

# Designing Public Awareness Campaigns for Dermatology-Specific STI Manifestations

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## Abstract

Adolescents account for nearly half of all newly diagnosed sexually transmitted infections (STIs), a disproportionate burden driven by limited sexual health education, inconsistent condom use, and a lack of awareness regarding early clinical manifestations. Many STIs present with cutaneous signs that could serve as early diagnostic clues; however, dermatological symptoms often go unrecognized by adolescents, contributing to delayed care and increased morbidity. Despite this, public health initiatives rarely emphasize dermatologic features in STI education. This review critically examines the role of dermatology-specific public awareness campaigns in STI prevention among adolescents. Drawing upon interdisciplinary literature from dermatology, behavioral science, and health communication, we identify key elements of effective campaigns, including culturally tailored messaging, visual dermatologic education tools, and adolescent-centered community engagement strategies. By analyzing the successes and shortcomings of existing efforts, this review provides a framework for designing future campaigns that close knowledge gaps, destigmatize cutaneous STI symptoms, and foster proactive healthcare-seeking behavior. Integrating dermatologic insight into public health strategy is imperative to reversing the rise of STIs in adolescents and ensuring they are equipped to recognize, respond to, and prevent infection.

## Keywords

Sexually Transmitted Infections, Adolescents, Dermatological Manifestations, Public Awareness Campaigns, Health Communication,

## 1. Introduction

Adolescents account for 50% of new STI cases annually in the United States, with chlamydia and gonorrhea being the most prevalent in this age group [1]. The rise in cases is due to high-risk sexual behaviors, confidentiality concerns, and low health literacy among adolescents. Engaging in sexual activity with multiple partners, inconsistent condom use, substance abuse, and early sexual debut all increase the risk of sexually transmitted infections (STIs) [2] [3]. Decreased contraceptive use further contributes to an increased risk of STI exposure, thereby contributing to elevated STI transmission rates. Furthermore, concerns over the confidentiality of potentially positive STI status serve as a barrier for seeking health services in this demographic. Although parental consent is not required for STI screening and treatment throughout the United States, 18 states notify parents if the patient is a minor, and individuals covered by their parents' insurance plan are also prone to the disclosure of sensitive health information [1]. This results in delayed detection and treatment, thereby contributing to the increasing STI rates amongst this population. Moreover, inadequate health literacy related to STIs can lead to reduced contraception use and testing. According to Lee *et al.*, only 2.8% of women who were educated about HIV/AIDs reported having casual intercourse with an individual they had recently met [3]. This demonstrates how instrumental STI literacy is in promoting safe sex practices, which can help curb STI transmission rates.

A significant and often overlooked barrier to STI detection is the failure to recognize their dermatologic signs. Cutaneous manifestations of STIs often go undetected due to atypical presentations as well as spontaneous resolution, thereby hindering early detection and treatment. Bechtel and Trout report that condylo-mata lata, the mucocutaneous lesions of secondary syphilis, present as gray-white plaques and may be mistaken for candidiasis [4]. This demonstrates how atypical presentations of STIs can lead patients to have a lower threshold for concern as they underestimate the severity of their condition and, consequently, risk having adverse health outcomes. Furthermore, Cunha *et al.* report that individuals presenting with a characteristic chancre of syphilis may experience resolution without treatment in three to six weeks, thereby escaping detection by the patient [5]. The spontaneous resolution of skin lesions associated with STIs may also contribute to decreased detection, undermining efforts to control STI transmission rates and mitigate health complications.

The inability to identify skin lesions associated with STIs can lead to delayed treatment and poor health outcomes. HIV patients who contract STIs experience increased progression of their disease process due to increased plasma viremia, as well as increased susceptibility to other STIs [6]. A lack of awareness regarding

skin lesions that indicate dermatology-specific STIs leads to an increased risk of negative health outcomes due to delays in treatment. Public health campaigns may be a solution as they have the potential to provide STI awareness and education. Health communication and social marketing campaigns attempt to provide objective and educational information regarding STIs, in contrast to media portrayals that often minimize the risks associated with sex [7]. Such interventions help to educate individuals on STIs and safe sex practices and also promote services offered by such programs for STI mitigation.

A review of existing literature on STI awareness campaigns implemented over the years highlights their effectiveness in addressing knowledge gaps surrounding STIs and their dermatological presentations. Jefferson *et al.* analyzed the effectiveness of scenario-based STI educational interventions delivered to adolescent high school students and found a notable increase in understanding regarding STI education through pre- and post-intervention surveys [8]. Moreover, educational interventions in a dermatology STI clinic have increased HPV vaccine uptake if there was simultaneous vaccine availability [9]. This highlights the potential of interventions aimed at educating people about STI prevention and promoting safe sex practices. Such efforts can help reduce the transmission rates of STIs and improve long-term health outcomes, particularly for adolescents. Additionally, exploring various methods and media channels for delivering digital interventions can enhance the effectiveness of these campaigns. It should be considered when designing public awareness campaigns for Dermatology-Specific Manifestations.

Despite the high rates of STIs amongst adolescents, dermatologic manifestations often go undetected. This gap in awareness contributes to a delay in treatment, ultimately leading to increased STI transmission rates and adverse health outcomes. The goal of this review is to evaluate the effectiveness of public health and educational campaigns in increasing awareness of dermatologic manifestations of STIs among adolescents. This will help inform the development of targeted and accessible educational interventions that provide early recognition and prevention of STIs.

## 2. Knowledge Gaps in STI Dermatological Manifestations

Sexually transmitted infections (STIs) have been on the rise in recent years and present a significant public health challenge. Adolescents represent about half of all new STI diagnoses, and their risk of acquiring STIs increases due to age, behavioral factors such as inconsistent condom use, and a lack of knowledge about sexual health [10] [11]. Public health campaigns could serve as an intervention in educating adolescent communities about STIs and preventing disease. *Chlamydia trachomatis* and *Neisseria gonorrhoeae* are the most common STIs among adolescents, while syphilis has experienced the most significant increase [12]. While many of these STIs have dermatological manifestations that can indicate early infection, adolescents often lack the knowledge to identify dermatology-specific STI signs and symptoms. Jefferson *et al.* reported that the overall average improve-

ment in general STI knowledge following a presentation on STIs increased by 125% to 185% among adolescents. However, when asked about the major signs and symptoms of sexually transmitted diseases, adolescents had a mean pretest score of 0.44 (SD = 0.5) and a posttest score of 0.58 (SD = 0.5) ( $p = 0.06$ ) [8]. The pretest score indicates a low baseline knowledge, with only 44% of adolescents able to correctly identify major signs and symptoms of STIs, highlighting the severity of this knowledge gap. Additionally, Jefferson *et al.* discussed that students demonstrated a slight, non-significant improvement in identifying STI signs and symptoms post-test. This implies the need for targeted education and emphasis on symptom recognition during educational campaigns. Public health awareness campaigns should include information on how to identify dermatological manifestations of sexually transmitted infections (STIs).

Limited awareness of sexually transmitted infection (STI) symptoms often leads to delayed identification and treatment of sexually transmitted infections that can result in more severe disease progression. *Syphilis* is increasingly prevalent among adolescents. In its primary stage, it can appear as a solid papule and a painless ulcer on the genitalia, anal canal, or mouth. If untreated, the infection progresses to secondary *syphilis*, affecting 60% to 90% of infected individuals. Various skin manifestations and systemic symptoms characterize this stage, ultimately leading to tertiary syphilis, which can impact several organ systems [13] [14]. The increasing prevalence of *syphilis* among adolescents demonstrates the need for education on recognizing cutaneous manifestations to aid in early detection. Additionally, Meyer-Weitz *et al.* discussed that individuals who delayed seeking treatment for STI symptoms did so due to a lack of knowledge about the consequences of sexually transmitted infections [15]. Early detection through public awareness campaigns for dermatology-specific manifestations represents a promising way to combat the epidemic.

*Chlamydia trachomatis* and *Neisseria gonorrhoeae* can also lead to long-term consequences in both men and women such as infertility, systemic infection, and increased HIV risk in both men and women. Yet, less than half of adolescents seek STI evaluation [13] [16]. This suggests that adolescent individuals are at an increased risk of severe disease progression, and public awareness campaigns should consider focusing on the long-term health consequences of delaying treatment to promote STI testing among adolescents. Beatrous *et al.* describe a case of an 18-year-old woman positive for both *Chlamydia trachomatis* and *Neisseria gonorrhoeae* who initially delayed seeking evaluation at the emergency department, despite her provider's recommendation. However, after a follow-up call in which her provider explained that she had a systemic infection, she returned for treatment [17]. This emphasizes the need to educate patients about the potential long-term complications of untreated STIs to improve compliance and shows how healthcare providers can significantly contribute to public awareness campaigns. Additionally, the patient presented with several skin manifestations that were key indicators of a sexually transmitted infection (STI). Public awareness campaigns

should emphasize dermatological manifestations of common STIs and promote early treatment, as this can significantly affect disease progression and help reduce the spread of sexually transmitted infections.

### 3. Public Awareness Campaigns & Interventions

Incorporating evidence-based interventions and public awareness campaigns into schools can serve as a convenient location to target adolescents who are particularly vulnerable to sexually transmitted infections (STIs). Wood *et al.* revealed that adolescents in clinical settings were infrequently provided with information regarding the consequences and complications of STIs during clinical encounters. Moreover, participants desired educational topics that addressed knowledge gaps and facilitated more informed decision-making. This suggests that incorporating dermatologic manifestations into existing school sex health education could help close knowledge gaps regarding various presentations and complications of STIs and improve STI evaluation behaviors [18]. The influence of peer relationships in school settings can impact adolescent treatment-seeking behaviors. Peer-led initiatives have been demonstrated to improve health knowledge and destigmatize STI discussions. Almost half of adolescents acquire their understanding of sexual health from sources outside of school on social platforms [19] [20]. While school-based interventions are critical to improving knowledge on sexually transmitted infections and empowering adolescents to make informed decisions, public health campaigns should be designed across various multimedia platforms.

Stephenson *et al.* discovered that peer-led sex education interventions lead to fewer unintended pregnancies compared to teacher-led sessions. Additionally, 57% of girls and 32% of boys expressed a preference for sex education in single-sex settings [20]. This demonstrated that peer-led sex education initiatives are more effective and should be incorporated into campaign design. It is recommended to incorporate single-sex educational workshops when tailoring initiatives for adolescents, as this can reduce discomfort and create spaces that promote open discussions about sexually transmitted infections.

Social media is commonly used among adolescents and allows for targeted marketing, which could be a crucial tool for designing public awareness campaigns for dermatology-manifested STIs. Nadarzynski *et al.* demonstrated that adolescents prefer visual platforms like Instagram and Facebook. The use of animations and videos on these platforms was found to be engaging and relevant, leading to a 41% increase in the total number of chlamydia tests requested [21]. This suggests that social media platforms are effective in disseminating health information to adolescents. The preference for visual content highlights the benefits of creating interactive campaigns that illustrate how to identify STI-related skin manifestations in comparison to normal skin conditions. Additionally, including peer representatives and using relatable language among adolescents can support the effectiveness of the intervention [19] [22]. Incorporating these key components could improve the effectiveness of public awareness campaigns for dermatology-

specific manifestations and enhance prevention efforts.

TikTok has become a primary source of health education for younger teenagers, particularly in sexual health and education [23]. The platform facilitates sharing short videos, typically no longer than a minute, enabling users to interact and obtain information effectively. Gennaro *et al.* discussed that approximately 70% of adolescents demonstrated unawareness of symptoms and available treatment options for Chlamydia, Gonorrhea, and Syphilis [24]. Therefore, TikTok campaigns should be tailored to deliver brief key messages, such as identifying visible STI symptoms and addressing common misconceptions. Meanwhile, Instagram campaigns are preferred for peer narratives and information that requires longer explanations, which can be supplemented with visual storytelling. Utilizing various social media platforms during campaign designs ensures that adolescents with varying health literacy can obtain the essential health information on dermatology-specific sexually transmitted infections.

Sexually transmitted infections (STIs) have shown notable differences between genders. Young women between the ages of 15 - 19 have a higher susceptibility to STIs, while men demonstrate riskier sexual behaviors coupled with poorer STI knowledge and prevention measures [21] [25]. Considering the gender differences that exist in STI knowledge, health behaviors, and disease burden, public health campaigns should tailor messaging to emphasize gender-specific risk factors and symptom presentation. In one study, one-third of girls did not consider dermatology manifestations in the genital area as signs and symptoms of STIs [26]. Among young women, knowledge of modes of transmission of HIV/AIDS is relatively high, with approximately 77% of young women being aware of the high-risk behavior. However, knowledge about available screening services and other common STIs, such as genital herpes and syphilis, was significantly decreased, with 71% and 43% not having heard about the diseases, respectively [21]. This demonstrates the need for better education in recognizing the cutaneous signs and symptoms of sexually transmitted infections between genders. The utilization of digital campaigns on social media platforms enhances the ability to tailor health education to different genders and adapt to the specific needs of the community, and should be considered when designing public health campaigns.

#### **4. Challenges & Barriers**

Much of the misinformation associated with STIs can be attributed to misinterpretations in initial education and cultural stigma. Effective public STI awareness campaigns are scientifically accurate and must consider the developmental stage of their target audience [27] [28]. By using age-appropriate terms, with more straightforward concepts for younger students and more complex ones for older adolescents, educators can effectively prevent any misunderstandings associated with recognizing initial STI symptoms. Stigma associated with STIs also serves as a critical barrier to prevention and care [29]-[32]. Individuals with STI symptoms may experience both perceived stigma, like fear of judgment and discrimination

from others, and self-stigma, involving shame caused by internalizing societal beliefs about STIs [33] [34]. This suggests that STI stigma contributes to delayed care seeking and prevents preventive screening, demonstrating the necessity of implementing STI public awareness campaigns to reduce stigma.

Leveraging culturally specific pedagogical approaches serves as a beneficial tool for enhancing youth engagement in a variety of settings. Multicultural urban settings often require adapting lessons for better student understanding. Critically, a strong connection has been established between the delay of the first sexual intercourse encounter and sex education in adolescents [35] [36]. For example, Midtown AIDS Center (MAC), an urban non-profit HIV/AIDS center located in Roxbury, MA aimed at specifically providing services to predominantly Black and Latinx urban rainbow youth. MAC effectively supports its community by addressing emotional, developmental, and educational needs that are otherwise overlooked amongst the group's participants [37]. Despite sparse examples, culturally informed dermatology-specific STI campaigns remain largely unexplored, highlighting a critical gap and are for future research.

In the U.S.A., stark disparities in access to STI education persist. For example, fewer than half of high schools and less than one-fifth of middle schools provide access to recommended care services and educate students on essential sexual health topics, including STIs and condom use, as determined by the Centers for Disease Control (CDC) [38]. Additionally, the multicultural and diverse religious landscape in the U.S.A can add another layer of complexity when designing public awareness campaigns for STI prevention, recognition, and treatment. While increased religiosity is related to a later coitarche and lower number of sexual partners, contraception use and plans do not differ by level of religiosity, potentially because organized religions often promote abstinence relative to contraceptive use [39]. Furthermore, federally funded abstinence-only education only provides information about condom failure rates [40], and could harm adolescent sexual health knowledge and result in an increase in STI transmission rates.

Interdisciplinary collaboration has been shown to be incredibly effective for youth sexual education. School-based health centers (SBHCs) have a significant impact on adolescents' adherence to health-related behaviors and help overcome various socioeconomic barriers, including costs, transportation, accessibility, and availability [41] [42]. Since not all schools have SBHCs, policymakers should work to integrate such ideas into their agendas. On the same note, school nurses often serve a prominent role, as they possess extensive knowledge of health-related issues that can be incorporated into sexual health discussions. Furthermore, given adolescents' time on mobile devices, interventions through this route are also promising. [43] [44]. To have successful public health awareness campaigns, they should be interdisciplinary and focused on reducing common barriers faced by adolescents when seeking STI care.

## 5. Gaps in Research & Future Directions

An increase in sexually transmitted infections, especially with a recent rise in ad-

olescents, necessitates public awareness campaigns to address this issue through community and school interventions. Current research shows the need for long-term evaluations of STI awareness campaigns targeting adolescents. A pilot study evaluating the impact of a presentation on STIs in high school classrooms yielded short-term knowledge improvements [10]. However, sustained behavioral changes and long-term effectiveness are understudied. Research exists on recognizing and managing STIs within a dermatological context [45]. However, there is a lack of research on the integration of dermatology with sexual health education and public health frameworks. Additionally, an essential aspect of public awareness campaigns requires cultural considerations in sexually transmitted infections awareness strategies, as multiple taboos exist related to sexual health (Mohd and Haque, 2024). Further research is needed to develop effective, culturally sensitive awareness campaigns.

To effectively address the prevention of sexually transmitted infections, campaigns must be tailored to the demographics and cultural contexts of the target population. Recent studies show significant differences in sexually transmitted infection (STI) knowledge and attitudes among culturally diverse groups, indicating that generalized campaigns are insufficient [46] [47]. Strategies that respect and address cultural taboos are more likely to facilitate acceptance and discussions around sexual health. In the future, increased interdisciplinary collaboration between dermatologists, public health officials, and educators is necessary to enhance STI awareness and prevention. Since dermatologists may frequently encounter cutaneous manifestations of STIs in the clinic, increased integration of dermatologists in campaign efforts may allow for a more comprehensive approach to improving awareness of STIs [48]. Since adolescents are at an increased risk of sexually transmitted infections (STIs), integrating pre- and post-surveys in high school and college settings can be used to monitor campaign effectiveness. Additionally, providing STI testing opportunities as part of the awareness campaign could significantly improve early diagnosis of STIs [49]. These insights should inform the development of future public awareness campaigns, incorporating community feedback to assess cultural sensitivity and relevance, ensuring they meet the community's needs.

## 6. Conclusion

In response to the rising rates of sexually transmitted infections, public awareness campaigns for dermatology-specific sexually transmitted infections (STIs) must be strategically designed considering knowledge gaps in STI dermatological manifestations, various platforms and strategies for public awareness, and challenges or limitations to the campaigns to raise awareness and promote prevention and early detection effectively. The skin often serves as a key tool in early identification of an STI, specifically *sypilis*, allowing prevention of more serious sequelae or identification of dissemination, as in the case of *Neisseria gonorrhoeae* and *chlamydia trachomatis*. Emphasizing the characteristic signs of the most common

STIs in public awareness campaigns is a direct solution to improving early recognition and encouraging timely medical intervention. Additionally, how the campaigns are conveyed and tailored to specific genders and the public is equally important. Combining evidence-based education with the visual appeal of social media can effectively engage a larger target audience. Finally, identifying and understanding the possible limitations allows for the opportunity to address each one of the challenges specifically when designing a campaign for dermatology-specific STIs. Distinct challenges include understanding the role of cultures and social media in spreading misinformation or perpetuating stigma, recognizing the audience's ability to interpret medical concepts and language, addressing disparities in access to STI education, and the need for interdisciplinary collaboration and funding. Collaborative interdisciplinary efforts between clinicians and public health officials are essential to increase awareness of STI dermatological manifestations and improve patient population outcomes. The integration of targeted messaging, dermatological visuals, and community engagement, particularly among adolescents, can address these knowledge gaps and promote positive behavioral changes, encouraging safe sexual practices and early intervention.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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