REVISIONES

Factors associated with the increase in sexually transmitted infections in men: an integrative review

Factores asociados al aumento de infecciones de transmisión sexual en hombres: una revisión integradora

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ABSTRACT:
Objective: To analyse the scientific evidence regarding the factors associated with risk behavior in men in relation to the increase in sexually transmitted infections (STIs).
Method: An integrative review based on a bibliographic search of the PubMed, WoS, CINHAL, and Cochrane databases.
Results/Discussion: 151 articles were identified applying the following selection criteria: a) use of English or Spanish, and b) publication between 2015 and 2021. 128 articles were discarded after reading the title and abstract, leaving a total of 23. In accordance with the adapted version of the Precede-Proceed Model, the following factors associated with the presence of STIs: predisposing factors: drug use, alcohol, multiple partners, STI diagnosis, post-exposure prophylaxis (PEP) administration, and sexual orientation; facilitating factors of risk behavior: unprotected sexual intercourse, needle exchange; and reinforcing factors/predictors of behavior change: early diagnosis, use of pre-exposure prophylaxis (PrEP), educational interventions and health programs. All these factors should be considered in a socio-demographic and cultural context along with factors such as age, country of origin, migrant status, work or income level, and educational level.
Conclusion: The prevalence of STIs has decreased, but further improvements are necessary. Identification of all the factors associated with risk behavior and the application of the Precede-Proceed method can help to strengthen the impact of educational interventions designed by health professionals with regard to changing sexual behavior.

RESUMEN:

Objetivo: Analizar la evidencia científica existente sobre los factores asociados a un comportamiento de riesgo en hombres en relación al aumento de infecciones de transmisión sexual (ITS).

Método: Revisión integradora mediante búsqueda bibliográfica en las bases de datos PubMed, WoS, CINHAL, Cochrane.

Resultados/Discusión: Se identificaron 151 artículos aplicando los criterios de selección: artículos en inglés y español del 2015 al 2021. Tras lectura de título y resumen, se descartaron 128 artículos siendo 23 artículos los finales. Los Factores asociados clasificados según categorías guiadas por la adaptación del Modelo Precede-Proceed son: Factores predisponentes: uso de drogas, alcohol, múltiples parejas, diagnóstico de ITS, administración de la profilaxis post-exposición (PPE) y orientación sexual. Factores facilitadores del comportamiento de riesgo: relaciones sexuales sin protección, intercambio de jeringuillas. Factores reforzadores/ previsores de un cambio de conducta: diagnóstico precoz, utilización de la profilaxis preexposición (PrEP) e intervenciones educativas y programas de salud. Todos estos factores se tienen que considerar en un contexto sociodemográfico y cultural relacionándolos con la edad, país de origen, migración, trabajo o nivel de ingresos y nivel de estudios.

Conclusión: La disminución de la prevalencia de las ITS se puede mejorar conociendo todos los factores asociados a un comportamiento de riesgo y incidir en ellos según la adaptación al método Precede-Proceed. Esto contribuye a la mejora de intervenciones educativas de los profesionales sanitarios en la incidencia y cambio del comportamiento sexual.

Palabras clave: Factores asociados; conducta sexual; conducta de riesgo sexual; comportamiento de riesgo sexual; Infecciones de Transmisión Sexual; hombres.

INTRODUCTION

Sexually transmitted infections (STIs) are caused by bacteria, parasites and viruses that are transmitted from person to person via the exchange of body fluids, or via direct contact with skin or mucous membranes affected by the infection. The eight most common infections are syphilis, gonorrhea, chlamydia, trichomoniasis, hepatitis B, herpes simplex virus (HSV), human immunodeficiency virus (HIV) and human papillomavirus (HPV). The diagnosis and treatment of STIs can be difficult because the patient may be infected but may not present symptoms. Their treatment is further complicated by the increasing resistance to antibiotics, which is becoming problem of major proportions[1].

Every day more than a million people worldwide are infected with an STI. And every year, about 6 million people contract one of the following four infections: chlamydia, gonorrhea, syphilis or trichomonas. More than 500 million people are carriers of HSV. In the US and Europe, the scale of this public health problem has been recognized for some time; in Europe the prevalence of STIs has risen steadily since the mid-1990s, with Spain recording particularly high rates of new HIV diagnoses in comparison to other countries in its vicinity [1,2].

The STIs that must be notified in Spain are chlamydia, gonorrhea, lymphogranuloma, trichomonas, herpes, HIV/AIDS and viral hepatitis. Men have a much higher rate of STIs than women; epidemiological surveillance shows that 85.3% of new diagnoses of HIV correspond to men. The largest group is men who have sex with men (MSM), who account for 56% of cases, while heterosexuals account for 27%[2]. Among the other notifiable STIs that are undergoing exponential growth, men represent between 80% and 100% of cases of syphilis, gonorrhea and lymphogranuloma, with particularly high figures among the MSM group[2]. According to country of origin, the highest rates of

STIs in Spain are recorded among people born in Latin America and the Caribbean with values ranging from 50% to 70%, followed by those born in Spain (40-55%), western Europe (10-20%) and northern Africa (0-8%)[2].

In order to influence and/or change risk behaviors and to reduce rates of STIs, knowledge of the associated factors is essential. The groups in which most sexual risk behaviors occur are generally men, especially those aged between 15 and 19 years old, young adults between 20 and 40 years old, MSM, sex workers, bisexuals and transexuals[1,3]. Multiple factors associated with condom use have been studieds[4] but there are other factors associated with sexual risk behavior that require an in-depth review[5].

Few studies have assessed all the factors associated with sexual risk behavior in men. The Precede-Proceed Model (PPM) is an effective method in health programs for assessing and encouraging behavioral changes. In step 4 of the model (the educational and ecological diagnosis phase) the factors considered essential for behavioral change are selected: namely, the predisposing factors, already present before the behavior; the enabling factors, those that facilitate the behavior; and the reinforcing factors, those that will help to consolidate the change in behavior[6]. The present study applies an adaptation of the PPM to identify these factors.

By classifying the factors according to the PPM, the objective of this study is to analyse the scientific evidence of all the factors associated with sexual risk behavior in men in relation to the increase in STIs.

MATERIAL AND METHOD

An integrative review (IR) was carried out, due to the ability of this design to group and summarize scientific evidence[7].

This study follows the stages proposed by Mendes[8]: 1, the definition of the research topic and the question; 2, the selection of the inclusion and exclusion criteria; 3, the identification of the selected studies; 4, the categorization of the studies; 5, the analysis and interpretation of the results; and 6, the synthesis of the knowledge obtained and presentation of the review. Following Mendes, the research question ("what scientific evidence is available regarding the factors associated with risk sexual behaviors in men in relation to the increase in STIs?") was presented in accordance with the PICO strategy: Population (male gender), Intervention (risky sexual behavior), Comparison, and Outcomes (STIs).

To identify the studies, searches were conducted of the PubMed, WoS, CINHAL and Cochrane electronic databases. The search strategy was formulated by combining the descriptors developed in the *Medical Subject Headings* (MeSH terms) or Health Science Descriptors: "associated factors", "sexual risk behavior", "men", "sexually transmitted infections", combined with the Boolean operator AND, and adapted according to the specificities of each database.

The inclusion criteria were: articles whose samples included the male gender, articles related to factors associated with sexual risk behavior, articles published in English and Spanish, articles published recently (i.e., in the years with the greatest increase in

STIs, from 2015 to 2021). The exclusion criteria were: articles with samples obtained before 2015, studies carried out in women, or studies in which subjects were not classified by gender.

The articles were classified according to their level of evidence (LoE)[9]. Level I, bibliographic reviews and retrospective data reviews; Level II, cross-sectional observational studies, and one longitudinal study; Level III, multicenter cross-sectional studies, and one comparative study; Level IV, non-randomized intervention studies; Level V, clinical trials with educational interventions and meta-analyses.

To extract primary data, a table was created with the Microsoft word 2019® program containing the following information: title, authors, country, year of publication, LoE, objectives and main results. All the selected articles were examined by two researchers independently and the different factors associated with risk behavior were analysed. A consensus was reached through a meeting and in case of discrepancy, the third researcher was consulted.

RESULTS

The initial search identified 151 articles. After applying the exclusion criteria and removing duplicates, 128 articles were discarded, and 23 articles were finally selected (see Figure 1).

Figure 1. Flowchart of identification, selection, eligibility and inclusion
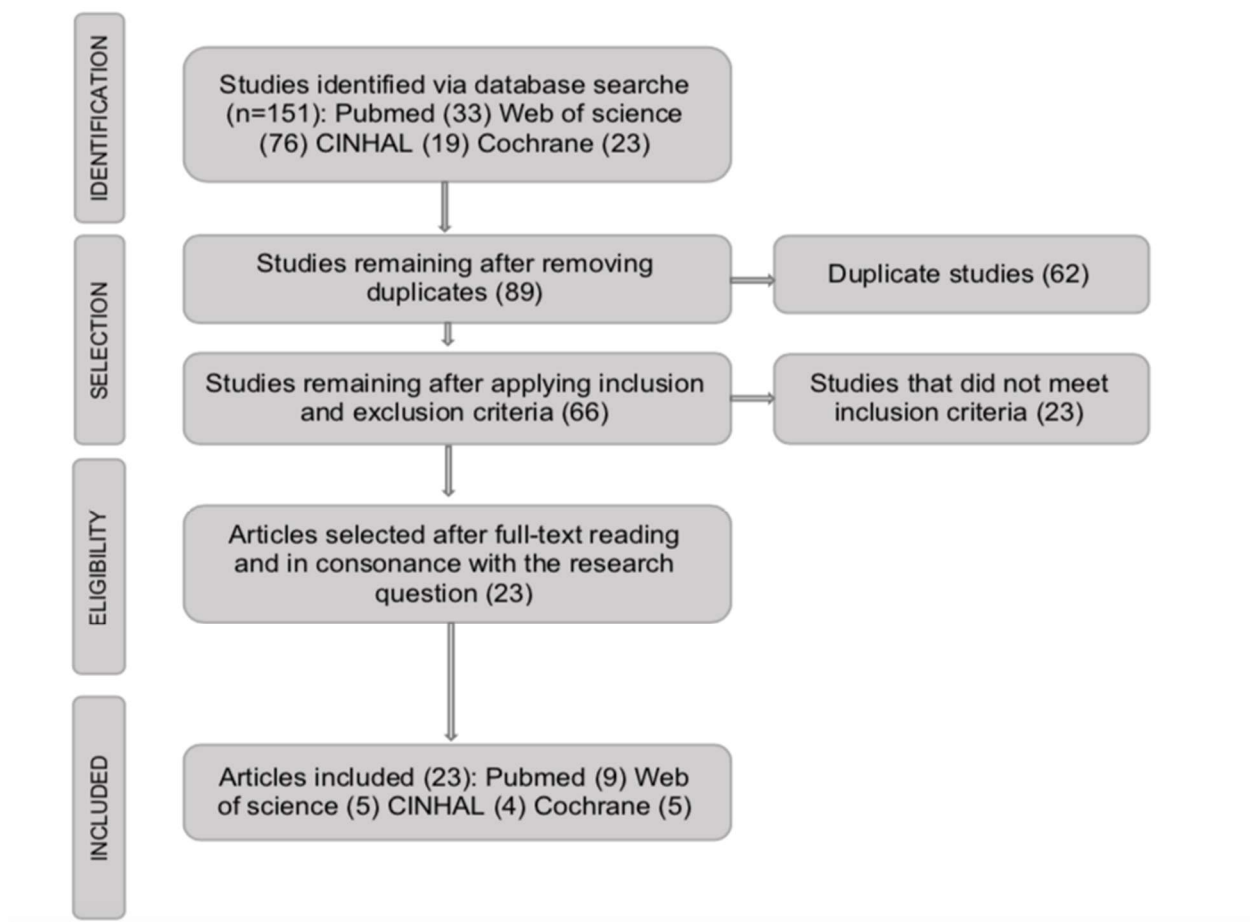
With regard to study design, the final sample comprised seven cross-sectional observational studies, one longitudinal study, one comparative analytical study, two multicenter cross-sectional studies, three non-randomized intervention studies, four clinical trials with educational interventions and five reviews, including bibliographic reviews, one meta-analysis and one retrospective data review.

In relation to the year of publication, two studies were published in 2015, two in 2016, four in 2017, and five each in the three last years, 2018, 2019 and 2020. Eight studies were carried out in the US, 12 in Europe (four in Spain) and one in Asia.
Table 1 provides a general description of the articles included, summarized by author, year of publication, country, study, sample, LoE, objective and main results/conclusions.

Table 1. Summary of the selected articles according to author, year of publication, country, study, sample, level of evidence, objective, and main results/conclusions

Author Year Country	Study Sample LoE	Objective	Main results/conclusions
Ballester-Arnal, 2017[10] Spain	Experimental quantitative study of a longitudinal educational program in 467 men LoE IV	To analyse the effectiveness of a *brief educational intervention* on knowledge, attitudes, beliefs and behaviors related to HIV/AIDS.	Describes and stresses importance of education at the appropriate ages (most infections occur before the age of 30). The intervention increased knowledge and perception of infection risk, and also condom use.
Martínez 2018[11] USA	Mixed cross-sectional study of 150 Latino male couples LoE II	To determine sexual risk behaviors among *Latino men* in same-sex relationships.	*Multiple partners* and *alcohol and other substance abuse* associated with risk behavior (such as engaging in anal intercourse without a condom). Cultural and educational interventions are vital to influence risk behavior.
Lim, 2016[12] Singapore	Cross-sectional study of 604 men who have sex with sex workers LoE II	To assess the prevalence of HIV/STI testing among heterosexual men who frequent entertainment establishments for sexual relations.	Participants reported *inconsistent condom use*; only 163 (27%) had undergone HIV/STI testing in the last 6 months, 17 had had symptoms and of these 12 had attended the clinic (the symptoms were not serious). Study stresses the *needforprevention interventions and promoting prevention testing* in this population.
Ballester-Arnal, 2015[13] Spain	Cross-sectional study comparing two time	To compare the evolution of risk factors related to HIV infection among male sex workers in Spain	In 2015 there was less use of protective barriers in sexual relations, less use of condoms, less perception of risk or fear of HIV and STI infection. Study

	points. 2010 and 2015	between 2010 and 2015.	calls for more efficient *health strategies based on culture and sexual orientation* and the allocation of more government resources.
Cordova, 2019[14] USA	Mixed intervention 20 young people and 6 doctors LoE IV	To evaluate an application that develops interventions for reducing *drug consumption* and risk behaviors, in order to avoid STIs/HIV.	Study improved doctor-patient communication, facilitating *prevention strategies* and risk reduction.
Esser, 2017[15] Germany	Two-year longitudinal study of 223 MSM with HIV LoE II	To determine parameters regarding sexual behavior and to identify HIV-positive MSM who are at high risk of transmitting HIV and STIs.	A history of substance abuse, *multiple partners, younger age*, known STIs are associated with a higher incidence of unprotected sex and STIs.
Achter berg, 2020[16] Netherlands	Cross-sectional study of 4,461 MSM LoE III	To identify classes of MSM in Amsterdam and surrounding urban area with distinctive patterns of sexualized drug use and its association with STIs.	The average age was 35 years and the majority were Dutch. Drug or alcohol use was related to a greater number of sexual partners and a higher prevalence of STIs.
Gonzá lez-Baeza, 2018[17] Spain	Multicenter cross-sectional study of 742 MSM with HIV LoE III	To calculate the prevalence of sexualized drug use and associated factors.	60% had been *diagnosed with an STI*. 59% had *used drugs*. Of those who participated in Chemsex, 88% *used the app* for sexual encounters.
Pitpitan, 2019[16] USA	Clinical trial of 432 men at 4, 8 and 12 months LoE IV	To evaluate the effectiveness of a trifocal intervention in reducing depression, methamphetamine use, and condomless sex.	Use of methamphetamine is associated with a higher risk of contracting HIV and other STIs. Male participants in the intervention group showed reduction in methamphetamine use and condomless sex.
Maxwell, 2019[19] High income countries	Bibliographic review Chemsex in MSM between	Synthesize the antecedents, behaviors and consequences associated with	Chemsex participants expect that drugs will positively affect sexual encounters, especially in HIV-positive MSM. *Exchange of injection equipment* was also

	2000 and 2018 LoE I	Chemsex behaviors among MSM.	detected.
George, 2019[20] Developed countries	Bibliographic review LoE I	To examine the relationship between alcohol and sexual health outcomes.	Alcohol and sexual health are related. Study highlights risk behaviors such as resistance to condom use in men, which increase the risk of STIs.
Jones, 2017[21] USA	Cross-sectional multicenter study of 702 young black men LoE III	To evaluate the distal and proximal emotional factors involved in alcohol-related sexual risk.	Alcohol and drug use are related to the *number of sexual partners*, desire to become pregnant, and *unprotected vaginal and anal sex*. Study establishes a basis for *educational intervention or prevention programs* in sexual behavior.
Bermu dez, 2016[22] Spain	Comparative study of 318 subjects: 159 general population and 159 living with HIV LoE III	To compare people living with HIV with the general population on cognitive variables *(knowledge of STIs and HIV, concern about STIs/HIV, pregnancy, self-efficacy to refuse sexual relations, resilience)* and sexual behavior.	People with HIV obtain higher scores in terms of knowledge and concern about STIs/HIV and self-efficacy to refuse sexual relations. *Number of partner*s and unprotected sex are risk behaviors. Preventive health interventions should be addressed to minimize the risks of sexual behavior.
Platteau, 2017[23] Belgium	Cross-sectional study of 480 swingers (consensual heterosexual relationships) LoE II	To assess swingers' lifestyle, sexual health, and STI screening history, and to review risk factors for risky sexual behavior and STI transmission.	Study highlights a *high number of sexual partners, lower condom use*, drug use and *higher number of STI diagnoses* compared with the general population.
Vasilenko 2018[3] USA	Cross-sectional study of 32,831 men LoE II	To determine multidimensional patterns of sexual behavior among MSM associated with STIs.	More than half of the participants have *multiple partners, a recent STI diagnosis*, and less *condom use*. *Prevention messages* may be more effective if they are

			adapted to sexual behavior patterns and to demographic and socio-contextual factors.
Reisner, 2015[24] Boston	Retrospective review of data in medical histories of 180 transgender patients LoE I	To identify factors associated with risky sexual behavior and structural and psychosocial risk indicators in relation to HIV and STIs.	Study recorded data on risky sexual behavior such as *non-use of condoms* and STIs, highlighting factors such as *late access to healthcare* and *stigma*. Other factors that appeared were *sexual orientation, number of STIs, casual sexual partners* and *sex workers.*
Deogan, 2020[5] Sweden	Stratified population study of 50,000 men LoE II	To identify sexual health factors associated with searching for sexual partners online and their estimated prevalence.	Meeting *sexual partners online* was associated with reporting several risk factors such as *non-condom use, multiple partners, and having had an STI.*
Achter berg 2020[25] Amster dam	Random controlled trial of 155 MSM Educational intervention LoE V	To identify, report, and manage psychosocial problems in order to reduce sexual risk behavior.	High prevalence of *mental health and substance use problems*; tailored interventions did not significantly increase help-seeking behavior.
Llewe llyn, 2019[26] United Kingdome	Randomized controlled trial of 175 MSM receiving PEP LoE V	To examine the impact of augmented motivational interviewing.	There were no significant impacts on *sexual risk behaviors, STIs, PEP rates*, or *psychological factors.*
Pharaon, 2020 Canada	Compartmental model of the spread of STIs in the form of parameters and time series in homosexual and bisexual men. LoE I	To identify possible behavioral changes with PrEP in relation to the increase in STIs, condom use, HIV transmission and frequency of STI testing.	The use of PrEP does not increase other STIs if STI tests are requested frequently enough to avoid an increase in prevalence and if there is *an emphasis on reducing* risk behaviors, e.g. by promoting condom use.

Traeger, 2018[28] Developed countries	Meta-analysis of open studies In MSM and transgender (TG) LoE V	To assess sexual risk in the context of daily oral PrEP use in MSM and TG individuals	Most studies showed evidence of an increase in *condomless sex* and the need for *preventive strategies*.
Hoornen borg, 2018[29] Amster dam	Comparative prospective study (baseline and 6 months later) of 328 MSM and 2 TG LoE IV	To examine changes in sexual behavior between baseline and 6 months after PrEP initiation among MSM and TG.	Surveys were completed on sexual partners, *sexual practices without a condom*, and an STI test was performed at baseline and 6 months after using PrEP. At 6 months, *sexual practices without a condom* increased and the prevalence of STIs remained stable.
Pan 2020[30] USA	Randomized clinical trial of 5012 patients LoE V	To examine counts of sexual acts and to evaluate interactions between different categories of sexual behaviors and other predictors	A useful tool in future research on disaggregated characteristics of sexual acts. In general there were more *sexual acts without a condom*. Distinguishes between primary and non-primary partners.

DISCUSSION

In this section, the results obtained are discussed in relation to the methodology of the Precede-Proceed model. Sociodemographic factors are also taken into account:

Predisposing factors or predictors of behavior

The studies of Maxwell, George and Bermúdez[19,20,22] highlight drug or alcohol use/abuse as a predictor of sexual risk behavior, stressing that numerous groups consider it to be positive. González-Baeza identifies drug consumption as the most important factor that precedes unprotected sexual relations[17]. According to Platteau[23] the multiple partner factor is usually associated with increased drug use and a recent diagnosis of an STI, both factors being closely associated with unprotected sex.Vasilenko[3] highlights the predictive factor of recent STI diagnosis, noting that it increases the chances of contracting another STI. The study by Traeger[28] names access to post-exposure prophylaxis (PEP) as a factor. Ballester reports that people with certain sexual orientations, such as transsexuals, homosexuals, or bisexuals may be at a particular risk of contracting STIs, and also notes that stigma and poor access to healthcare (two factors that are often related) complicate the access to information regarding STIs and regarding interventions to prevent them[13]. Deogan highlights that the use of applications or the internet to meet sexual partners is factor that predisposes to unprotected sex, and is associated with other factors such as multiple partners and the recent diagnosis of an STI[5]. Llewellyn reports that suffering from a mental health disorder and lacking trust in the healthcare-patient relationship are also facilitating factors for STIs[26].

Enabling factors

Unprotected sexual relations and syringe exchange are the key enabling factors of risky sexual behavior. They are consistent with all the predisposing factors, especially with the drug consumption factor that is currently used in a context related to "sexual" relationships[17,19,20].

Behavior-reinforcing factors

According to the majority of studies, the factors that encourage behavioral change and ensure its continuity are the performance of STI diagnostic tests and early diagnosis, the use of PrEP, and educational interventions. These factors are regarded as essential in order to reduce the prevalence of STIs[22,27,28].

Sociodemographic factors

The studies do not reach a consensus with regard to the age factor; rather, the authors propose that its influence depends on the place and the population studied. The age range in all studies is between 18 and 40 years. In their studies of MSM populations, Esser and Vasilenko found that young people between 18 and 25 had the highest risk of suffering from STIs[3,15]. In the same population group Martínez and Achterbergh found increased rates of STIs in people aged 30 or older, with an average age of 35 years[11,16]. According to Ballester, the highest rate of HIV infection occurred before the age of 30, with an average age of 36 years, highlighting that 46.5% had late diagnoses[10]. In general, a low level of education is associated with a poor knowledge of STIs and, as a consequence, increases the risk. Another factor highlighted in these studies is migration: Latino men born in Central and South America are the group with the highest level of STIs in Spain, followed by those born in Spain itself, western Europe and northern Africa[11]. Other groups that should be mentioned are sex workers and transgender individuals, who present rates of STIs that are much higher than in the general population[13].

Most of the studies analysed have limitations with regard to sample selection, since they included all people willing to participate without estimating the correct sample size. Another frequent drawback is the focus on highly specific populations in a certain place[15,20]. The more recent studies are methodologically more rigorous and the number of publications has increased over the years, due to the exponential increase in STIs that we have mentioned above[25,30].

CONCLUSIONS

The man risk factors predisposing to sexual risk behavior are: use of drugs, alcohol, multiple partners, recent STI diagnosis, administration of PEP, sexual orientation, stigma, access to healthcare, use of the Internet to find sexual partners, mental health problems and poor communication between the patient and the healthcare system.

The enabling risk factors identified are unprotected sexual relations and syringe exchange. The fundamental reinforcing factors of behavior change are early diagnosis, the use of PrEP and educational interventions or health programs. All these factors should be considered in their socio-demographic and cultural context, bearing in mind

issues such as age, country of origin, immigrant status, work or income level, and level of education.

The prevalence of STIs can be reduced by identifying and acting upon all the factors associated with risk behavior. To this end, the classification of associated factors using the Precede-Proceed method can help to provide the information necessary for the design of health programs and educational interventions.

More research is needed into STIs and associated factors, not only in populations considered at risk, but in other populations as well. Studies that demonstrate the effectiveness of educational interventions in different populations are essential to achieving a reduction in STIs.

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