each included study (unit of analysis) as follows. For dichotomous  
34  
35 280 variables, number of participants in the intervention group and the number of participants in the  
36  
37  
38 281 standard/control group will be used. For continuous variables, the mean, standard deviation, and  
39  
40 282 the number of participants in the intervention and control groups will be used. For studies with  
41  
42 283 multiple intervention groups, each pair-wise comparison will be included separately. Moreover,  
43  
44 284 for dichotomous outcomes, we will divide both the number of events and the total number of  
45  
46  
47 285 participants. For continuous outcomes, means and standard deviations will not be changed but will  
48  
49 286 be divided by the total number of participants.

### 287 *Assessment of heterogeneity*

1  
2  
3 288 Heterogeneity among studies and between subgroups will be assessed using a Chi<sup>2</sup> test with a  
4  
5 289 significance level at  $p < 0.10$ . The degree of heterogeneity among studies and between subgroups  
6  
7  
8 290 will be assessed using the I<sup>2</sup> statistic using the following guide: I<sup>2</sup> = 0% to 40% as heterogeneity  
9  
10 291 that might not be important, I<sup>2</sup> = 30% to 60% as moderate heterogeneity, I<sup>2</sup> = 50% to 90% as  
11  
12 292 substantial heterogeneity, and I<sup>2</sup> = 75% to 100% as considerable heterogeneity ([60](#))

### 14 293 *Assessment of reporting bias*

16  
17 294 Publication bias will be assessed if at least 10 studies are included in the review. A funnel plot will  
18  
19 295 be used to assess the magnitude of reporting bias as per Cochrane guidelines.

### 21 296 **Data synthesis**

23  
24 297 Data will be pooled using the random effects model according to Chapter 9 of the *Cochrane*  
25  
26 298 *Handbook for Systematic Reviews of Interventions* ([60](#)). Dichotomous outcomes' data (e.g.,  
27  
28 299 number of participants who experience sexual debut) will be reported as risk ratios and continuous  
29  
30  
31 300 data (e.g., number of sexual partners) as mean differences. Depending on the different types of  
32  
33 301 interventions identified, such as sexuality education, economic interventions or a combination of  
34  
35 302 different approaches, we will conduct pooled effects for each type of interventions to examine  
36  
37 303 which are more effective in delaying sexual debut. Additionally, and where possible, we will  
38  
39 304 identify and consider conceptual groupings such RCTs and non-RCT studies while conducting the  
40  
41  
42 305 analysis. All analyses will be done at 95% confidence intervals. Data will be analysed using the  
43  
44 306 statistical software Comprehensive Meta-Analysis([56](#)) . In studies where the effects of clustering  
45  
46 307 have not been taken into account, standard deviations will be adjusted for the design effect, using  
47  
48 308 intra-class coefficients, if they are provided in the study reports, or alternatively using external  
49  
50  
51 309 estimates obtained from similar studies. Stratifications will be done by school level (primary or  
52  
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3 310 secondary (or age, if applicable), grade level, instructor (e.g., teacher or peer), intervention type  
4  
5 311 (e.g. behaviour change communication, study setting).  
6

7  
8 312 Other acceptable data synthesis methods such as those described by [McKenzie and Brennan](#)  
9  
10 313 [\(52\)](#) will be considered where meta-analysis is not possible. Such methods include summarizing  
11  
12 314 effect estimates in case estimates of intervention effects are available but the variances of the  
13  
14 315 effects are not reported or are not correct [\(52\)](#). Another method described by [McKenzie and](#)  
15  
16 316 [Brennan \(52\)](#) is combining P values if no other information is available; differing statistical tests  
17  
18 317 and outcomes across studies; or non-parametric test results reported. Lastly, vote counting based  
19  
20 318 on the direction of the effect can be used when only the direction of effect is reported or there is  
21  
22 319 no consistent effect measure or data reported across studies [\(52\)](#).  
23  
24  
25

26 320 Findings will be organised in tables and charts, while presenting a description of the themes  
27  
28 321 and concepts found in literature reflecting the review objectives. A summary narrative that  
29  
30 322 synthesizes the information across tables and charts will be developed, critically highlighting the  
31  
32 323 advances and gaps in research, with a focus to draw implications for future research.  
33  
34

#### 35 324 **Patient and public involvement**

36  
37  
38 325 Patients and public will not be involved in the design and conduct of this review  
39

#### 40 326 **Ethics and dissemination**

41  
42 327 Ethics approval is not required. The findings of this systematic review will be disseminated  
43  
44 328 through peer-reviewed publications as well as in relevant stakeholders' fora. In case of any  
45  
46 329 amendments to the protocol following its publication, the date of each amendment will be  
47  
48 330 provided, change(s) described, and report the rationale for the change(s) in future publications  
49  
50 331 arising from this protocol.  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 332 **Author contribution:** BWM, KJ, EKI and JO contributed to the conceptualization, and  
4  
5 333 development of the protocol. BWM and KJ provided the initial draft of the protocol. HW and  
6  
7 334 CWK provided a critical review of the protocol. All authors read and approved the final draft of  
8  
9  
10 335 the protocol.

11  
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13  
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15  
16 338 Development Cooperation Agency (Grant number 12103)

17 339 **Competing interests:** None declared

18  
19 340 **Patients consent for publication:** Not required

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21  
22 341

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26 342



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510 **Word Count:** 3,360 words (excludes the title page, abstract, and references)

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## Search strategy

### Pubmed

1. (intervention[Title/Abstract]) OR (program\*[Title/Abstract])
2. (school[Title/Abstract]) OR (institution[Title/Abstract]) OR (academic[Title/Abstract])  
OR (education[Title/Abstract])
3. (sexual debut[Title/Abstract]) OR (sexual initiation[Title/Abstract]) OR (sexual  
delay[Title/Abstract]) OR (sexual activity [Title/Abstract])
4. (adolesce\*[Title/Abstract]) OR ("young people"[Title/Abstract]) OR  
(youth[Title/Abstract]) OR (teenage\*[Title/Abstract]) OR (learner[Title/Abstract]) OR  
(children[Title/Abstract])
5. (Africa south of the Sahara [MeSH Terms]) OR (Africa [MeSH Terms])
6. ("2009/01/01"[Date - Publication]: "2020/12/31"[Date - Publication])
7. #1 AND #2 AND #3 AND #4 AND #5 AND #6  
  
("intervention"[Title/Abstract] OR "program\*" [Title/Abstract]) AND  
("school"[Title/Abstract] OR "institution"[Title/Abstract] OR "academic"[Title/Abstract]  
OR "education"[Title/Abstract]) AND ("sexual debut"[Title/Abstract] OR "sexual  
initiation"[Title/Abstract] OR "sexual delay"[Title/Abstract] OR "sexual  
activity"[Title/Abstract]) AND ("adolesce\*" [Title/Abstract] OR "young  
people"[Title/Abstract] OR "youth"[Title/Abstract] OR "teenage\*" [Title/Abstract] OR  
"learner"[Title/Abstract] OR "children"[Title/Abstract]) AND ("africa south of the  
sahara"[MeSH Terms] OR "africa"[MeSH Terms]) AND 2009/01/01:2020/12/31[Date -  
Publication]

## PRISMA-P 2015 Checklist

This checklist has been adapted for use with protocol submissions to *Systematic Reviews* from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>ADMINISTRATIVE INFORMATION</b>					
<b>Title</b>					
Identification	1a	Identify the report as a protocol of a systematic review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1 - 2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
<b>Registration</b>	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not registered
<b>Authors</b>					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	<input checked="" type="checkbox"/>	<input type="checkbox"/>	6 - 15
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	447 - 450
<b>Amendments</b>	4	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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	98 - 100
<b>Support</b>					
Sources	5a	Indicate sources of financial or other support for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	451 - 452
Sponsor	5b	Provide name for the review funder and/or sponsor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	451 - 452
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	<input checked="" type="checkbox"/>	<input type="checkbox"/>	451 - 452
<b>INTRODUCTION</b>					
<b>Rationale</b>	6	Describe the rationale for the review in the context of what is already known	<input checked="" type="checkbox"/>	<input type="checkbox"/>	74 - 91
<b>Objectives</b>	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	91 - 93

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>METHODS</b>					
<b>Eligibility criteria</b>	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	95 - 134
<b>Information sources</b>	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	135 - 151
<b>Search strategy</b>	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	<input checked="" type="checkbox"/>	<input type="checkbox"/>	152 - 161
<b>STUDY RECORDS</b>					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	164 - 192
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	164 - 170
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	<input checked="" type="checkbox"/>	<input type="checkbox"/>	172 - 177
<b>Data items</b>	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	177 - 192
<b>Outcomes and prioritization</b>	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	<input checked="" type="checkbox"/>	<input type="checkbox"/>	115 - 119
<b>Risk of bias in individual studies</b>	14	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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	193- 230
<b>DATA</b>					
<b>Synthesis</b>	15a	Describe criteria under which study data will be quantitatively synthesized	<input checked="" type="checkbox"/>	<input type="checkbox"/>	270 - 285
	15b	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 (e.g., $I^2$ , Kendall's tau)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	235 - 265
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	275 - 277
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	<input checked="" type="checkbox"/>	<input type="checkbox"/>	282 - 285
<b>Meta-bias(es)</b>	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	276 - 281
<b>Confidence in cumulative evidence</b>	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	231 - 234

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