Cogitare Enfermagem

REVIEW

Interventions to prevent Sexually Transmitted Infections among adolescents in school contexts: An integrative review

HIGHLIGHTS

1. Multicomponent interventions were more effective in terms of prevention.
2. HPV vaccination in schools increase adherence and reduce inequalities.
3. Multipurpose technologies expand prevention options for adolescents.
4. Continuing education actions enhance autonomy and safe practices.

João Felipe Tinto Silva[1]
Antônio Rosa de Sousa Neto[1]
Gleciane Costa de Sousa[1]
Ana Maria Ribeiro dos Santos[1]
Márcia Teles de Oliveira Gouveia[1]
Fernanda Valéria Silva Dantas Avelino[1]
Rosilane de Lima Brito Magalhães[1]

ABSTRACT

Objective: To identify interventions focused on preventing Sexually Transmitted Infections and targeted at adolescents in school contexts. **Method:** An integrative literature review conducted during October 2015 in the PubMed, Web of Science and Biblioteca Virtual em Saúde data sources. The selection process followed the Identification, Screening and Eligibility stages, subjecting the studies to thematic analysis. **Results:** Nine primary studies published between 2015 and 2025 were selected for this review. Seven interventions were identified, namely: Structured sex education programs; Promoting safe sexual practices (condom use); Guidance on contraception and double protection; Multipurpose Prevention Technologies (MPTs); HPV vaccination programs in schools (with educational support); SMS reminders to increase adherence to vaccination; and Including boys and gender equality in vaccination. Combined interventions proved to be more effective; however, challenges such as insufficient continuity in terms of the actions implemented, lack of teachers' training programs, regional inequalities and shortage of pedagogical materials are still detected. **Final Considerations:** Integrated interventions enhance prevention and qualify practices in school settings.

DESCRIPTORS: Adolescent; Sexually Transmitted Diseases; Health Promotion; Students; Sex Education.

HOW TO REFERENCE THIS ARTICLE:
Silva JFT, de Sousa Neto AR, de Sousa GC, dos Santos AMR, Gouveia MTO, Avelino FVSD, et al. Interventions to prevent Sexually Transmitted Infections among adolescents in school contexts: An integrative review. Cogitare Enferm [Internet]. 2026 [cited "insert year, month and day"];31:e102455en. Available from: https://doi.org/10.1590/ce.v31i0.102455en

[1]Universidade Federal do Piauí, Programa de Pós-graduação em Enfermagem, Teresina, PI, Brasil.

INTRODUCTION

Sexually Transmitted Infections (STIs) are caused by different pathogenic microorganisms such as viruses, bacteria, fungi and protozoa. The main transmission route is unprotected sexual contact (oral, vaginal, anal) but they can also be transmitted via non-sexual means, even if in lower proportions[1].

The high incidence of STIs represents an important Public Health problem at the global level. In Brazil, the Information System for Mandatory Notification Diseases (*Sistema de Informação de Agravos de Notificação*, SINAN) recorded 718,651 viral hepatitis cases between 2000 and 2021, as well as 434,803 HIV infection cases from 2007 and June 2022 and 1,035,942 acquired syphilis cases between 2011 and 2021 (466,584 in pregnant women and 221,600 congenital syphilis cases), representing the most prevalent STIs[2].

The World Health Organization (WHO) estimates that there are nearly 1.2 billion adolescents in the world, which corresponds to one person aged from 10 and 19 years old out of every six individuals[3-4]. Characterized by physical, psychological and social transformations, this phase constitutes a period marked by vulnerabilities and discoveries, which increases the risk of exposure to unsafe sex behaviors.

In Brazil, STI notifications are more frequent among adolescents, especially in the age group from 10 to 19 years old. Several factors contribute to this reality, namely; flaws in immunization strategies; insufficient resources for diagnosis and treatment; precarious infrastructures in basic health units; shortage of duly trained professionals; and weaknesses in educational actions focused on sexual and reproductive health[5].

In this context, sex behaviors among adolescents and young people represent a challenge for public policies, as they reflect a combination of cognitive and emotional immaturity, peer influence and absence of family communication[6]. Given this, it becomes essential to enhance sex education at schools, addressing topics such as sexuality, STI prevention and health promotion, in addition to fostering communication between adolescents and their family members[7].

School institutions are acknowledged as strategic spaces for health promotion, as they are part of their students' everyday life and allow developing continuous and contextualized educational actions. Consequently, they are privileged settings to implement effective strategies focused on STI prevention and on mitigating social vulnerabilities[8-9].

Thus, the objective of this review was to identify interventions focused on preventing Sexually Transmitted Infections and targeted at adolescents in school contexts.

METHOD

This is an Integrative Literature Review (ILR) of an exploratory and descriptive nature and with a qualitative approach, grounded in a methodological framework widely recognized in the Health area, which enabled synthesizing diverse evidence from different methodological designs, allowing reaching a comprehensive and integrated understanding of the phenomenon researched[10]. This study modality is used in the Evidence-Based Practice (EBP) scope, as it allows for a critical synthesis of diverse theoretical and empirical knowledge, contributing to in-depth understanding of the phenomena researched, to defining concepts, to reviewing theories and to analyzing varied available evidence[11].

The review was conducted following six methodological stages: (1) Identifying the topic and formulating the research question; (2) Defining the inclusion and exclusion

criteria; (3) Searching for materials in databases; (4) Selecting and categorizing studies; (5) Analyzing and interpreting the results; and (6) Presenting the knowledge synthesis[10].

The guiding question was structured based on the PICo mnemonic rule; this acronym is used as a guide to formulate research questions in qualitative and integrative reviews. In this context, P (Population or Problem) corresponded to the adolescents, I (Interest) was STI primary prevention and Co (Context) was represented by school settings. Consequently, the PICo strategy served as a guide to identify the problem and to outline the following research question: Which interventions for preventing Sexually Transmitted Infections targeted at adolescents in school contexts are described in the scientific literature?

The inclusion criteria corresponded to primary and original studies answering the research question and published in the last ten years (2015-2025). There were no language restrictions. Gray Literature materials such as theses, dissertations, course conclusion papers, protocols, editorials, letters to the editor, experts' opinions, abstracts from event annals and unindexed book chapters were not included.

The bibliographic survey was conducted in October 2026 by resorting to remote access to the data sources via the Journals Portal held by the Coordination Office for the Improvement of Higher Education Personnel (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*, CAPES) through the Federated Academic Community (*Comunidade Acadêmica Federada*, CAFe), with due access provided by the Federal University of Piauí (*Universidade Federal do Piauí*, UFPI).

The data sources consulted were as follows: *Biblioteca Virtual em Saúde* (BVS), Medical Literature Analysis and Retrieval System Online (MEDLINE/PubMed) and Web of Science – Core Collection. All searches were made using the advanced research method.

Structured vocabularies and controlled descriptors were used to devise the search strategies, as per the *thesauri* adopted by the main scientific databases: *Descritores em Ciências da Saúde* (DeCS) and Medical Subject Headings (MeSH). The process to select the descriptors was based on the PICo strategy components, ensuring thematic standardization and scope.

The strategies consisted in different combinations of controlled and uncontrolled descriptors (keywords) by means of Boolean operators (AND and OR) and adapted according to the indexation logics and specificities inherent to each database consulted. The full strategies applied in each database are detailed in Chart 1.

Chart 1. Search strategy applied in the data sources. Teresina, PI, Brazil, 2025

(continue)

Databases/ Information sources*	Search terms
PubMed® *All Fields*	((((((((("Primary Prevention"[MeSH Terms])))) OR ("Prevention, Primary"[Title])) OR ("Disease Prevention, Primary"[Title])) AND ("Students"[MeSH Terms])))) OR ("Student"[Title]) AND ("Sexually Transmitted Diseases"[MeSH Terms])) OR ("Disease, Sexually Transmitted"[Title])) OR ("Diseases, Sexually Transmitted"[Title]))) OR ("STIs"[Title])) OR ("STI"[Title])
Web of Science™ Core Collection *All Fields*	((adolescen* OR youth* OR teen*) AND ("primary prevention" OR "primordial prevention") AND ("sexually transmitted infect*" OR "sexually transmitted disease*" OR STI* OR STD*) AND (student* OR schoolchild*))

Chart 1. Search strategy applied in the data sources. Teresina, PI, Brazil, 2025

(conclusion)

Databases/ Information sources*	Search terms
BVS *Title, Abstract and Keywords*	(Adolescente) OR (Adolescência) OR (Adolescentes) OR (Jovem) OR (Jovens) OR (Juventude) AND ("Prevenção Primária") OR ("Prevenção de Doença, Primária") OR ("Prevenção Primária da Doença") OR ("Prevenção Primária das Doenças") OR ("Prevenção Primária de Doença") OR ("Prevenção Primária de Doenças") AND ("Infecções Sexualmente Transmissíveis") OR ("DST") OR ("DSTs") OR ("Doença Sexualmente Transmissível") OR ("Doença Sexualmente Transmissível (DST)") OR ("Doenças Sexualmente Transmissíveis") OR ("Doenças Sexualmente Transmissíveis (DST)") OR ("Doenças Sexualmente Transmitidas") OR ("Doenças Venéreas") OR ("Doenças de Transmissão Sexual") OR ("IST") OR ("Infecções Sexualmente Transmitidas") AND (Estudantes) OR (Aluno) OR (Alunos) OR ("Egressos Universitários") OR (Estudante) OR ("Estudante Universitário") OR ("Matrícula Escolar")

Source: The authors (2025).

The studies identified in each data source were exported and organized into specific folders, duly identifying the individual number of records. Subsequently, the files were imported into the *Rayyan Web* platform developed by the *Qatar Computing Research Institute* (QCRI), which uses a semi-automated screening system renowned for its high usability and efficacy degree in study selection processes[12].

The initial stage consisted in identifying and excluding duplicates. Subsequently, the materials were screened by titles and abstracts, to then read the eligible studies in full according to the previously defined inclusion and exclusion criteria and to their adherence to the guiding question. It is noted that the selection process was in charge of two independent and blinded reviewers, ensuring more rigor and methodological reliability.

The search and selection stages were conducted according to the recommendations set forth in the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA 2020), which proposes a theoretical-methodological model consisting in a flowchart divided into four phases, namely: *Identification*, *Screening*, *Eligibility* and *Inclusion*, in addition to a 27-item checklist[13]. The flowchart corresponding to the process followed in this review is presented in Figure 1.

After selecting the studies to be included, two reviewers extracted the data independently using a table-format instrument developed by the authors to collect and organize the main findings. The purpose of this proprietary tool was to systematically characterize the studies that comprised the sample.

Although the initial extraction step included several variables, it was decided to only present the most relevant data for the review objectives in the chart, in order to ensure greater clarity and conciseness. Levels of evidence as per the *Oxford Centre for Evidence-Based Medicine*[14] were included among the data selected, so as to qualify the methodological rigor of the research studies analyzed.

Once both reviewers had completed the data collection process, all the information was compared, consolidated and synthesized to include it in this review. The data condensation technique was employed in the Presenting the results stage, with the purpose of integrating the findings and evidencing existing gaps in the literature. This

process involved a critical analysis and thematic categorization of the results, grouped into conceptual categories. The data were presented in a descriptive way by means of simple counts organized in a chart, and complemented by a schematic figure that synthesizes the analytical categories identified[10].

It is noted that no reference manager software program was used in this study: due bibliographic control was implemented manually in a recording spreadsheet. For being a review, this study was not subjected to analysis by any Research Ethics Committee.

RESULTS

A total of 571 publications were identified, removing 379 of them due to duplicity. After the screening stage and reading titles and abstracts, 107 studies were selected for full-reading. Five of them were not retrieved and 93 were excluded for not meeting the eligibility criteria, resulting in nine articles that were included in the review (Figure 1).

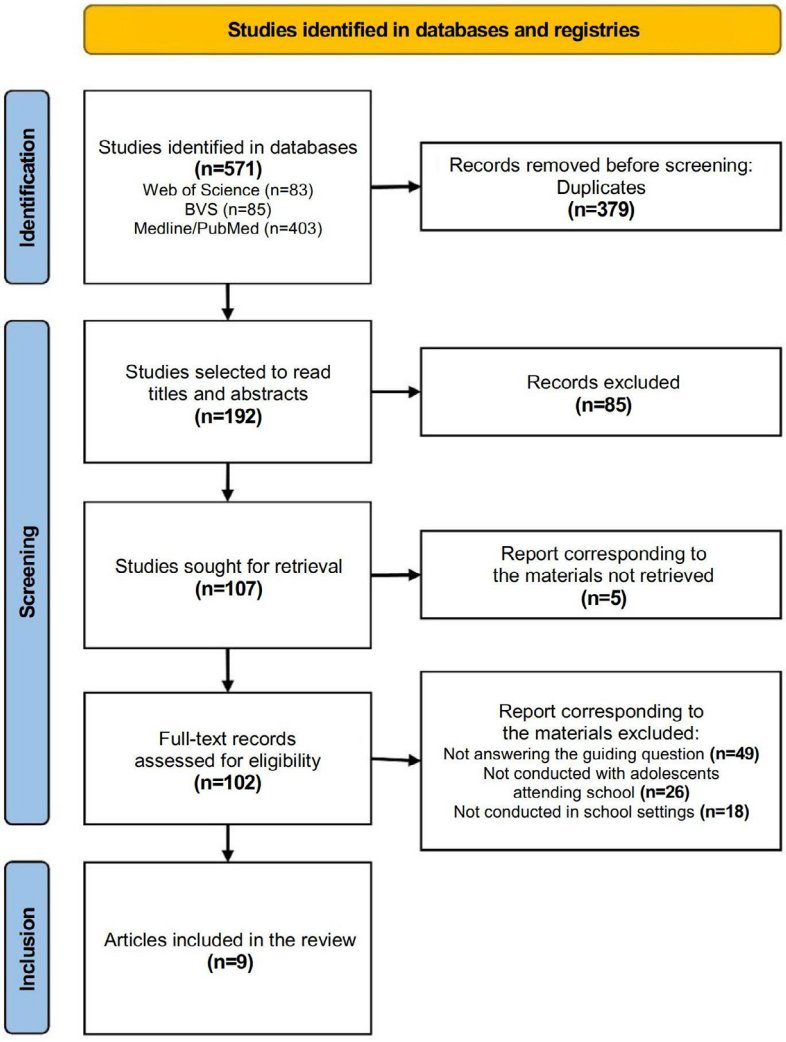

Figure 1. Flowchart showing the process followed to identify, screen and include the articles. Teresina, PI, Brazil, 2025

Source: Adapted from Page MJ *et al.*[13]

A sample comprised by nine studies was obtained from the articles that met the inclusion criteria, as presented in Chart 2. The publications covered the 2015-2021 period, with predominance of research studies conducted in Australia (30%), the United States (20%) and Brazil (20%).

As for methodological designs, randomized clinical trials prevailed with 60%, followed by cross-sectional (20%), descriptive (10%) and qualitative (10%) studies. Their levels of evidence varied between 1b and 4, indicating predominance of research studies with high scientific reliability levels and robust methodologies, capable of grounding consistent conclusions about the effectiveness of the interventions analyzed.

Chart 2. Synthesis of the studies included, according to authors, objectives, main results and levels of evidence. Teresina, PI, Brazil, 2025

(continue)

No.	Authors / Year / Country	Type of Study / Level of Evidence (Oxford)	Main Objective	Main Results
1	Bauman et al., 2021, USA[15]	Randomized clinical trial (educational intervention) / 1b	To assess the efficacy of the "Project Prepared" program in preventing VIH/STI among adolescents aged between 12 and 14 years old.	Significant improvements in terms of knowledge, sexual self-efficacy and positive expectations regarding condom use, the effect was maintained in boys and girls alike.
2	Davies et al., 2021, Australia[16]	Cluster randomized clinical trial / 1b	To assess the effect exerted by a school-based intervention on knowledge, anxiety and self-confidence in relation to HPV vaccination.	The intervention enhanced engagement in decisions, reduced anxiety and improved vaccination self-efficacy, the effect was maintained until the end of the scheme.
3	Balle et al., 2020, South Africa[17]	Randomized clinical trial (secondary analysis) / 1b	To compare the effect exerted by three hormonal contraceptive methods (oral, injectable and vaginal ring) on the incidence of STIs and bacterial vaginosis among adolescents.	High overall incidence of STIs; using the Net-En injectable contraceptive method was associated with higher Mycoplasma genitalium risk; combined contraceptive methods (COCs) reduced the relative risk when compared to vaginal ring.
4	Podgorski et al., 2019, Brazil[18]	Cross-sectional study / 2b	To identify factors associated with adherence to HPV vaccination in adolescents.	Adherence was higher among girls and when family and school guidance was provided; main barriers: fear of adverse effects and disinformation.
5	Grandahl et al., 2019, Sweden[19]	Qualitative study (interviews) / 3b	To explore perceptions, information sources and vaccination intention regarding HPV among boys.	Two main topics: (1) Equality in health and (2) Information as a factor that eases decision-making; adolescents advocate for vaccination in both genders.
6	Tull et al., 2019, Australia[20]	Randomized clinical trial / 1b	To test the impact exerted by SMS messages sent to parents to improve HPV vaccination rates among adolescents.	The vaccination rate was significantly higher among the groups that were sent SMS reminders, with motivational and self-regulation messages being equally effective.

Chart 2. Synthesis of the studies included, according to authors, objectives, main results and levels of evidence. Teresina, PI, Brazil, 2025

(conclusion)

No.	Authors / Year / Country	Type of Study / Level of Evidence (Oxford)	Main Objective	Main Results
7	Hynes et al., 2018, USA[21]	Analytical and cross-sectional study / 2b	To assess young women's interest in Multipurpose Prevention Technologies (MPTs) against VIH, STIs and unintended pregnancies.	83% showed interest in MPTs; more pronounced among users of contraceptive methods and those concerned about STIs; less pronounced among those not using preventive methods.
8	Maciel et al., 2017, Brazil[22]	Quantitative and descriptive study / 4	To describe sexual behaviors among adolescents attending public schools from Bahia.	High rate of early sexarche and unprotected relations; only half of the participants mentioned regular use of contraceptive methods; main method: condoms.
9	Jemmott et al., 2015, South Africa[23]	Randomized clinical trial (longitudinal follow-up) / 1b	To assess long-term effects exerted by an intervention designed to reduce the VIH/STI risk among adolescents.	Sustained reduction in number of unprotected relations and incidence of curable STIs; positive effects on preventive beliefs and behaviors.

Source: The authors (2025).

Seven approaches were identified when analyzing the interventions, with Structured sex education programs, Promoting safe sexual practices (condom use), Guidance on contraception and double protection, Multipurpose Prevention Technologies (MPTs), HPV vaccination programs in schools (with educational support), SMS reminders to increase adherence to vaccination and Including boys and gender equality in vaccination standing out (Chart 3).

Chart 3. Interventions related to STI prevention among adolescents in school contexts, according to the thematic categories identified. Teresina, PI, Brazil, 2025

(continue)

No.	Intervention	Description
01	Structured sex education programs	Implementing multisession school programs based on behavioral theories, with content on VIH/STIs, gender norms, communication, emotional competencies and decision-making. They improve knowledge and self-efficacy and reduce risk behaviors[15,23].
02	Promoting safe sexual practices (condom use)	Developing continuous actions on vulnerabilities, prevention, negotiation and consistent condom use. Relevant given the high frequency of unprotected sexual relations among adolescents[22].
03	Guidance on contraception and double protection	Offering guidance about contraceptive methods, reinforcing that only condoms prevent STIs. Fostering combined use (Contraceptive method(s) + Condom) and informed decisions[17].
04	Multipurpose Prevention Technologies (MPTs)	Presenting innovating technologies that combine simultaneous contraception and STI/VIH prevention (such as vaginal rings, gels and methods under study), expanding the adolescents' prevention repertoire[21].
05	HPV vaccination programs in schools (with educational support)	Offering vaccination directly in schools, along with educational materials that mitigate fear and disinformation, enhance autonomy and improve adherence to vaccination schemes. Diverse evidence shows greater vaccination coverage when schools adopt an active role[16,18].

Chart 3. Interventions related to STI prevention among adolescents in school contexts, according to the thematic categories identified. Teresina, PI, Brazil, 2025

(conclusion)

No.	Intervention	Description
06	SMS reminders to increase adherence to vaccination	Sending SMS messages to parents/guardians reminding them about the dates of the doses. Simple, low-cost and highly effective strategy to improve vaccination coverage in school-based programs[20].
07	Including boys and gender equality in vaccination	Including male adolescents in HPV campaigns and guidelines to reinforce collective protection and reduce transmission. Boys consider that schools are the perfect places for them to be provided with information and be vaccinated[18-19].

Source: The authors (2025).

The interventions identified were organized into a visual model comprised by two inter-related central categories (Figure 2). The first one (Integrated sex education and behavioral prevention strategies) comprises educational actions targeted at enhancing knowledge and adopting safe practices. The second one (Promoting HPV vaccination in school contexts) encompasses interventions focused on improving adherence to vaccination schemes and on expanding collective protection. Together, these categories synthesize the main STI prevention axes in school settings.

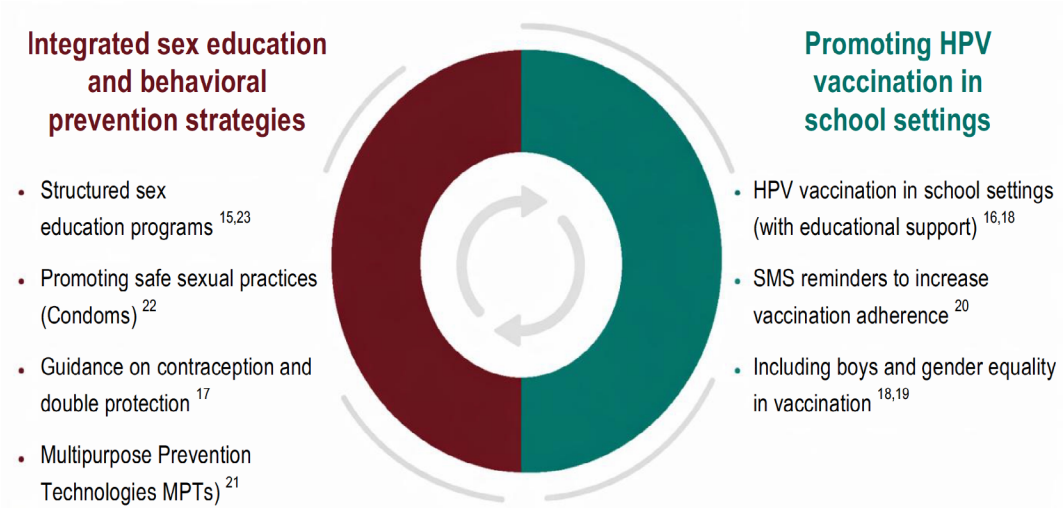

Figure 2. Synthesis of the STI prevention thematic categories identified in the review. Teresina, PI, Brazil, 2025

Source: The authors (2025).

DISCUSSION

The findings of this review allowed organizing strategies aimed at preventing STIs among adolescents in school contexts into inter-related categories, evidencing that multicomponent interventions are superior in terms of performance.

The literature has shown that single strategies tend to generate one-time and less sustainable effects, whereas integrated approaches enhance engagement, strengthen decision-making skills and favor long-lasting changes. Thus, STI prevention in school contexts should be understood as a continuous process that requires articulated and diversified actions sensitive to the dynamics inherent to these educational settings[24].

Health education has perpetuated itself as a central activity to shape safe practices among adolescents. This proposal synthesizes interventions that combine information, skills development and decision-making support, pointing out that structured and continuous actions tend to generate more consistent changes. Based on that, some of the studies analyzed have reinforced the role of schools as strategic spaces to promote protective knowledge and behaviors.

Structured sex education programs emerge as the most solid strategy, especially when anchored in behavioral theories and developed in multisession format. These programs favor gradual knowledge internalization, favor socioemotional competencies and enhance negotiation and decision-making capabilities, allowing adolescents to turn information into concrete preventive behaviors[15,23].

In the Brazilian context, several experiences accumulated in the scope of the Health at School Program (*Programa Saúde na Escola*, PSE) evidenced that continuous educational interventions integrated to pedagogical routines and supported by due articulation between the Health and Education areas significantly expand the students' access to qualified information, strengthen bonds, favor participation of families and render prevention actions more effective. These findings show that structured and intersectoral strategies outdo the logic of one-time actions, contributing to comprehensive education that includes self-care skills and competencies to reduce vulnerabilities among children and adolescents[25].

Promoting consistent condom use is still one of the main challenges in STI prevention. In this scenario, schools assume a strategic role because they offer protected spaces for discussing vulnerabilities, demystifying taboos and developing competencies that help adolescents deal with peer pressure, hasty decisions and risk situations[22].

In this context, the literature evidences that decision-making on condom use among adolescents is strongly permeated by emotional and social elements such as fear of pregnancy, concern about sexually transmitted infections, uncertainties regarding partners' fidelity and fear of consequences at the family and community levels[17]. These affective factors work simultaneously on rational risk assessments, exerting a direct influence on the ability to negotiate safe practices and the chances for consistent condom use. Consequently, school-based interventions that integrate information, emotional support and development of decision-making skills stand out as essential strategies to enhance the adolescents' autonomy and favor protective choices in the Sexual Health field[26].

As for inadequate knowledge on contraception and double protection, many adolescents still associate hormonal contraceptive methods with STI prevention, which represents a significant risk[23]. The studies included show that educational interventions which clearly explain the differences between pregnancy and infection prevention are fundamental for duly informed choices, in line with another study[17].

The recent literature reinforces such findings by showing that many adolescents are unaware of fundamental aspects inherent to the hormonal and long-lasting methods, presenting doubts regarding eligibility, safety, and effects on fertility and (particularly relevant) on protection against infections. Only part of them acknowledge that hormonal methods such as intrauterine implants and devices do not protect against STIs, evidencing that wrong interpretations about double protection still persist and intensifying vulnerability situations. These results show that educational interventions should explicitly address the differences between pregnancy prevention and infection prevention, deconstructing myths and qualifying the adolescents' decision making processes[27].

Multipurpose Prevention Technologies (MPTs) stand out as an innovating strategy in the combined prevention field, although still scarcely present in the adolescents'

everyday life[21]. Despite the interest identified (especially among those who were more aware of preventive practices), it is noticed that familiarity with these methods remains limited and little explored in school settings.

This low circulation of information contributes for young people to still not perceive MPTs as a concrete care option, evidencing the need to add dialogical spaces and to strengthen educational processes that will bridge gaps between these technologies and the students' reality[21].

The recent literature reinforces this need when it shows that MPT acceptability is associated with clearly understanding their action mechanisms, with safety perceptions and with the opportunity to learn different application modalities, such as vaginal rings, oral tablets and injectable technologies. On the other hand, diverse evidence indicates that previous familiarity and direct contact with these devices enhance confidence, thus increasing the chances of adopting MPTs in the future. Therefore, educational interventions that present these technologies in an accessible and contextualized way are essential to expand their acceptability and favor better informed preventive choices[28].

Regarding HPV vaccination promotion in school contexts, the weight of biomedical strategies combined with educational approaches stands out. These data evidence that, associated with due communication with students and families, organizing vaccination programs in schools contributes to improving adherence and to reducing inequalities. Based on this, the literature findings allow discussing how vaccination interventions have consolidated as an essential prevention component in school settings.

When implemented in school contexts, HPV vaccination stood out as one of the most impactful biomedical interventions. Despite that, there are still inequalities in terms of adherence influenced by gender, disinformation, vaccination hesitation and communication flaws among schools, families and health services, evidencing the need for better integrated and culturally sensitive strategies[16,18].

In this context, it is noted that HPV vaccination coverage varies significantly across institutions even in structured school-based programs. An analysis performed in educational institutions from Sydney identified significant differences associated with type of school, frequency pattern and organizational context, with coeducational schools presenting lower vaccination rates when compared to single-gender ones. In addition to that, vaccination coverage varied from 25% to 98%, revealing substantial inequalities that remain concealed when only overall mean values are observed. These findings underscore that school-related, social and cultural factors exert a direct influence on adherence, reinforcing the need for better targeted strategies that are sensitive to the specificities inherent to each educational community[29].

Also in relation to HPV vaccination, the review findings showed that SMS reminders for parents and guardians represent a simple, low-cost and extremely effective strategy to increase vaccination adherence. The studies analyzed indicate significantly higher vaccination rates among those that were sent motivational or informative messages[20].

Diverse recent evidence reinforces this finding by showing that sending automated reminders (either via SMS or phone calls) significantly increases the chances of completing the necessary doses from the vaccination scheme. In a randomized trial conducted in Uganda, the adolescents whose guardians were sent reminders presented almost twice the chances of being vaccinated within he recommended time frame (65.4% *versus* 35.5%), with a Number Needed to Treat of only 3.4 families. These results confirm that simple, culturally adequate and customized digital interventions are promising tools to expand vaccination coverage and reduce delays in the HPV scheme[30].

Consequently, including boys in educational actions and in vaccination campaigns stood out as an essential aspect to achieve gender equality and collective protection.

The review highlighted that male adolescents show interest in understanding HPV, acknowledge their role in the transmission process and legitimize schools as privileged information spaces[18-19].

This perspective is supported by analyses that evidence the breadth of the impact exerted by HPV on men's health, revealing that men are not only part of the transmission chain but also significantly affected by relevant infections and clinical outcomes. It is also noted that the immune response is limited in males, which favors reinfections and perpetuated viral circulation. Given this scenario, it is necessary to devise immunization programs that are unbiased in terms of gender, as they expand protection in the population, reduce the burden of the disease in both genders and meet the international recommendations signaling male vaccination as a strategic component to attain the global targets regarding the elimination of HPV-related tumors. Such approach outdoes the logic historically centered on women and reinforces prevention co-accountability between boys and girls, in addition to contributing to reducing inequalities and enhancing gender-based justice in sexual and reproductive health [31].

Consequently, when comparing the strategies identified, it is observed that STI prevention among adolescents requires interventions that combine individual, social and structural factors, as suggested in the studies analyzed. Although structured educational programs, actions targeted at consistent condom use, contraception guidelines, multipurpose technologies, HPV vaccination in schools and SMS reminders have shown effectiveness potential, important challenges have also arisen. The following ones stand out: lack of continuity of educational actions; gaps in teachers' training; regional inequalities in vaccination coverage; and scarcity of updated pedagogical materials. All these elements tension due implementation of the strategies and limit their scope in school routines.

In addition, traditional sex education models still do not suffice to meet the adolescents' needs, as they undergo rapid transformations and face contexts marked by disinformation and access barriers. Better structured, participatory and methodologically standardized interventions tend to produce more consistent results, especially when including technological elements and active learning experiences capable of promoting greater engagement and favoring behavioral changes over time[32].

The main limitation of this study concentrates on the predominance of surveys conducted in high-income countries.

FINAL CONSIDERATIONS

The results of this review evidenced that multicomponent interventions that combine educational, behavioral, technological and biomedical actions are more effective in preventing STIs among adolescents in school settings. Interventions such as structured sex education programs, promoting consistent condom use, multipurpose technologies, HPV vaccination and SMS reminders showed potential to enhance knowledge, strengthen the students' autonomy and favor safer preventive practices.

The contribution of this review lies in having synthesized diverse up-to-date evidence on effective preventive practices and organized strategies that may assist health managers, educators and professionals, supporting the implementation of educational and strategic prevention actions in school contexts, in addition to supporting health promotion and prevention public policies.

REFERENCES

1. Corrêa MLN, Alves MES, Santana PP, Maciel VS, Belasco AGS, Calandrini TSS, et al. Development of educational technology on sexually transmitted infections for adolescent students. Rev Bras Enferm [Internet]. 2026 [cited 2025 Nov 29];79:e20250024. Available from: https://doi.org/10.1590/0034-7167-2025-0024

2. Ministério da Saúde (BR). Protocolo Clínico e Diretrizes Terapêuticas para Atenção Integral às Pessoas com Infecções Sexualmente Transmissíveis (IST) [Internet]. Brasília: Ministério da Saúde; 2022 [cited 2025 Nov 30]. 211 p. Available from: https://www.gov.br/aids/pt-br/central-de-conteudo/pcdts/2022/ist/pcdt-ist-2022_isbn-1.pdf/view

3. World Health Organization (WHO). Adolescent and young adult health [Internet]. Geneva: WHO; 2024 [cited 2025 Nov 30];Newsroom.[about 9 screens]. Available from: https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions

4. Metelski FK, Coelho B, Meirelles BHS, de Sousa FM, Vendruscolo C, de Mello ALSF. Educational practices on Sexually Transmitted Infections in light of complex thinking. Saúde debate [Internet]. 2025 [cited 2025 Nov 16];49(144):e9290. Available from: https://doi.org/10.1590/2358-289820251449290P

5. de Andrade PSP, Barros KRS, dos Santos JP, do Nascimento EF, Bacelar PAA. Conhecimento de adolescentes e jovens sobre questões relacionadas ao sexo, em uma escola pública de Monte Alegre do Piauí-PI. Gerais, Rev Interinst Psicol [Internet]. 2021 [cited 2025 Nov 11];14(2):1-23. Available from: http://dx.doi.org/10.36298/gerais202114e16279

6. Bonett S, Tam V, Singapur A, Min J, Koenig HC, Wood SM. Incidence of syphilis infection and syphilis-related care utilization among adolescents and young adults living with HIV. Int J STD AIDS [Internet]. 2022 [cited 2025 Nov 28];33(2):136-43. Available from: http://dx.doi.org/10.1177/09564624211048774

7. Maesima GM, Gomes MA. Medidas socioeducativas em meio aberto: apontamentos oriundos de uma revisão narrativa. Psicol Polít [Internet]. 2022 [cited 2025 Nov 30];22(55):637-53. Available from: https://submission-pepsic.scielo.br/index.php/rpp/article/view/21819

8. Jourdan D, Gray NJ, Barry MM, Caffe S, Cornu C, Diagne F, et al. Supporting every school to become a foundation for healthy lives. Lancet Child Adolesc Health [Internet]. 2021 [cited 2025 Nov 30];5(4):295-303. Available from: https://doi.org/10.1016/S2352-4642(20)30316-3

9. Bastos PO, Cavalcante ASP, Pereira WMG, Castro VHS, Ferreira Júnior AR, Guerra PH, et al. Health Promoting School interventions in Latin America: a systematic review protocol on the dimensions of the RE-AIM framework. Int J Environ Res Public Health [Internet]. 2020 [cited 2025 Nov 30];17(15):5558. Available from: https://doi.org/10.3390/ijerph17155558

10. Whittemore R, Knafl K. The integrative review: updated methodology. J Adv Nurs [Internet]. 2005 [cited 2025 Nov 30];52(5):546-53. Available from: https://doi.org/10.1111/j.1365-2648.2005.03621.x

11. Lockwood C, Munn Z, Porritt K. Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. Int J Evid Based Healthc [Internet]. 2015 [cited 2025 Nov 30];13(3):179-87. Available from: https://doi.org/10.1097/XEB.0000000000000062

12. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan - a web and mobile app for systematic reviews. Syst Rev [Internet]. 2016 [cited 2025 Nov 30];5:210. Available from: https://doi.org/10.1186/s13643-016-0384-4

13. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ [Internet]. 2021 [cited 2025 Nov 30];372:n71. Available from: https://doi.org/10.1136/bmj.n71

14. Howick J, Chalmers I, Glasziou P, Greenhalgh T, Heneghan C, Liberati, et al. The 2011 Oxford (OCEBM Levels of Evidence: introductory document. Oxford: Oxford Centre for Evidence-Based Medicine [Internet]; 2011 [cited 2025 Nov 30]. 1 p. Available from: https://www.cebm.ox.ac.uk/resources/levels-of-evidence/levels-of-evidence-introductory-document

15. Bauman LJ, Watnick D, Silver EJ, Rivera A, Sclafane JH, Rodgers CRR, et al. Reducing HIV/STI risk among adolescents aged 12 to 14 years: a randomized controlled trial of Project Prepared Prev Sci [Internet]. 2021 [cited 2025 Nov 30];22:1023-35. Available from: https://doi.org/10.1007/s11121-021-01203-0

16. Davies C, Marshall HS, Zimet G, McCaffery K, Brotherton JML, Kang M, et al. Effect of a school-based educational intervention about the human papillomavirus vaccine on psychosocial outcomes among adolescents: analysis of secondary outcomes of a cluster randomized trial. JAMA Netw Open [Internet]. 2021 [cited 2025 Nov 30];4(11):e2129057. Available from: https://doi.org/10.1001/jamanetworkopen.2021.29057

17. Balle C, Gill K, Konstantinus IN, Jaumdally SZ, Lennard K, Esra R, et al. Hormonal contraception and risk of STIs and bacterial vaginosis in South African adolescents: secondary analysis of a randomised trial. Sex Transm Infect [Internet]. 2021 [cited 2025 Nov 30];97:112-7. Available from: https://doi.org/10.1136/sextrans-2020-054483

18. Podgorski T, Andrade VRM, Vargas FA, Oliveira TB. Adesão de adolescentes à vacinação contra o Papilomavírus Humano em um município da Região Sul do Brasil. Rev Epidemiol Controle Infecç [Internet]. 2019 [cited 2025 Nov 30];9(4):258-63. Available from: https://doi.org/10.17058/.v9i4.12922

19. Grandahl M, Nevéus T, Dalianis T, Larsson M, Tydén T, Stenhammar C. 'I also want to be vaccinated!' - adolescent boys' awareness and thoughts, perceived benefits, information sources, and intention to be vaccinated against Human papillomavirus (HPV). Hum Vaccin Immunother [Internet]. 2019 [cited 2025 Nov 30];15(7-8):1794-802. Available from: https://doi.org/10.1080/21645515.2018.1551670

20. Tull F, Borg K, Knott C, Beasley M, Halliday J, Faulkner N, et al. Short message service reminders to parents for increasing adolescent human papillomavirus vaccination rates in a secondary school vaccine program: a randomized control trial. J Adolesc Health [Internet]. 2019 [cited 2025 Nov 30];65:116-23. Available from: https://doi.org/10.1016/j.jadohealth.2018.12.026

21. Hynes JS, Sales JM, Sheth AN, Lathrop E, Haddad LB. Interest in multipurpose prevention technologies to prevent HIV/STIs and unintended pregnancy among young women in the United States. Contraception [Internet]. 2018 [cited 2025 Nov 30];97(3):277-84. Available from: https://doi.org/10.1016/j.contraception.2017.10.006

22. Maciel KMN, Andrade MS, Cruz LZ, Fraga CDS, Paixão GPN, Souza RS. Caracterização do comportamento sexual entre adolescentes. Rev emfem UERJ [Internet]. 2017 [cited 2025 Nov 30];25:e23496. Available from: https://www.semanticscholar.org/paper/Caracteriza%C3%A7%C3%A3o-do-comportamento-sexual-entre-of-de-Maciel-Andrade/064ceb749eba4c7adbe4a99e819218071823fbab

23. Jemmott JB III, Jemmott LS, O'Leary A, Ngwane Z, Lewis DA, Bellamy SL, et al. HIV/STI risk-reduction-intervention efficacy with South African adolescents over 54 months. Health Psychology [Internet]. 2015 [cited 2025 Nov 30];34(6):610-21. Available from: https://doi.org/10.1037/hea0000140

24. Putri YHS, Maryati I, Solehati T. Interventions to improve sexual and reproductive health related knowledge and attitudes among adolescents: a scoping review. Risk Manag Healthc Policy [Internet]. 2025 [cited 2025 Nov 30];18:105-16. Available from: https://doi.org/10.2147/RMHP.S490395

25. Rumor PCF, Heidemann ITSB, de Souza JB, Manfrini GC, de Souza JM. School Health Program: potential and limits of the intersectoral articulation to promote the health of children. Saúde Debate [Internet]. 2022 [cited 2025 Nov 30];46(Esp 3):116-28. Available from: https://doi.org/10.1590/0103-11042022E308

26. Davids EL, Zembe Y, de Vries PJ, Mathews C, Swartz A. Exploring condom use decision-making among adolescents: the synergistic role of affective and rational processes. BMC Public Health [Internet]. 2021 [cited 2025 Nov 30];21:1894. Available from: https://doi.org/10.1186/s12889-021-11926-y

27. Kirubarajan A, Li X, Yau M, Yu C, Got T, Li Q, et al. Awareness, knowledge, and misconceptions of adolescents and young people regarding long-acting reversible contraceptives: a systematic review and meta-analysis. Fertil Steril [Internet]. 2022 [cited 2025 Nov 30];118(1):168-79. Available from: https://doi.org/10.1016/j.fertnstert.2022.03.013

28. Young IC, Benhabbour SR. Multipurpose prevention technologies: oral, parenteral, and vaginal dosage forms for prevention of hiv/stis and unplanned pregnancy. Polymers [Internet]. 2021 [cited 2025 Nov 30];13(15):2450. Available from: https://doi.org/10.3390/polym13152450

29. McIndoe L, Wilson E, Ferson MJ, Sheppeard V. Beyond averages: unpacking disparities in school-based vaccination coverage in eastern sydney: an ecological analysis. Vaccines [Internet]. 2024 [cited 2025 Nov 30];12(8):888. Available from: https://doi.org/10.3390/vaccines12080888

30. Kitaka SB, Rujumba J, Zalwango SK, Pfeffer B, Kizza L, Nattimba JP, et al. SEARCH study: text messages and automated phone reminders for hpv vaccination in uganda: randomized controlled trial. JMIR Mhealth Uhealth [Internet]. 2025 [cited 2025 Nov 30];13:e63527. Available from: https://doi.org/10.2196/63527

31. Naidoo D, Govender K, Mantell JE. Breaking barriers: why including boys and men is key to HPV prevention. BMC Med [Internet]. 2024 [cited 2025 Nov 30];22:525. Available from: https://doi.org/10.1186/s12916-024-03701-8

32. Sierra-Yagüe A, Zafra-Agea JA, Aguilar-Quesada A, González-Cano-Caballero M, Del-Pino-Casado R, Lima-Serrano M. A systematic review and meta-analysis of gamified affective sexual health interventions in schools. Sex Res Soc Policy [Internet]. 2025 [cited 2025 Nov 30]. Available from: https://doi.org/10.1007/s13178-025-01118-3

Received: 09/12/2025
Approved: 01/10/2026
Associate editor: Dr. Josielson Costa da Silva

Corresponding author:
João Felipe Tinto Silva
Universidade Federal do Piauí
Av. Universitária, s/n, Ininga, 64049-050, Teresina, PI, Brasil.
E-mail: felipetinto99@gmail.com

Role of Authors:
Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - **Silva JFT, de Sousa Neto AR, de Sousa GC.** Drafting the work or revising it critically for important intellectual content - **Silva JFT, de Sousa Neto AR, de Sousa GC, dos Santos AMR, Gouveia MTO, Avelino FVSD, Magalhães RLB.** Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **Silva JFT, de Sousa Neto AR, de Sousa GC, dos Santos AMR, Gouveia MTO, Avelino FVSD, Magalhães RLB.** All authors approved the final version of the text.

Conflicts of interest:
The authors have no conflicts of interest to declare.

Data availability:
The authors declare that all data are fully available within the article.

ISSN 2176-9133

This work is licensed under a *Creative Commons Attribution 4.0 International License*.