Preventive Interventions Regarding Sexuality in Adolescence: A Systematic Review of School-Based Programs*

Intervenciones preventivas sobre sexualidad en la adolescencia: revisión sistemática de programas escolares

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Fernando Martins de Azevedo[a]
Universidade Federal do Rio Grande do Sul, Brasil
ORCID: https://orcid.org/0000-0002-2155-5975
Amanda Costa Schnor
Pontifícia Universidade Católica do Rio Grande do Sul, Brasil
ORCID: https://orcid.org/0000-0003-4048-7290
Rodrigo Falcão Chaise
Pontifícia Universidade Católica do Rio Grande do Sul, Brasil
ORCID: https://orcid.org/0000-0002-8671-7058
Gabriela dos Santos Jacobsen
Universidade Federal do Rio Grande do Sul, Brasil
ORCID: https://orcid.org/0000-0001-5538-6463
Kátia Bones Rocha
Pontifícia Universidade Católica do Rio Grande do Sul, Brasil
ORCID: https://orcid.org/0000-0001-7603-1709
Adolfo Pizzinato
Universidade Federal do Rio Grande do Sul, Brasil
ORCID: https://orcid.org/0000-0002-1777-5860

[a] Autor de correspondencia. Correo electrónico: fernandoazevedo940@gmail.com

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ABSTRACT

This study describes preventive interventions in school-based settings aimed at reducing sexually transmitted infections (STIs) among adolescents. A systematic review was conducted. 3860 articles were identified, of which 25 were thoroughly analyzed. The study adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist. Database searches using PsycNet, Scopus, and PubMed happened on May 27, 2020. MeSH terms were employed. The review was limited to articles published from January 1, 2016, to the search date. Inclusion criteria targeted original empirical studies on preventive interventions for school-age adolescents. The goal was to reach studies reporting school programs designed to work on adolescent sexuality, HIV, STIs, and sexual risk. Results indicate that most interventions significantly enhanced knowledge about HIV, STIs, and prevention. Notably, interventions with substantial behavioral outcomes (such as carrying a condom) covered a diverse range of topics. Gender, relationship equity, communication skills, decision-making, and violence are examples. It is possible to conclude the importance of a comprehensive approach to improving sexual health in adolescence.

Keywords

Adolescents; Systematic review; Sex education; Psychosocial interventions; Sexual Behavior; Prevention.

RESUMEN

Este estudio describe intervenciones preventivas en escuelas dirigidas a reducir las infecciones de transmisión sexual (ITS) entre adolescentes. Se llevó a cabo una revisión sistemática. Se identificaron 3860 artículos, 25 fueron analizados. El estudio sigue la lista de verificación *PreferredReporting Items for Systematic Reviews and Meta-Analyses* (PRISMA). Las búsquedas en bases de datos utilizaron PsycNet, Scopus y PubMed y se llevaron a cabo el 27 de mayo de 2020. Se emplearon términos MeSH. La revisión se limitó a artículos publicados desde el 1 de enero de 2016 hasta la fecha de la búsqueda. Los criterios de inclusión se centraron en estudios empíricos originales sobre intervenciones preventivas para adolescentes en edad escolar. El objetivo era alcanzar estudios sobre programas escolares diseñados para abordar la sexualidad, el VIH, las ITS y el riesgo sexual en adolescentes. Los resultados indican que la mayoría de las intervenciones mejoraron significativamente el conocimiento sobre salud sexual. Notablemente, las intervenciones con resultados conductuales sustanciales (como tener un condón consigo) abordaron una amplia gama de temas. Ejemplos incluyen género, equidad en las relaciones, habilidades de comunicación, toma de decisiones y violencia. De hecho, es posible concluir la importancia de un enfoque integral para mejorar la salud sexual en la adolescencia.

Palabras clave

Adolescentes; Revisión sistemática; Educación sexual; Intervenciones psicosociales; Conducta Sexual; Prevención.

Sexually transmitted infections (STIs) are healthcare issues that occur when people are exposed to pathogenic viruses by unprotected sexual contact. Some STIs may also be transmitted through blood transfusion, pregnancy, breastfeeding, or giving birth. Chlamydia, gonorrhea, HIV (human immunodeficiency viruses), HPV (human papillomavirus), and syphilis are some of the most prevalent STIs (World Health Organization, 2023). STIs are considered a major public health issue across the world. In 2005, for example, HIV and AIDS-related deaths were listed by the World Health Organization (WHO) as the fourth most common cause of death globally. In Sub-Saharan Africa, meanwhile, HIV/AIDS is the leading cause of morbidity and mortality. In the United States, 20 million new STI cases are reported every year, and half of those cases happen among adolescents (Satterwhite et al., 2013). According to the literature, adolescence can be a period of increased risk for STIs and unintended pregnancy (Bozzini et al., 2020; Forrest & Singh, 1990; Harrison et al., 2005; Pettifor et al., 2005; Outlaw et al., 2011). In Sub-Saharan Africa, evidence indicates that adolescents are less likely to use condoms in their first sexual experience (Pettifor et al., 2005). The same applies to the United States. According to the American Centers for Disease Control (CDC), approximately half of the teenagers who are sexually active report not using a condom in their last sexual encounter. (CDC Youth, 2012).

Substantial evidence, including several systematic reviews, demonstrates the importance of preventive interventions when promoting safer sex practices (Johnson et al., 2003; Kirby, 2008; Kirby & Laris, 2009; Schooler, 2013). A preventive intervention is a public policy framework designed to respond to the public health situation regarding adolescent sexuality (Downing et al., 2011). Some interventions are school-based, while others may occur in health and community centers. Whatever the strategy, these interventions are focused on improving health knowledge and reducing behavioral risk (Jones et al., 2006). Systematic reviews have studied preventive interventions (Downing et al., 2011; Levy et al., 2019; Sani et al., 2016; Shangase et al., 2021).

In a systematic review conducted in Sub-Saharan Africa, it was reported that many of the interventions resulted in significant increases in condom use. However, the study also indicates that none of the interventions reviewed reported decreases in infection rates within the intervention groups (Sani et al., 2016). Another systematic review from Sub-Saharan Africa indicated that knowledge related to HIV/AIDS increased with most of the prevention interventions studied. However, none of the interventions were able to reduce STI rates, including rates of herpes simplex virus type 2 (HSV-2) and HIV (Shangase et al., 2021), approximating what was found by Sani et al. (2016).

Yet, in a systematic review focused on interventions conducted to improve condom

use by applying social and cognitive models, only three interventions achieved the goal of improving condom use. Therefore, according to the authors, more interventions focusing on cognitive and social determinants are necessary to improve prevention strategies (Levy et al., 2019).

The fact that sexuality is often reduced to a physiological issue, fallaciously related only to sexual intercourse, diseases, and reproduction, might be one of the reasons why those interventions have not been entirely successful. Other aspects fundamentally related to human sexuality, such as sexual rights and gender roles, are often ignored (Chaveiro, 2011; Sehnem et al., 2019). In this perspective, preventive interventions regarding sexuality should comprehensively address those aspects, taking into consideration its socio-cultural dimension and attending to issues such as gender relations, self-esteem, and prejudice (Ew et al., 2017).

Furthermore, according to Levy et al. (2019), some variables seem to be associated with more effective interventions. Having a qualitative component, multiple stages, a broad mix of learning tools, peer education strategies, and the high involvement of the participants are all factors found to improve preventive interventions significantly. Nevertheless, multiple authors agree that sexual health interventions should continue to be scientifically investigated, either because they currently do not address all the challenges and necessities regarding the mitigation of the HIV/AIDS epidemic or because they are not addressing those demands appropriately (Downing et al., 2011; Levy et al., 2019; Sani et al., 2016).

School-based interventions to promote sexual health are considered of significant importance. One reason for that is the fact that many countries mandate sexual health content in schools. That is the case of Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Luxembourg, the Netherlands, Norway, Portugal, Slovakia, and Sweden (Edgardh, 2002; Parker et al., 2009). In the United States, while not necessarily mandatory, school-based preventive interventions are common practice. The country also has extensive research in the field (Guttmacher Institute, 2023; Woolweaver et al., 2023). Further, school is considered by many authors a privileged place to work on sexuality due to the goal of the institution: commit to the whole development of young people (Dessen & Polonia, 2007; Gava & Villela, 2016).

Therefore, the main goal of this research is to systematically review preventive interventions regarding sexuality in adolescence, specifically designed for school environments and published in peer-reviewed journals. Our secondary goal is to determine which variables can influence the effectiveness of those interventions, as well as the topics and the main results of each. According to the literature, only a few interventions have had positive results (Levy et al., 2019; Sani et al., 2016; Shangase et al., 2021). Consequently, this research aims to investigate and separate those same interventions by their different results: increasing knowledge about sexual prevention, increasing condom use, promoting delay of sexual debut, and decreasing infection rates of sexually transmitted infections. Thus, this study is expected to point out which interventions used the most effective tools so that those models can be replicated afterward.

Method

The systematic review methodology is one of the most solid techniques to formally conduct a literature review in several areas of knowledge, given that it uses core standards to strategically search, synthesize, and critically analyze data on a specific subject (Siddaway et al., 2019; Zoltowski et al., 2014). The reporting of this systematic review conforms to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (Galvão et al., 2015).

Search Strategy

Searches were performed on May 27, 2020, in three electronic databases — PsycNet, Scopus, and Pubmed — using the following search algorithm with MeSH terms in English: ((HIV OR "HIV/AIDS" OR "Sexually Transmitted Diseases" OR STI OR STD OR IST OR DST) AND ("sexual education" OR "sex education" OR "condom use" OR "AIDS education" OR "school-based HIV education" OR "HIV prevention" OR "psychosocial intervention" OR "psychoeducational intervention" OR "prevention program")) AND (adolescence OR adolescents). The present review is restricted to publication date from January 1, 2016, to the search date.

Inclusion Criteria

The articles included were studies published in English, Portuguese, or Spanish in peer-reviewed journals that present original empirical results, addressing preventive interventions regarding sexuality designed for school-age adolescents and focused on the prevention of HIV, other STIs, and risky behaviors. Our exclusion criteria include: studies that address preventive interventions not in the educational field (e.g., interventions held in community or health centers), studies with participants over eighteen years old, articles addressing interventions that were all-male or all-female, and also studies that focused on specific populations (e.g., HIV-infected adolescents, ethnic minorities, adolescents with psychopathologies).

Data Extraction

Four independent reviewers conducted data extraction and coding. They checked each other's data. Disagreements between individual judgments were submitted for mutual consensus after re-analyzing records. Missing data were declared as non-existent. Finally, the researchers used an Excel spreadsheet to record data.

Data items extracted included the title of the research, its journal of publication, location, sample information (number of participants, sex, ages), the name of the intervention, number of sessions/classes, operationalization of the intervention (face-to-face or face-to-face with multimedia support), topics and subjects within the interventions, theoretical basis, and effectiveness variables. Furthermore, information about the study design (such as objectives, methodology, sample techniques, instruments used, statistical analysis conducted, limitations, results, and conclusions) was also coded.

Quality Assessment

The researchers also carried out a quality assessment of the articles found in the present systematic review using an adapted version of the quality assessment described by Levy et al. (2019). First, it was assessed whether study samples were randomly selected. If not random, studies were checked to see if tests were used to verify sample representativeness. If one or both options were true, the article got 1 point. The second assessment evaluated the use of valid and reliable measures. If measures as such were used, the article got two points; if they were partially used, it got one point. Thirdly, it was assessed if the groups in each study were randomly assigned and whether cluster/stratified randomization or matching plus randomization were performed. This criterion also had a maximum of two points. The papers that only performed randomization but did not use a cluster or matching approach received 1 point. Then, it was assessed if studies compared the groups on background and baseline measures after randomization. If this criterion was met, studies received an extra point. The last assessment evaluated whether or not studies used appropriate statistical analysis, which granted one more point. Thus, a paper could score a total of 7 points. The ones that reached a higher score are those with the best methodological quality.

Risk of Bias

The blinding technique for screening and joint discussions between the four reviewers for data extraction is expected to reduce the risk of research bias. Nevertheless, the theme scope is limited to preventive interventions of school-based programs, which are mainly face-to-face.

Results

As demonstrated by Figure 1, the researchers found 3860 articles in the database search. After removing 1529 duplicates, 2331 studies were examined by abstract, and 2289 more papers were excluded from the analysis. The review team read the full text of the remaining 42 articles and excluded another 17; thus, 25 papers were analyzed.

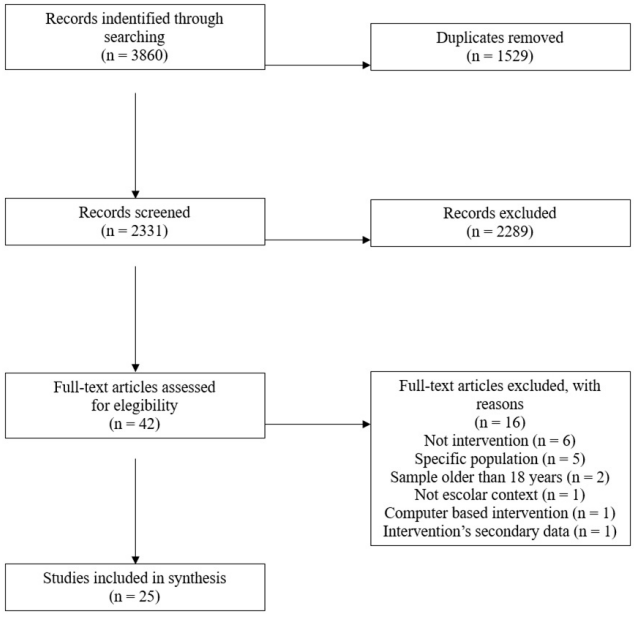

Figure 1.
Flow Diagram.

Of the 25 papers analyzed, 13 were research conducted in the United States (52%). We also found four studies from South Africa, two from The Bahamas, two from Spain, one bi-national survey from South Africa and Tanzania, one from Ghana, one from Uganda, and one from Madagascar.

The average age of the participants, considering all 25 interventions, was 13.9 years of age, with a standard deviation of 1.30, meaning that the average age of most interventions was between 13 and 15 years of age. Regarding the number of sessions, a much wider range was observed. The minimum number of sessions found was three, whereas the maximum number was 24, resulting in a mean of 11.5 sessions, with a standard deviation of 6.31.

Most of the studies reviewed only had statistically significant results in improvements of knowledge regarding sexuality (Abe et al., 2016; Dinaj-Koci, 2015; Duh et al., 2017; Escribano et al., 2017; Goesling et al., 2016; Harrison et al., 2016; Kemigisha et al., 2019; Klinger & Asgary, 2015; Krugu et al., 2018; Maneseri at el, 2019; Mathews et al., 2016; Peskin et al., 2019; Potter et al., 2016; Robinson et al., 2016; Rotz et al., 2018; Taggart et al., 2016; Timol et al., 2016; Wang et al., 2017). Thus, these studies only had significant outcomes in variables such as "sexual health knowledge," "STI knowledge," and "awareness of health services," not displaying significant results when it comes to delaying sexual debut, increasing condom or contraceptive use, or other behavioral variables. Lightfoot et al. (2015), Duh et al. (2017), Espada et al. (2015), and Krugu et al. (2018) also did not have any results in behavioral outcomes. Still, their research did not include behavioral variables in the assessment measures.

Nonetheless, some interventions presented significant behavioral outcomes, such as Rohrbach et al. (2015). This rights-based sexuality intervention was conducted in 10 urban high schools in South and East Los Angeles. According to the authors of the research, the approach used in US schools is usually abstinence-plus, which means that it teaches abstinence from sexual encounters while promoting condom and contraceptive use. The intervention under consideration also approaches human rights, gender equality, adolescent's right to sexuality, the right to sexual health care, the right of self-determination, as

well as non-discrimination towards others. The goal of the intervention was to reduce the risk of unintended pregnancy and STIs while also improving adolescent's ability to manage their sexuality (Rohrbach et al., 2015).

The ninth-grade students (average age of 14.16 years) receiving the intervention had a 12-session curriculum included in their regular classes. The control group received a three-session basic sexual health program. According to the analysis, the participants in the intervention group were more likely to use sexual health services after the 1-year follow-up when compared to controls. Moreover, intervention participants were more likely to carry condoms, which is crucial for sexual prevention (Rohrbach et al., 2015).

Another intervention was conducted in Texas, USA, which consisted of a teen/pregnancy/HIV/Sexually Transmitted Infection prevention program named "It's Your Game… Keep it Real (IYG)". 1,693 sexually inexperienced seventh-grade students from 20 schools of five districts in Harris County participated in the study. Schools were randomly assigned to the intervention or a wait-list condition. Data on outcomes were collected at baseline (seventh grade) and at a 12 and 24-month (ninth grade) follow-up using self-report surveys. Data analysis used a person-centered approach to examine differences in intervention effects by subgroups, the latent class analysis (LCA) (Vasilenko et al., 2019).

LCA identified three subgroups: family disruption, other language households, and frequent religious attendance. There was no significant effect on the "other language households" and "frequent religious attendance" groups. However, after the intervention, the family disruption group had a statistically positive effect, with a 30% less likelihood of vaginal intercourse initiation when compared with the control group. The study had no information regarding the number of sessions/classes, topics, or subjects within the program (Vasilenko et al., 2019).

Stanton et al. (2016) research also displayed significant results regarding behavioral outcomes. This study was conducted in The Bahamas and assessed the effectiveness of an intervention applied to young individuals in two different moments of their school life. Two independent longitudinal studies were conducted with the same students. Initially, the FOYC (Focus on Youth in the Caribbean) intervention was completed with sixth-grade students. When these individuals reached tenth grade, another version of the same intervention was applied, but with more age-appropriate content, called BFOOY (Bahamian Focus on Older Youth). In both of these separate moments, parents received a communication intervention, CImPACT (Caribbean Informed Parents and Children Together) (Stanton et al., 2016).

FOYC and BFOOY are 8-session interventions based on the Protection Motivation Theory. Decision-making and how to deal with consequences with long-term actions seem to be the most important topics discussed during these interventions. Moreover, the intervention provided a 22-minute video with information about sex, HIV prevention, and condom use to the children's parents, aiming to encourage communication between the two parts. In addition to increases in knowledge about HIV/AIDS, the intervention reported significant increases in the ability of how to use a condom, higher levels of abstinence, and higher levels of condom use (Stanton et al., 2016).

Studies conducted in Sub-Saharan Africa also achieved significant behavioral results. As previously mentioned, Sub-Saharan Africa is the region with the highest rates of HIV infection. One research analyzed in the present article was conducted in Cape Town, Mankweng (both in South Africa), and Dar es Salaam, Tanzania. Its intervention project was called SATZ (South Africa and Tanzania Project). Similar to Rochrbach et al. (2015), this intervention also encompasses topics such as gender roles, reproductive health rights, intimate partner violence, and communication skills. Other issues, such as the use of condoms and other contraceptive methods, HIV/AIDS, and skills for protection and safety, were also discussed.

The results of the previously mentioned intervention demonstrate a significant decrease in sexual transition, which means engaging in vaginal or anal sex, having previously reported no sexual intercourse whatsoever. Individuals in the intervention group of the Dar es Salaam trial had significantly fewer sexual transitions when compared to controls. According to the authors, this particularity was partially mediated by an increase in communication with adults. Therefore, in Dar es Salaam, communicating with parents and teachers about topics regarding sexuality seems to have a positive impact on knowledge and behavior (Namisi et al., 2015).

The intervention tested by Fernandez-Santos et al. (2016) hypothesized that increasing self-esteem and HIV knowledge would result in behavioral outcomes. According to their model, the intervention would reduce alcohol use, drug use, and sexual risk-taking behavior by changing mediating factors. Favorably to the hypothesis, they found a statistically significant difference between the intervention and the control groups in the "HIV risk behavior" variable. The variable included reporting at least one of the following: sexual intercourse, condomless sexual intercourse, cannabis use, and alcohol use. The control group of this intervention had significantly higher scores in this "combined" variable. Nonetheless, there is no significant difference between groups by separating the four outcomes (cannabis use, alcohol use, sex, and sex without a condom). Therefore, this research has a behavioral result, but not a very robust one (Fernandez-Santos et al., 2016).

Moreover, Robinson et al. (2016) was the only research analyzed in the present study that did not display statistically significant results in either behavioral or non-behavioral variables. All of the information collected from the articles can be seen in Table 1.

Table 1
Studies analyzed

Setting (level & country)	Study design	*N*		Intervention	Comparison	Length(s) of follow up
		Intervention	Control group			
Timol et al. South Africa	RCT	Baseline: 2225 Post-Intervention test: 2036 Follow Up: 2.211	Baseline: 679 Post-Intervention test: 558 Follow Up: all from intervention schools	Age range: 10-17; Objectives: Improving knowledge, attitudes, perception, and behaviors related to risky behaviors. Content: peer education; decision-making; healthy relationships; risky behaviors; abstinence; early pregnancy; alcohol awareness. Activities: listening/discussing during peer-education lessons; group discussion; one-on-one meeting. Dose/frequency/duration: 07 sessions/35-45min. Theory used: NR.	No intervention	Between 5 and 7 months
Namisi et al. South Africa and Tanzania	Cluster RCT	Baseline: 12462 (intervention and control group) Follow up: NR.		Age range: 12-15; Objectives: Delay sexual transition and improve consistent condom use. Content: NR. Activities: teacher presentations; whole class and small group discussions; small group activities; role-plays. Dose/frequency/duration: 16 sessions Theory used: Attitude–social influence–efficacy (ASE) model	No intervention	Between 6 and 15 months
Stanton et al. Bahamas	Cluster RCT	Baseline: 1792 Follow Up 1 (6mth): 1515 Follow Up 2 (12mth): 1424 Follow Up 3 (18mth): 1402 Follow Up 4 (24mth): 1420	Baseline: 772 Follow Up 1 (6mth): 638 Follow Up 2 (12mth): 590 Follow Up 3 (18mth): 589 Follow Up 4 (24mth): 583	Average age: 14.5; Objectives: Increase knowledge and skills regarding sexual-risk avoidance. Content: NR. Activities: interactive discussions; role-plays; games. Dose/frequency/duration: 08 sessions Theory used: Protection Motivation Theory	The existing Bahamian Health and Family Life Education (HFLE) Curriculum	6,12,18 and 24 months.
Taggart et al. USA	Quasi-experimental	Baseline: 239 Intervention test: 423 (intervention and control group)	Baseline: 237 Post-	Age range: 14-15; Objectives: Increase HIV knowledge, improve awareness and attitudes, and increase self-efficacy. Content: HIV/STIs; contraception; testing; sexual health; substance use during sexual activity; peer and partner communication; risky sexual situations; proper condom use; condom negotiation skills; experiences of PLHIV. Activities: interactive performance; theater workshop; skills-based workshop; HIV positive speakers. Dose/frequency/duration: 03 sessions/60min Theory used: Theory of Reasoned Action and Social Cognitive Theory	No intervention	No follow-up
Rohrbach et al. USA	Cluster RCT	Baseline: 1025 Follow up: 769	Baseline: 884 Follow up: 678	Age range: 12-18; Objectives: Reduce the risk of pregnancy and STIs, and improve students' ability to manage their sexuality respectfully. Content: sexual rights; gender roles; media messages; sexual and reproductive anatomy; pregnancy; HIV/STIs; contraception. Activities: NR. Dose/frequency/duration: 12 sessions Theory used: Social Ecological Model	Control curriculum	12 months
Abe et al. USA	Cluster RCT	Baseline: 1135 Follow up: 997	Baseline: 600 Follow up: 551	Average age: 12; Objectives: Improve knowledge, attitudes, skills, and intentions toward pregnancy and STIs prevention. Content: reproductive health; pregnancy prevention methods; causes, transmission, and prevention of STIs; abstinence; negotiation and refusal skills; proper condom use; self-efficacy. Activities: NR. Dose/frequency/duration: 10 sessions Theory used: Social Learning Theory	No intervention	12 months
Dinaj-Koci Bahamas	Cluster RCT	Baseline: 537 Follow up: 434	Baseline: 1459 Follow up: 1225	Average age: 15; Objectives: NR. Content: risk avoidance; communication; negotiation strategies and condom-use skills; HIV. Activities: lectures; interactive discussions; games; field visit to the community clinic. Dose/frequency/duration: 10 sessions Theory used: Social Cognitive Model (Protection Motivation Theory)	HFLE curriculum	6 months
Mathews et al. South Africa	Cluster RCT	Baseline: 1748 Follow-up 1: 1650 Follow up 2: 1515	Baseline: 1703 Follow-up 1: 1634 Follow-up 2: 1519	Average: 13; Objectives: Delay sexual debut, increase condom use and decrease intimate partner violence (IPV). Content: values and aspirations related in intimate relationships; assertive communication; gender power inequities; sexual decision-making; IPV and sexual violence; support for victims of IPV and sexual violence. Activities: worksheets; group discussion; story reading; games; role-plays. Dose/frequency/duration: 21 sessions delivered once a week. Theory used: Theory of Reasoned Action and I-Change theoretical model.	No intervention	6 and 12 months
Kemigisha et al. Uganda	Cluster RCT	Baseline: 476 Follow up: 380	Baseline: 620 Follow up: 484	Average age: 12; Objectives: Promote changes in knowledge, attitudes and practices related to sexual health. Content: puberty; relationships and emotions; decision-making; self-esteem skills; reporting of physical and sexual violence; knowing one's rights; STIs; HIV/AIDS and stigma; pregnancy prevention; sexuality, gender and media influence. Activities: role-plays; group discussions; case studies; individual written activities; lectures. Dose/frequency/duration: 11 sessions. Theory used: Theory of Planned Behavior and Social Ecological Model.	NR	2-3 months
Vasilenko et al. USA	RCT	Baseline: 2380 Follow-up 1: NR Follow-up 2: 1941	Baseline: NR Follow-up 1: NR Follow-up 2: NR.	Age range: 12-14; Objectives: prevent pregnancy/HIV/STIs. Content: NR. Activities: NR. Dose/frequency/duration: NR. Theory used: Social Ecological Model.	Wait-list condition	12 and 24 months.
Harrison et al. South Africa	Quasi-experimental	Baseline: 628 Follow-up: 583	Baseline: 305 Follow-up: 341	Age range: 14-17; Objectives: HIV and pregnancy prevention. Content: gender-related attitudes and social norms; self-efficacy; communication; negotiation skills; knowledge, attitudes, and behaviors for HIV/AIDS and pregnancy prevention. Activities: teacher-led classroom sessions with role-plays, vignettes, and demonstrations; participation of nurses and peer educators. Dose/frequency/duration: 15 sessions. Theory used: Gender Empowerment Theory.	Standard government Life Orientation curriculum	5 months.

Continuation Table 1

				and demonstrations; participation of nurses and peer educators. Dose/frequency/duration: 15 sessions. Theory used: Gender Empowerment Theory.		
Lightfoot et al. **USA**	Quasi-experimental	Baseline: 148	Baseline: 169	Age range: 14-15; Objectives: reduce HIV infection risk Content: HIV; stigma; condom use; testing. Activities: interactive theater. Dose/frequency/duration: 3 sessions. Theory used: NR	Standard school curriculum on sexual education	No follow-up
Goesling et al. **USA**	Cluster RCT	Baseline: 779 Follow-up 1: 625 Follow-up 2: 595	Baseline: 755 Follow-up 1: 651 Follow-up 2: 594	Age range: 12-13; Objectives: delay sexual debut, increase knowledge on reproductive health, contraceptive methods and STI transmission, and increase refusal skills. Content: reproductive anatomy; abstinence; refusal skills; STI prevention; sexual orientation; gender identity. Activities: NR. Dose/frequency/duration: 12 lessons of 45 to 90 minutes. Theory used: NR.	No intervention	Follow-up 1: 9-10 months Follow-up 2: 18-19 months
Rotz et al. **USA**	Quasi-experimental	Baseline: 977 Follow-up: NR	Baseline: 545 Follow-up: NR	Average age: 15; Objectives: Reduce sexual risk behaviors. Content: postponing sexual involvement; unintended pregnancy; HIV/STIs prevention; role of alcohol and other drugs in sexual decision-making. Activities: workshops. Dose/frequency/duration: 5 workshops. Theory used: Social Learning Theory, Health Belief Model, and principles of Positive Youth Development.	Wait-list condition	6 months
Fernandez-Santos **USA**	Cohort study	Baseline: 173 (total recruited) Final sample:66	Final sample:69	Age range: 13-14; Objectives: Increase self-efficacy, self-esteem, and HIV/AIDS knowledge and attitudes, while decreasing negative peer pressure, sensation seeking, and invulnerability. Content: NR. Activities: small group discussion; role-plays; debates; brainstorming; patient testimony; critical thinking. Dose/frequency/duration: 8 workshops. Theory used: NR.	HIV/AIDS educational materials	NR.
Klinger & Asgary **Madagascar**	Quasi-experimental	Baseline: 155 Post-Intervention test: 28	No control group	Age range: 15-19; Objectives: introduce a comprehensive program for sexual prevention. Content: STIs; pregnancy prevention; family planning. Activities: interactive and open-discussion sessions; role-plays; jeopardy-style games. Dose/frequency/duration: 6 sessions. Theory used: NR.	No intervention	No follow-up
Escribano et al. **Spain**	Quasi-experimental	Baseline: 622 Post-Intervention test: 519 Follow-up: 395	Baseline: 499 Post-Intervention test: 415 Follow-up: 321	Age range: 14-16; Objectives: Promote condom use and prevent the transmission of HIV/STIs. Content: HIV/AIDS; decision-making; communication about sex; maintaining one's decisions. Activities: group discussions; group games; brainstorming; skill-building activities. Dose/frequency/duration: 5 weekly sessions. Theory used: Social Learning Theory and Information-Motivation-Behavioral Skills Model for AIDS	No intervention	12 months
Maneseri et al. **USA**	Cluster RCT	Baseline: 1735 (intervention and control group) Follow Up: 997	Follow Up: 551	Average age: 12; Objectives: Reduce risk of unintended pregnancy and STIs. Content: healthy relationships; birth control; causes transmission, and prevention of STIs; abstinence; teen pregnancy; decision-making and negotiation skills; self-efficacy. Activities: slides; videos; audio; recordings; role-plays. Dose/frequency/duration: 10 sessions. Theory used: Developmental Assets/Resiliency Model.	Regular Sexual Education Program	12 months
Robinson et al. **USA**	Cluster RCT	Baseline: 5735 (intervention and control group) Post-Intervention test: 1725	Post-Intervention test: 1527	Age range: 11-17; Objectives: To prevent pregnancy. Content: goal-setting; values and decision-making. Activities: small group activities; caring adult support and guidance; community service learning in addition to basic sexuality education. Dose/frequency/duration: 9-month intervention. Theory used: Not reported.	Louisiana: no intervention. Rochester: less intensive work-readiness intervention.	No follow-up
Mathews et al. **South Africa**	Cluster RCT	Baseline: 3.451 (intervention and control group) Post-Intervention test: 1.576 (intervention and control group)		Age range: 13-16; Objectives: Delay sexual debut, increase condom use, change gender norms and power inequities, and improve communication to prevent the use of violence in relationships. Content: values clarification; assertiveness and communication; gender and power; relationships; sexual decision-making; violence; support. Activities: NR. Dose/frequency/duration: 21-session. 6-month intervention. Theory used: NR.	No intervention	No follow-up
Peskin et al. **USA**	RCT	Baseline: 1.222 Follow-up 1: 1004 Follow up 2: 912 Analyzed: 804	Baseline: 1.155 Follow-up 1: 975 Follow up 2: 879 Analyzed: 739	Average age: 12.99; Objectives: To facilitate dialogue. Content: Friendship qualities; dating; sexual behavior. Activities: group-based classroom activities with personalized journaling; individual, tailored, computer-based activities; parent–child homework activities. Dose/frequency/duration: 24 lessons. 2-year intervention. Theory used: NR.	Usual sexual health education program.	12 and 24 months
Duh et al. **USA**	Pre-experimental	Baseline: 120 Post-Intervention test: 74	No control group	Average age: 12; Objectives: Equip students with comprehensive knowledge about sexual health. Content: NR. Activities: Lessons are adapted from the Family Life and Sexual Health Curriculum (FLASH). Dose/frequency/duration: 12 sessions. 1-year intervention. Theory used: NR.	No control group	No follow-up
Espada et al. **Spain**	Cluster RCT	Baseline: 1.563 (intervention and control group) Follow-up 1 (COMPAS): 519 Follow-up 1 (Cuidate): 334 Follow-up 1 (Control Group): 415		Age range: 14-16; Objectives: To promote healthy sexual behaviors and reduce sexual risk. Content: transmission of information; social skills training; problem-solving training; strategies to maintain safer sexual behavior. Activities: interactive activities; group games; role-plays; discussion groups; Dose/frequency/duration: 5 sessions of 50 minutes each. Theory used: Information-Motivation-Behavioral model and the Social Learning Theory	No intervention	1 week

Continuation Table 1

Krugu et al. **Ghana**	RCT	Baseline: 1.934 (intervention and control group) Post-Intervention test: 1.805 (intervention and control group) Follow-up 2: 1.959 (intervention and control group)		Average age: 15.84; Objectives: delay initiating sexual activities; correctly and consistently use condoms, and other contraceptives to protect against STIs/unintended pregnancies; and undertake HIV/STI testing and counselling to know their status, and take measures if necessary. Content: knowledge; attitude; risk perception; self-efficacy; skills; social norms related to the program objectives. Activities: scenario-based risk information; modelling; consciousness raising; persuasive communication; discussion; shifting perspective. Dose/frequency/duration: 11 lessons/1 hour each. Theory used: integrative model of behavioral prediction, the latest formulation of the Theory of Planned Behavior (TPB) that is the Reasoned Action Approach (RAA), Health Belief Model (HBM) and the AIDS Risk Reduction Model.	No intervention	6 months
Potter et al. **USA**	RCT	Baseline: 1725 Follow-up 8: 1496 Follow up 9: 1496	Baseline: 1418 Follow-up 8: 1264 Follow up 9: 1130	Average age: 12.7; Objectives: To evaluate the effectiveness of an evidence-based HIV/STI/pregnancy prevention program. Content: information on reproductive health and pregnancy prevention methods and on the causes; transmission and prevention of STIs; abstinence; negotiation and refusal skills; proper condom use; self-efficacy. Activities: NR. Dose/frequency/duration: 10 sessions; Theory used: Social Learning Theory	Regular Sexual Education Program from each school	1 year

Note. NR: Not reported. RCT: Randomized Controlled Trial

Concerning the quality assessment, most papers succeeded in terms of methodological quality. Most studies reached a score of 5 points. Nonetheless, six articles scored 6 points, and one scored 7. For this review, achieving a score of 5, 6, and 7 was considered a good outcome regarding research quality. The seven articles with lower scores (4, 3, 2, and 0) are the ones that lacked methodological strength in this systematic review. All results of the quality assessment are displayed in Table 2.

Table 2
Quality Assessment of the studies found

Study	I	II	III	IV	V	Sum
Espada et al.	1	2	2	1	1	7
Mathews et al.	1	2	2	1	0	6
Escribano et al.	1	2	1	1	1	6
Potter et al.	1	2	1	1	1	6
Maneseri at al.	1	1	2	1	1	6
Peskin et al.	1	2	1	1	1	6
Krugu et al.	1	2	1	1	1	6
Namisi et al.	1	0	2	1	1	5
Stanton et al.	1	1	2	1	0	5
Rohrbach et al.	0	1	2	1	1	5
Abe et al.	1	1	2	1	0	5
Dinaj-Koci.	1	1	2	1	0	5
Kemigisha et al.	1	0	2	1	1	5
Harrison et al.	1	1	2	1	0	5
Lightfoot et al.	0	2	1	1	1	5
Goesling et al.	1	0	2	1	1	5
Rotz et al.	1	1	1	1	1	5
Mathews et al.	1	1	2	0	1	5
Robinson et al.	0	0	2	1	1	4
Vasilenko et al.	1	0	2	0	1	4
Timol et al.	1	0	1	0	1	3
Taggart et al.	0	2	1	0	0	3
Fernandez-Santos	0	1	1	1	0	3
Klinger e Asgary	1	0	0	0	1	2
Duh et al.	0	0	0	0	0	0

Note. I - Was the sample randomly selected from the population or was there an attempt to test its representativeness? (0/1). II – Were the measures used reliable and valid? (0/1/2). III – Were groups randomly assigned, and were either cluster/stratified randomization or matching and randomization performed? (0/1/2). IV – Were background and baseline measures compared between groups after randomization? (0/1). V – Was statistical analysis appropriate? (0/1).

Discussion

Through the systematic review conducted in the present study, it was possible to conclude that most preventive interventions regarding adolescent sexuality conducted in school-based environments had positive and significant results in improving knowledge about HIV, STIs, and contraceptives. Most interventions seem to have succeeded in informing adolescents about sexuality in a comprehensive manner; however, this aspect did not necessarily lead to changes in behavior.

Further, According to Sani et al. (2016), preventive interventions should reduce the occurrence of sexually transmitted infections. Nevertheless, none of the interventions analyzed in the present article has offered HIV or STI tests to participants. Thus, it can be inferred that the interventions that resulted in significant behavioral changes, such as condom use and delay of sexual debut, are the ones that come closer to that goal.

Moreover, it should be taken into consideration that all the studies included in this systematic review delivered comprehensive sexual health education, providing the participants with information about STIs, prevention, and safer sex practices. That is usually in contrast with abstinence-only education, which is a more limited-scoped type of sexual health curriculum (Advocates for Youth, 2007; Sani et al., 2016; Ott & Santelli, 2007 Woolweaver et al., 2023), which studies have found to be ineffective (Brückner et al., 2005; Goldfarb & Constantine, 2011; Santelli et al., 2007; Trenholm et al., 2007).

Taking into consideration the quality assessment discussed in this systematic review and the importance of behavioral outcomes as results of interventions regarding sexuality, Stanton et al. (2015), Namisi et al. (2015), and Rohrbach et al. (2015) were the studies with the most significant results. They also have excelled in terms of methodological strength. Therefore, it seems essential that we consider, for the purpose of this discussion, the results of these three studies.

Parental involvement was observed in those three studies. Stanton et al. (2015) and Rohrbach et al. (2015) included a specific program to instruct parents. The results of Namisi et al. (2015) were also partially mediated by increased communication with adults (both parents and teachers). It seems that the participation of parents may be a significant variable to consider in further studies regarding sexual health in schools. Parental involvement in school-based preventive interventions might likely increase the effectiveness of programs.

Additionally, the aforementioned interventions included alternative learning techniques, transcending the standard classroom approach. Namisi et al. (2015) intervention involved teacher presentations, group discussions, small group activities, and role-playing. Stanton et al. (2015) used games as a part of their curriculum. The effectiveness

of these techniques is consistent with previous findings from the literature. Levy et al. (2019) found that a broad mix of learning tools can create more effective interventions. However, in the present review, there was no concrete evidence that interventions with a qualitative component are necessarily linked to better results, as Levy et al. (2019) found. Further research in this area should consider that interventions with a wide range of teaching and learning techniques are possibly associated with better outcomes. Researchers in this field should also be encouraged to include qualitative components in their studies, as this seems to be a gap in the literature.

Furthermore, preventive interventions with the most effective results addressed not only topics related to HIV, STIs, condoms, and abstinence but also decision-making and thinking about the possible consequences of having unprotected sex (Stanton et al., 2015). Topics such as gender, gender relations, equality, violence in relationships, and sexual rights were also found in their curriculum (Rohrbach et al., 2015; Namisi et al., 2015). This finding concurs with Ew et al. (2017) that a broad view of sexuality, including its cultural, social, historical, and emotional aspects, is better suited. The present study adds evidence to the literature indicating that the inclusion of broad, comprehensive content is associated with more effective interventions. More studies should test this theory. Today, many countries still mandate that content regarding sexual health should be included only in science or biology classes (Downing et al., 2011; Parker et al., 2009).

Another aspect that might influence the effectiveness of a preventive intervention is its length of time. Interventions in this review were mainly divided into sessions (learning experiences that happened once a week, with specific content for each specific day). The most effective interventions included in this review had, respectively, 8 (Vasilenko et al., 2019), 12 (Rohrbach et al., 2015), 16 (Namisi et al., 2015), and 8 (Stanton et al., 2015) sessions. The average between those four interventions is 11 sessions. Nonetheless, other studies had fewer sessions, such as three (Taggart et al., 2016; Lightfoot et al., 2015) and five (Goesling et al., 2016), or more sessions, such as 21 (Mathews et al., 2016; Mathews et al., 2015) and 24 (Potter et al., 2016). One possible conclusion from these results would be that policymakers and researchers should avoid creating preventive interventions that are either too brief or too long. Studies should further investigate the appropriate length of time in programs trying to promote sexual health among adolescents.

Limitations

Among the limitations of this review, it is essential to outline the fact that it has a cultural bias. Most of the studies analyzed were from the United States. One-third of the studies (approximately) were conducted in African nations. Therefore, a lack of studies from Latin American and Asian countries can be considered an obstacle in analyzing and reviewing the effectiveness of preventive interventions targeted at adolescent sexuality on a global scale.

Moreover, one possible limitation of the current systematic review is that many analyzed studies did not fully report the activities, content, and theory behind them. This limits this study's conclusions significantly since checking each intervention's approach on each topic is not necessarily possible. Nevertheless, future studies should analyze the effectiveness of interventions based on the theoretical framework used, which the present study could not do.

Ultimately, most of the reviewed articles only significantly improved knowledge about sexuality—our discussion points to some possible variables that may increase positive behavioral outcomes. However, future research should focus on understanding why so many interventions fail in this aspect, a question that this article does not tackle. Also, a majority of reviewed studies focused exclusively on heterosexual individuals, which indicates heteronormativity-biased research. The preventive interventions of the analyzed studies often assume opposite-sex sexual relations. Finally, only studies published

in peer-reviewed journals were included in this systematic review. Interventions described in other literary sources (grey literature), such as theses, dissertations, and book chapters, were excluded.

Conclusions

The present systematic review indicates that most preventive school-based interventions regarding adolescent sexuality resulted in knowledge improvement related to preventive strategies, contraceptive methods, and HIV/AIDS. Nonetheless, few studies have led to behavioral changes, such as carrying and using a condom and delaying sexual debut. According to the evidence found through this research, in order to achieve behavioral outcomes, it may be necessary to (1) have a diverse set of learning techniques included in the intervention; (2) engage both teenagers and adults (family and teachers) in the process; and (3) try to include in your curriculum a wide range of content, including communication skills, decision making, gender relations, equity, violence within relationships and communication with partners. Nevertheless, more studies are necessary to fully understand the scope of interventions in adolescent sexuality and create more effective interventions.

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Notes

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