Digital media and sexually transmitted infections

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**Purpose of review**
Digital media, including the Internet, social networking sites, text messaging, and mobile applications, are ubiquitous among adolescents and young adults. These platforms enable users to obtain important information on a multitude of health topics, they may facilitate risk-taking behaviors, and they can be key components of health interventions. The purpose of this article is to review the recent literature on digital media and sexually transmitted infections, discussing their role in potentiating and reducing risk.

**Recent findings**
This review demonstrates adolescents’ use of digital media to gather information on health topics and discusses significant privacy concerns regarding using media to explore sexual health information. Although several studies demonstrate an association between social media and increased sexual risk-taking behaviors, this relationship is not fully understood. Digital media-based interventions are increasingly being developed to either reduce risk or improve management of sexually transmitted infections.

**Summary**
As greater numbers of adolescents use digital media, the potential for these platforms to influence sexual risk-taking behaviors is significant. Additional research is needed to better understand the impact of digital media on sexually transmitted infection risk and to develop social media-based interventions to improve sexually transmitted infection outcomes.

**Keywords**
adolescent, behavior, digital media, interventions, sexually transmitted infection

**INTRODUCTION**
Although young people aged 15–24 years represent only 25% of the overall population, they account for nearly half of all the new cases of sexually transmitted infections (STIs) each year [1]. To reduce risk behaviors and related health problems among adolescents, new approaches and strategies for STI prevention and intervention are increasingly employing digital media. The term digital media refers to a variety of technologies, including computer programs and applications, digital videos and audio recordings, web pages and websites, and social media networks. More broadly, digital media refer to any computer-generated information that can be transmitted across computers or other technologies (e.g., mobile phones and tablet). Digital media are ubiquitous, particularly among adolescents and young adults who are the most frequent users of such technologies [2]. Digital media have a wide-ranging and complex impact on adolescent sexual health, with the potential to positively and negatively influence sexual behaviors. The goal of this article is to review the most current literature on digital media and STIs among adolescents. In particular, we explore the potential impact of digital media use on increasing STI risk; how digital media are being used to disseminate sexual health information; and what new and innovative digital media interventions are currently being used to prevent and treat STIs.

Given the pervasiveness of social media use among young people, it is important to understand the potential risks and benefits that this type of communication poses on adolescent sexual health and STI or HIV transmission. Young people comprise some of the most frequent users of short message services (SMS) or text messaging, with a majority using text messages daily and sending and receiving 50–100 texts a day. SMS represent a new form of adolescent communication, which can also lend itself to new modes of sexual communication. Adolescents engage in a range of sexual
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KEY POINTS

- Digital media are ubiquitous among adolescents who are the most frequent users. However, the association between digital media use, such as sexting, and HIV risk behaviors is unclear.
- Adolescents use digital media in health-promoting ways, gathering information on sexual and reproductive health topics.
- Interventions designed to incorporate digital media platforms to prevent and treat STIs are showing increased promise for reducing risk behaviors.
- Digital media offer a widely used platform to access adolescents with the potential to promote sexual and reproductive health and implement innovative STI or HIV prevention interventions. More research examining how such technologies can be used to improve the lives of adolescents is needed.

Communication associated with digital media. These communications are referred to as sexting. Sexting describes sharing sexually suggestive or explicit photographs and messages across cell phones, mobile devices, and social networking sites.

Since the proliferation of mobile technologies in adolescents’ lives, public health researchers have posited the question of whether sexting has the propensity to influence STI or HIV risk behaviors among adolescents. Results from studies examining such effects have yielded mixed results. In a cross-sectional study by Benotsch et al. [3], sexting was reported by 44% of participants. These participants were significantly more likely to report higher rates of unprotected sex, sex with multiple partners, and sex after drinking or using drugs in the past 3 months compared with their nonsexting counterparts. Of those participants who reported sexting, roughly one-third (31.8%) reported having sex with a new partner for the first time after sexting with that person. However, it is important to note that this study did not assess the specific behaviors sexting participants engaged in, suggesting that although the sexting individuals may be more likely to engage in more frequent sexual behaviors, the risk of these behaviors may vary from low (e.g., manual stimulation) to high (unprotected penile-vaginal intercourse). Additionally, the study sample was primarily comprised white, college-aged, women and may not reflect a more diverse population.

In a study specifically aimed at assessing the association between SMS and STI risk behaviors among Latino adolescents (mean aged 15.7 years), an association was found between sexual risk behaviors and the frequency of SMS and use of social media accounts (e.g., Facebook, Myspace, etc.), with participants who sent more than 100 texts a day being more likely to have ever had vaginal sex [4]. However, there were no associations reported between SMS and social media accounts and contraceptive use at last sex, with roughly 47% of Latino adolescents reporting using contraception at last sex. Thus, although participants were likely to have reported a higher frequency of vaginal sex, their protective behaviors against unintended pregnancy was not associated with their use of SMS and social media accounts.

Conversely, a study by Gordon-Messer et al. [5] confirmed that sexting is a popular form of sexual communication among young people. However, the connection with riskier sexual behaviors in this study was unclear. Among the 3447 young people aged 18–24 who were sexually active in the past 30 days, no differences were found between sexting and nonsexting participants regarding the number of sexual partners or the number of unprotected sex acts compared with nonsexting participants, suggesting that sexting may not be directly related to sexual risk behaviors. In a similar study of young men who have sex with men (YMSM), Bauermeister et al. [6] found that sexting was more frequent among sexually active young men, with men who had engaged in sexting being more likely to report having had insertive anal intercourse, with and without a condom, compared with young men who did not report sexting behaviors. There were no associations found for engaging in sexting and receptive anal intercourse.

When assessing the direct relationship between sexting and social media use and STIs, Buhi et al. [7] found that using social media specifically to find a sexual partner online was not associated with a previous or current STI among youth aged 13–19 years. However, seeking a sexual partner online was associated with other risk behaviors. Thus, the relationship between social media and STI risk among adolescents represents a complex interplay between sexual partner seeking, protective behaviors (e.g., contraception and condom use), and risk behaviors associated with sexual risk. A clear causal or explanatory connection between engaging in STI risk behaviors and using social media was not fully articulated in these studies.

Health-seeking behaviors

Digital media also play a critical role in health-seeking behaviors. They can be used to obtain health information either by actively engaging peers or by anonymously searching for content. Two recent studies have explored adolescents' use of social
media to engage their peers about health information. A qualitative study of adolescents hospitalized for chronic medical conditions found that respondents generally denied using social media to gather information about their disease, find peers with similar conditions, or participate in patient organization sites [8]. Participants cited self-protection and privacy concerns as reasons not to engage in these activities. Byron et al. conducted focus groups with youth about using social media to promote sexual health. Although participants avidly used social networking sites to learn about topics and conduct interpersonal relationships, they expressed reservations about using sites to learn about sexual health. Participants were concerned with bullying and ‘drama’ when using sites to communicate about sexual health [9].

Although the preceding studies demonstrate a reluctance to use social media to engage with peers regarding health matters, some adolescents report using digital media to anonymously gather sexual health information. A survey of adolescents found that 13% of respondents had searched for health information. Female respondents searched for these topics more than male respondents [10]. In a survey of adolescents presenting to a publicly funded adolescent clinic, Buhi et al. found that, although 79% of participants used the Internet daily, only 7% had ever searched for health information. However, adolescents reported that they would be likely or very likely to use text messaging (50%), blogs (48%), online videos (43%), videos on cell phones (35%), or podcasts (29%) to seek answers to sexual health-related questions [11*].

Studies stratifying online health information-seeking behaviors by race or ethnicity or sexual orientation have found important differences. A survey of young women presenting to a family planning clinic found that white (92.7%) and black (92.9%) women were more likely than Hispanic (67.5%) women to use the Internet. White (79.2%) women were more likely to search for health information compared with black (70.3%) and Hispanic (74.3%) women. After multivariable regression, black and Hispanic women sought contraceptive information less frequently, and sought information on pregnancy tests and sexually transmitted infections more frequently than white women [12*]. An online survey of 5542 youth found that online searches for sexual information differed by sexual orientation and ranged from 19% of heterosexual youth to 78% of gay or lesbian or queer youth [13*].

Although adolescents use digital media to disclose information and engage in relationships, they also express strong privacy concerns about seeking health information on these platforms. This privacy paradox is repeatedly demonstrated in surveys and interviews with youth about using digital media for information gathering [9,14,15]. Adolescents also express concerns with being stigmatized for using social media to search for topics such as STIs and mental health [9,16]. Adolescents and young adults are more receptive to digital health promotion strategies that use personal stories, humorous messaging, positive statements, and uncomplicated language [9,17].

Health information research involving digital media includes both observational and interventional approaches. The public health arena has great interest in using social media for disease surveillance [18]. Social media-based surveillance is especially promising in tracking or predicting infectious disease patterns and has been used during influenza, meningitis, and west nile virus outbreaks [18].

Digital media interventions and treatment of sexually transmitted infections

A number of investigators have demonstrated the use of digital media to create health interventions to prevent STIs among adolescents. Burton et al. in the UK considered the impact of SMS on reattendance rates of patients requiring repeat STI testing, using a pre-postintervention design. Prior to the intervention, the clinic procedure was to advise the patient to return for retesting but did not send reminders. The clinic then introduced SMS text reminders sent to those deemed high risk for STIs (i.e., patients diagnosed with an STI, commercial sex workers, MSM, emergency contraceptive recipients, in the window period for HIV). Rates of STI reattendance were compared with those of an earlier time period among patients with similar risk factors. There was no increase in reattendance rates [19]. However, an Australian study randomized 94 patients with a chlamydia diagnosis to SMS reminders with or without an incentive or to usual care. The participants allocated to the treatment condition were significantly more likely to return for retesting [20]. A US proof-of-concept study implemented an SMS-based intervention for HIV-positive MSM focusing on medication adherence, appointment attendance, reducing sexual and substance use, risk-taking behaviors, social support, general health, and patient involvement [21]. In collaboration with a community medical center, the authors studied key factors for implementation, stakeholder perspectives, fidelity, and recommendations for improvement. Messages were developed (151 total) and delivered to clients. Overall, the program was well received. A pilot test of a risk-reduction SMS program for young adults discharged from the
emergency department studied 52 women selected for sexual risk behaviors and alcohol use and randomized to an SMS program or control condition [22]. Only 39% of the intervention group completed all weeks of the intervention. At 3 months, there was an increase in condom use at last intercourse and always condom use, however, these changes did not reach statistical significance.

A recent social media intervention demonstrated the role of social networking in HIV prevention behaviors among YMSM. Young, predominantly African-American and Latino MSM were invited to join Facebook groups. Peer leaders were randomized to talk about HIV or general health information within the groups. Participants in the intervention group were more likely to accept and use HIV test kits than those in the control group. At follow-up, 93% of participants were retained [23].

Applying mobile technology to understanding STI transmission and interventions is an alternative approach to reducing STIs [24*]. Some authors have proposed using advanced computational methodologies, such as web, mobile phones, and sensors, collectively known as behavioral intervention technologies. For example, technology currently being developed to treat depression could be applied to HIV risk behaviors providing continuous access to information, scheduling, monitoring, and awareness locations and behaviors associated with risk behaviors [24*]. Overall, these early studies show some promising applications of digital media to STI prevention and treatment.

CONCLUSION

Social media are pervasive among adolescents. Although social media may be perceived as inherently risky, these technologies can also be used for positive purposes. Adolescents are using these technologies for health-seeking purposes. The domain of social media interventions to improve sexual health and change health behaviors has grown both nationally and internationally. Public health programs have the capacity to reach adolescents in new and innovative ways, particularly racial minority populations who may not have access to some programs and interventions. A better understanding of how social media contributes to both protective and risky sexual behaviors is critical in understanding increasing STI rates among adolescents. Yet, the research is still in early stages. As new technologies emerge, the challenge will be to create the additional research that will further investigate the role social media play in adolescents’ lives.

Acknowledgements

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Conflicts of interest

There are no conflicts of interest.

REFERENCES AND RECOMMENDED READING

Papers of particular interest, published within the annual period of review, have been highlighted as:
- of special interest
- of outstanding interest


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22. Suffoletto B, Aker A, McGinnis KA, et al. A sex risk reduction text-message program for young adult females discharged from the emergency department. J Adolesc Health 2013; 53:387–393. This study describes a trend toward increased condom use among high-risk adolescents after an emergency room visit. This pilot study had poor followup and the findings did not reach statistical significance, yet the findings are encouraging and suggest a larger study is warranted.


24. Brown CH, Mohr DC, Gallo CG, et al. A computational future for preventing HIV in minority communities: how advanced technology can improve implementation of effective programs. J Acquir Immune Defic Syndr 2013; 63:S72–S84. This study describes a number of potential uses for digital media for HIV prevention. For example, a combination of digital media technologies could be used to anticipate risk behaviors and provide timely text messages.