

Digital Technologies and Adolescent Sexual Health: A Literature Review

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1. Introduction

In 2013, the Saskatchewan Prevention Institute began investigating the feasibility of creating a Community of Practice (CoP) related to adolescent sexual health. In February 2014, the Prevention Institute invited Tom Klaus, Ph.D., to facilitate a learning event focused on the creation of a CoP related to adolescent sexual health. Following this event, the Adolescent Sexual Health CoP Leadership Team disseminated a needs assessment survey to be completed by all those who expressed interest in the learning event (both attendees and non-attendees). The purpose of the survey was to gather feedback and input on the direction of the CoP. In June 2014, a report was created to summarize the responses gathered from the Adolescent Sexual Health CoP needs assessment survey. For one particular survey section, respondents were asked to select topics in the area of adolescent sexual health that they would like to receive more information about. The majority of participants indicated an interest in social media/Internet and sexual health, as well as creating sexual health messages for youth.

In response to this request for more information, the Prevention Institute commissioned this literature review. The primary objectives of this review are to: 1) provide an overview of the forms of media that can be used for the purposes of providing sexual health information; 2) provide a specific overview of the use of social media and the Internet in the area of adolescent sexual health; 3) summarize the outcomes of recent media-based sexual health interventions; and 4) provide evidence-based recommendations related to online sexual health education and youth social media use. This literature review will be made available to members of the Adolescent Sexual Health CoP as well as the CoP's Google Group. As well, the information may be used to create new information resources to be disseminated by the Prevention Institute.

Without adequate sex education at home or school, the media becomes one of adolescents' primary sources of sexual health information (Strasburger, 2008). The Internet, in particular, is a valuable source of information for many adolescents. There are certainly benefits to adolescents attaining sexual health information through various forms of media like the Internet, including the fact that accessing information online affords privacy and allows for personal exploration around sensitive topics. However, the information accessed and/or received through media may be inaccurate or misleading. As well, not all media source sexual health content is comprehensive and inclusive. This means that adolescents may not have the information they need to make fully informed choices related to their sexual health.

Media need not be dismissed completely as a mode for disseminating sexual health information to adolescents, however. New forms of media, such as social networking sites and video sharing sites, have been showing promise as avenues for adolescent sexual health education and exploring individual sexuality and sexual relationships. The fact that so many adolescents are using new media for the purposes of accessing information related to sexual health suggests further investigation is needed regarding its impact. In particular, it is worth examining how new forms of media could be used to create effective sexual health messages for adolescents.

2. General Use of Media by Youth

North American adolescents aged 8 to 18 years spend anywhere from 6 to 11 hours a day with some form of media, including television, music, movies, magazines, the Internet, and smart cell phones (Rideout, Foehr, & Roberts, 2010; Roberts, Foehr, & Rideout, 2005). Many of these hours are spent multi-tasking (e.g., watching TV while texting and accessing social networking sites on smartphones) (Kachur, et al., 2013; Rideout et al., 2010). Estimates of daily media usage suggest that youth spend 4.5 hours watching TV, 2.5 hours listening to music, 1.5 hours on a computer, .4 hours watching movies, .4 hours reading print, and 1.5 hours texting/talking via mobile phone (Rideout et al., 2010). More recent research suggests that up to 24% of adolescents are online “almost constantly” (Lenhart, 2015). This is largely due to the accessibility of the Internet through the use of smartphones. It is estimated that up to 75% of adolescents have access to a smartphone (Lenhart, 2015).

2.1 Traditional Media

Traditional media (e.g., television, movies, and magazines) are still commonly used by adolescents each day (Boyar, Levine, & Zensius, 2011; Brown, Keller, & Stern, 2009). Much of the content presented in traditional media contains discussions and depictions of various aspects of sexuality and/or sexual behaviour. However, little of the content mentions or depicts the possible risks or responsibilities associated with sexual behaviour (Hust, Brown, & L’Engle, 2008). Some potential results of exposure to such content include increased body dissatisfaction, earlier sexual intercourse, less contraceptive use, and unintended pregnancy (Brown & Strasburder, 2007).

Frequency of use of traditional media and its impact on sexuality vary dramatically by a number of factors, including sexual maturity, gender, race, and personality variables. For example, earlier maturing girls are more likely to be interested in sexual content in the media than less physically mature girls (Brown, Halpern, & L’Engle, 2005). Girls also prefer more relationship-oriented shows, and boys tend to prefer sports and action-adventure (Brown & Pardun, 2004). As well, some individuals are more likely to seek sexual content while others would rather not see it (L’Engle, Brown, Romocki, & Kenneavy, 2007). Table 1 below provides an estimate of adolescents’ use of traditional forms of media, as well as the amount and type of sexual content presented by each medium.

Table 1. Traditional Forms of Media

Illustrative Findings of Adolescents' Use of Traditional Media and Sexual Content Present		
Medium	Use by Adolescents (12-17 years old)	Sexual Content
Television	<ul style="list-style-type: none"> • Average 12 hours per week • Males average about 1.5 hours per week more than females 	<ul style="list-style-type: none"> • 70% of the top teen programs include sex • 10% mention risk/responsibility of sexual behaviour (Kunkel, Eyal, Finnerty, Biely, & Donnerstein, 2005)
Radio/Music	<ul style="list-style-type: none"> • Average 16 hours per week • 86% have CD/MP3 player in bedroom • 52% listen to online radio 	<ul style="list-style-type: none"> • 37% of popular songs refer to sexual activity • 2/3 (mostly Rap) include degrading sex (Primack, Gold, Schwarz, & Dalton, 2008)
Movies	<ul style="list-style-type: none"> • Average 2 movies per month in theater • Prefer action-adventure, comedies 	<ul style="list-style-type: none"> • 25% of teen movie characters engage in sexual intercourse, often as way to achieve specific ends • Contraception rarely portrayed (Stern, 2005)
Magazines	<ul style="list-style-type: none"> • 63% of teens read a magazine for fun in the last month (Chartier, 2008) • Boys generally prefer sports and activity magazines; girls generally prefer fashion and celebrity magazines 	<ul style="list-style-type: none"> • Teen girl magazines portray girls as obsessed with males and their own appearance (Wray & Steele, 2002) • Teen boy magazines are more visually suggestive, portray all males heterosexual (Batchelor, Kitzinger, & Burtney, 2004)

Note. Recreated from Brown et al. (2009).

2.2 New Media

New media (i.e., digital media) is more than the conversion of traditional media to digital formats (e.g., putting radio on the Internet or posting videos on YouTube). Digital media also involves interactivity and the ability to form groups (e.g., social networking sites) (Centre for Digital Media, 2014). Digital media networks allow people to send the same information to many other people (e.g., Netflix, streaming radio, or a simple web page) or have interaction ranging from minor elements (e.g., rating a show on Netflix) to major components (e.g., posting photographs and comments on Flickr) (Centre for Digital Media, 2014). Digital media can also include text messaging, MP3 players, blogs or chat rooms on websites, and Internet social networking sites (e.g., Facebook). Deborah Levine published an article in 2009 which briefly described the most popular forms of digital media at that time:

SMS Text Messaging

- Also known as short message service (SMS) technology
- Provides a cheap, easy, instant, and non-intrusive way for people to chat
- Has taken the place of email for many young people (Lenhart, 2009)

Social Networking Sites

- Web-based (e.g., Facebook, MySpace)
- Allow users to define a personal network by linking to other people's profiles
- Users can communicate with others through bulletins, blogs, and status updates
- Provide another alternative to email for young people

Widgets and Apps

- Small software programs that can be embedded within a social networking profile (app), or social networking profiles and website pages (widget)
- Creative use of widgets and apps offers potential for boosting peer-to-peer sharing of content, information, and interactivity
- Usually built and maintained by engineers or skilled programmers

Video Sharing Sites

- Allow registered users to upload and stream digital video to the web (e.g., YouTube)
- Can view, tag with keywords, rate, "favour," and comment on videos
- Approximately 57% of adolescents with online access watch videos on these websites and about 39% share their own artistic creations (Lenhart, Madden, MacGill, & Smith, 2007)

Podcasts and Vodcasts

- Internet-based audio and/or video files available for download
- Used for self-guided tours, music, talk shows, trainings, storytelling, education, and advocacy
- About 19% of adolescents with online access download podcasts (Lenhart et al., 2007)

Online Games

- Can be used as study guides or learning supplements to promote safer behaviours, and to teach collaboration, critical thinking, and deductive skills
- Offer rich, interactive environments that can motivate learning
- About 99% of boys and 94% of girls play games on a console, computer, portable gaming device, or cellphone (Lenhart et al., 2008)

Research indicates that adolescents go online both for entertainment and to search for information, with 31% searching for health information and 17% searching for sensitive health topics such as drug use, depression, and sexual health (Lenhart, Purcell, Smith, & Zickuhr, 2010). Table 2 below provides an estimate of adolescents' use of new forms of media, as well as the amount and type of sexual content presented by each medium.

Table 2. New Forms of Media

Illustrative Findings of Adolescents' Use of New Media and Sexual Content Present		
Medium/Channels	Use by Adolescents (12-17 years old)	Sexual Content
Internet	<ul style="list-style-type: none"> • Average 12.5 hours per week online • Primarily online for email, instant messaging (IM)/social networking sites (SNS), and gaming (Chartier, 2008) • 30% of females and 70% of males view Internet porn (Peter & Valkenburg, 2006) 	<ul style="list-style-type: none"> • Sexual health information available • Sexually explicit images/pornography more accessible than ever before (Brown & L'Engle, 2009)
Social Networking Sites	<ul style="list-style-type: none"> • 38% of tweens (12-14) and 77% of teens (15-17) have SNS profiles • SNS especially popular among older females: 89% of 15-17 year old girls have SNS profiles (Lenhart, 2009) 	<ul style="list-style-type: none"> • Platform for sexual self-expression and finding like-minded teens (e.g., gay, abstinent) • About 1 in 10 teens are posting sexually suggestive images online (Moreno, Parks, Zimmerman, Brito, & Christakis, 2009)
Cell Phones	<ul style="list-style-type: none"> • Have cell phones: 52% of 12-13 year olds 72% of 14-16 year olds 84% of 17 year olds • 58% send text messages to friends (38% do so daily) (Lenhart, 2009) 	<ul style="list-style-type: none"> • Sexual health information available through Apps and with Internet access • About 1 in 5 teens are "sexting" (National Campaign to Prevent Teen and Unplanned Pregnancy, 2009)

Note. Recreated from Brown, Keller, & Stern (2009).

3. Use of New Media by Youth Related to Sexual Health

In addition to traditional forms of media, new forms of media have become important avenues for sex education. New forms of media provide access to discussions and portrayals of sexual behaviour that can impact adolescents' conceptions of sexual attractiveness, romantic relationships, and sexual behaviour (Boyar et al., 2011; Brown et al., 2009; Levine, 2009). Digital media (e.g., text messaging, Internet) are largely used by youth for exploring and maintaining social, sexual, and romantic relationships because of presumed safety, perceived anonymity, transcendence from adult control, 24/7 availability, and the ability to communicate with peers (Brown et al., 2009). The Internet is among the most popular source of information that youth and young adults use to learn about sexual and reproductive health (along with friends and family, schools, and health professionals) (Boyar et al., 2011). There are literally hundreds of online and mobile programs conducting awareness, outreach, advocacy, and parent-engagement activities related to youth sexual health (Boyar et al., 2011). These sites and programs are primarily designed to provide sexual health information (Boyar et al., 2011). Further, many adolescents believe that the Internet is a valuable place to attain answers to embarrassing sex-related questions, to learn more about uncomfortable topics, to familiarize themselves with intimate body parts, and to gain perspective on sexual practices (Brown et al., 2009).

Sexual self-expression online can also be functional for adolescents. Some argue that the Internet provides a relatively safe space for adolescents to explore and define themselves as sexual beings (Stern, 2002). Youth can also initiate and maintain "dating" relationships that may be less intimidating than those in the real world (Subrahmanyam, Greenfield, & Tynes, 2004). For lesbian, gay, transgender, transsexual, and queer (LGBTQ) youth, specifically, the Internet can provide a safe space for experimentation and self-definition that is often difficult or dangerous in offline spaces (Brown et al., 2009). Online, LGBTQ youth can safely discuss sexual identities and queer politics, seek partners, navigate the coming out process, and discuss sexual practices (Bond, Hefner, & Drogos, 2008).

The majority of youth prefer to utilize online search engines or school clinics to learn about birth control and talk to friends rather than to family about sexually transmitted infections (STIs) (Boyar et al., 2011). Online search engines are often cited as the first place that youth go when they have questions about sex (Boyar et al., 2011). Popular search engines include Google, Bing, Yahoo!, and Ask.com (Boyar et al., 2011). However, many adolescents are unfamiliar with specific sexual health education websites like Scarleteen, Planned Parenthood, Sex, Etc., and Go Ask Alice (Boyar et al., 2011).

Intended for practitioners and others who work with adolescents, the Center for Disease Control and Prevention (CDCP) released a document titled "Adolescents, Technology, and Reducing Risk for HIV, STDs, and Pregnancy" which provides an overview of the ways in which digital technology can be used to improve the sexual health of adolescents. This document provides a basic overview of

new digital technologies and media that youth are using (e.g., social networking sites, video sharing, blogs, instant messaging, mobile technology, and virtual worlds), and examines technology's potential for use for sexual health promotion. This document also presents examples of innovative adolescent sexual health interventions that have used digital technology to improve their reach and effectiveness (Kachur et al., 2013). The researchers concluded that incorporating technology and new media into prevention efforts can improve adolescents' access to sexual health information, thereby providing innovative ways to improve adolescent sexual health. However, they caution that it is important to consider current technology trends when developing or adapting programs to determine their relevancy and appropriateness for reaching target audiences. Periodic assessment of popular and new technologies and how they are being used by adolescents is strongly recommended.

There are two main concerns some researchers believe are associated with the use of new media to learn about sex and sexual health. First, the information accessed and/or received may be inaccurate or misleading (Brown et al., 2009). Adolescents may not consider the true credibility of websites (Fidel, Davies, & Douglass, 1999). Adolescents may also have poor health literacy (i.e., search for health-related information using slang terms) leading to less credible websites (Cecchino & Morgan, 2009). In addition, not all sexual health websites are comprehensive and inclusive, meaning they might discuss condom use and abstinence, but fail to discuss other safer sex strategies such as reducing the number of partners, reducing casual sex, or delaying first intercourse (Keller, LaBelle, Karimi, & Gupta, 2004; Noar, Clark, Cole, & Lustria, 2006). The second main concern associated with the use of new media to learn about sex and sexual health is that adolescents may rely on this form of information and turn away from real people in their lives (e.g., parents, teachers, physicians, community members) who can communicate certain values about sex (Brown et al., 2009).

A recent review of the literature on adolescents' use of the Internet for sex education found four distinct themes: 1) the prevalence of adolescents' engagement with sex information online; 2) the sex-related topics adolescents are interested in learning about online; 3) quality assessments of adolescent-targeted online sex information; and 4) interventions to increase sexual health knowledge via digital media (Simon & Daneback, 2013). Regarding the first theme, the studies examined revealed that 20 to 76.5% of adolescent samples reported using the Internet for sex education. For the second theme, a number of studies (mainly using content analysis, survey, and interview methodologies) were identified that addressed the types of sex-related topics adolescents seek or engage with online. The most commonly cited online sex education topics adolescents sought information about included HIV/AIDS/STIs, pregnancy/childbirth, contraception/protection, information about the body, relationships/social issues, and sexual identity/orientation. With respect to the third theme pertaining to the quality assessment of adolescent-targeted online sex information, the review suggested that while online information can be difficult to find and can lack indicators of quality, adolescents are savvy users capable of determining what makes an online resource trustworthy. However, it is unclear how and where adolescents have been taught to be critical of web sources or if they have been taught any web-based skills at all. Finally for the fourth

theme, few studies were identified that aim to change adolescents' sexual health knowledge or behaviours through Internet-associated technology. However, those which have addressed this topic provide valuable information about how online content can be harnessed to provide effective sex education. Results from these studies suggest that web-based interventions can significantly alter the sexual health attitudes, knowledge, and behaviours of adolescents.

3.1 Social Media

There are a number of forms of social media being utilized by youth today, including text messaging, social networking sites, online video sites, online gaming, and blogging within social networking sites (Carroll & Kirkpatrick, 2011). The ability to interact with others is a unique feature of social media, providing adolescents with new ways to create and navigate their social environments (Carroll & Kirkpatrick, 2011). The most commonly used social media by teens are text messaging, social networking sites (e.g., Facebook), online video sites (e.g., YouTube), online gaming (SecondLife.com), and blogging within social networking sites (Facebook feature) (Lenhart et al., 2010).

Social networking websites, like Facebook, allow young people to display information about their sexuality and sexual lives. A large majority of North American youth are creating and maintaining personal profiles on these websites. Studies estimate that 73% of teens between the ages of 12 and 17 have a social networking profile (Boyar et al., 2011; Lenhart et al., 2010; Moreno & Kolb, 2012). Adolescents are more likely to use sites such as MySpace and Facebook (Moreno & Kolb, 2012). Facebook is currently the world's most popular social networking site and is largely used by youth aged 18 to 25 years (Boyar et al., 2011; Goodman, Wennerstrom, & Springgate, 2011).

While Facebook remains the most used social media site by adolescents, other social media sites and apps are becoming increasingly popular (Lenhart, 2015). Newer social media sites and apps include Snapchat, Instagram, Vine, and Kik Messenger. Text messaging has also undergone a change in the past several years with the creation of smartphone-based messaging apps. Lenhart (2015) reports that up to 91% of adolescent mobile phone owners use text messaging, either directly through their mobile phones or through a messaging app like Kik or WhatsApp. Some of the newer sharing apps and sites allow adolescents to ask questions or post texts and pictures anonymously (e.g., Whisper, Yik Yak, ASK.FM). The following is a list of social media sites and apps that are popular among adolescents, along with their reported usage by American adolescents (Lenhart, 2015):

- Facebook – social networking website; 71% of adolescents report usage
- Instagram – online mobile photo sharing, video sharing, and social networking service; 52% of adolescents report usage

- Snapchat – photo and video sharing app¹; 41% of adolescents report usage
- Twitter – online social networking service that enables users to send and read, share, and respond to short messages called ‘tweets’; 33% of adolescents report usage
- Vine – app that allows users to record and share short, 6 second videos; 24% of adolescents report usage

As this list shows, social networking sites allow youth to create profiles and share information, upload pictures and videos, join groups about topics of interest, post comments about recent events (e.g., status updates), and communicate with friends via email or instant messaging. Youth can also link their profiles with others in a process referred to as friending (Moreno & Kolb, 2012). Sharing sexuality and sexual health information on social networking sites is also common and can take place in a number of ways, including: indicating sexual orientations on social network profiles; posting stories and poems about sexual desire and experience on blogs; sharing naked or semi-nude photos and videos of themselves on social networking profiles and via mobile phones (i.e., sexting); and discussing sexual practices on social networking sites and blogs (Brown et al., 2009).

Recent studies suggest that between one-tenth and one-fifth of teens engage in these online practices (Moreno et al., 2009; National Campaign to Prevent Teen & Unplanned Pregnancy, 2009). The potential repercussions of sharing this kind of information online, however, are only just revealing themselves. For example, in October 2014, three teenage boys in Kamloops, British Columbia, were charged with possession and distribution of child pornography after coercing several girls between the ages of 13 and 15 to send nude photos of themselves on social media sites (The Canadian Press; October 28, 2014).

3.2 Youth Perspectives on the Use of New Media for Sexual Health Education

A number of researchers have examined youths’ perspectives on the use of social media and new technologies for sexual health education. In 2011, Selkie, Benson, and Moreno conducted focus groups (29 participants, 5 groups) with adolescents aged 14 to 19 years old. Three major themes emerged from the collected data: 1) adolescents preferred sexual health education resources that are accessible (i.e., the Internet is a preferred resource because it provides immediate answers to questions); 2) adolescents preferred online resources that are trustworthy (i.e., resources should be credible and confidential); and 3) adolescents discussed preference for “safe” resources (i.e., resources should offer information in a non-threatening way that will not cause embarrassment). Overall, adolescents were enthusiastic regarding the use of technology for enhancing sexual health education. The researchers concluded that health organizations should use these results to better understand adolescents’ views and concerns about their interactions with professionals regarding sexual health.

¹ Images and videos (called ‘snaps’) can be shared and then are automatically deleted within a predetermined amount of time. It is important to note that there are ways that viewers can capture the snaps so that they are not deleted (e.g., screen shots can be taken and snaps can be undeleted).

Overall, youth seem to be familiar with, receptive to, and have an affinity for online sexual health services (Shovellor, Knight, Davis, Gilbert, & Ogilvie, 2012). In particular, adolescents find online services appealing because they are convenient, afford privacy, and provide expedient access to testing and/or counselling (Shovellor et al., 2012); however, many adolescents express a low tolerance for technologies they perceive to be outdated (Shovellor et al., 2012).

The social networking site, MySpace, was examined by Ralph, Berglas, Schwartz, and Brindis (2011) as a potential source for connecting youth to sexual health services. Overall, the study revealed high levels of Internet access, frequent use of social networking sites, and experience in searching for health information online. However, disparities in frequency and location of Internet access by race/ethnicity were revealed, as well as hesitancy among some youth to join a clinic's online social network. These factors should be taken into consideration during the development of such programs as they may negatively impact the success of this strategy in some populations. Some of the benefits for using MySpace as part of sexual health service outreach efforts include low cost, wide reach, and youth friendliness. Potential challenges for service providers include technological barriers, insurance of teen safety from inappropriate contact, and remaining timely and relevant given the dynamic nature of the Internet.

Recent examinations of adolescents' views on social media as a space for sexual health promotion material and as a mode for sexual health communication revealed some interesting findings (Byron, Albury, & Evers, 2013; Evers, Albury, Byron, & Crawford, 2013). First, adolescents are highly aware of the participatory culture of social network sites and how this can lead to embarrassment and "drama" associated with engaging in overt discussions of sexual health online. Second, a number of youth indicated that any content linked to sexual practice and sexual health was unlikely to be shared among peers on social media platforms due to the potential for stigma. Third, adolescents report being careful about what they present online about themselves and often place limits on their use of social media to avoid "drama." Fourthly, most adolescents set their online profiles to "private," thus ensuring limits on who can access the information published on their profiles. Finally, humour is used by many youth to defuse the embarrassment of discussing sexual health with strangers. While many adolescents stated that fears of bullying and gossip were likely to prevent the dissemination of sexual health messages via social media, humorous online videos are noted as a way in which to avoid stigma and enable the sharing of sexual health information online.

4. New Media-Based Sexual Health Interventions

To date, few media interventions for adolescent sexual health have been systematically evaluated (Brown et al., 2009; Newbold & Campos, 2011; Talukdar, 2013). Most evaluations have focused on interventions involving software administration in classroom settings. The results of these evaluations suggest these types of programs may be cost effective and easily replicable means of providing adolescents with basic sexual health information (Brown et al., 2009). Interventions that

make use of cellphones and text-messaging offer much more interactivity, but evaluations of these approaches are quite scarce (Brown et al., 2009). Brown et al. (2009) examined a number of sexual health media campaigns that made use of new technologies. It was concluded that some of the campaigns had moderate success. The lack of success of these campaigns may be due to the fact that most of the existing interventions have failed to target messages to specific audiences (e.g., sexual minorities or adolescents with varying levels of sexual experience) (Brown et al., 2009).

A recent systematic review of interventions that used new digital media to improve adolescent sexual health revealed a number of notable results to report (Guse et al., 2012). Two studies significantly delayed initiation of sex (e.g., Roberto, Zimmerman, Carlyle, & Abner, 2007); seven interventions significantly influenced psychosocial outcomes such as condom self-efficacy and abstinence attitudes (e.g., Bull, Pratte, Whitesell, Rietmeijer, & McFarlane, 2011; Halpern, Mitchell, Farhat, & Bardsley, 2008; Markham, Shegog, Leonard, Bui, & Paul, 2009; Marsch et al., 2011; Roberto et al., 2007; Tortolero et al., 2010); and six studies increased knowledge of HIV, STIs, or pregnancy (e.g., Halpern et al., 2008; Lou, Zhao, Gao, & Shah, 2006; Marsch et al., 2011; Roberto et al., 2007; Tian et al., 2007).

4.1 Examples of Social Media and Adolescent Sexual Health Interventions

During 2009 and 2010, a novel health promotion intervention called “The FaceSpace Project” made use of social networking sites to deliver sexual health promotion to two key at-risk groups (young people aged 16 to 29 years, and men who have sex with men [MSM]) (Eysenbach, 2012). The main concept of the project was to use fictional characters to post content (primarily videos) and to interact on various social networking sites with sexual health messages embedded within some postings and interactions. At the end of the projects, two main outcomes were reported: number of Facebook page fans and number of video views on YouTube. The youth Facebook pages had a total of 900 fans, while the MSM pages had 1332 fans. The youth project videos had 5300 views on YouTube, and the MSM videos had 7886 views. The intervention team felt these numbers suggested moderate success of the initiative, but there was much room for improvement, particularly with respect to website promotion. They cautioned that developing an intervention on social networking sites requires consideration of additional aspects beyond more traditional methods of health promotion. Some of these considerations include: the online environment and nature of human interaction online; Web 2.0 functionality (i.e., user-friendliness of newer websites); characteristics of the target audience and their preferred social networking site(s); and how end users interact and engage in these spaces. Additionally, they caution that obtaining ethical, legal, and organizational approval as well as developing effective evaluation strategies may be challenging (Eysenbach, 2012).

A more recent study conducted by Jones, Baldwin, and Lewis (2012) evaluated an evidence-based social-networking intervention in Chicago, Illinois aimed at reducing the incidence of chlamydia among 15 to 24 year olds. The intervention consisted of a Facebook site which addressed signs, symptoms, treatment, screening, and prevention of chlamydia infection.

Results included a 23% self-reported increase in condom use and a 54% reduction in positive chlamydia cases among 15 to 17 year olds. Based on these findings, Jones et al. (2012) concluded that social media may be an effective way to provide information and promote positive behavioural changes among this particular population.

In order to determine whether STI prevention messages could be successfully delivered via Facebook and have a positive impact on preventing increases in sexual risk behaviour, Bull, Levine, Black, Schmiege, and Santelli (2012) conducted an experiment with male and female adolescents aged 15 to 19 years. Study participants were randomly assigned to one of two conditions. Those in the experimental condition were exposed to a Facebook page called "Just/Us," which contained content related to eight broad topics related to sexual health (e.g., communication regarding sexual history; expectations for a healthy relationship; skills-building for condom negotiation and use; and how to access STI testing). Individuals assigned to the control group were directed to a page which discussed news issues unrelated to sexual health. The intervention ran for eight weeks after which all participants were invited to complete a follow-up behavioural risk assessment related to their sexual health and sexual health practices. Participants were also followed up six months after the end of the intervention. Immediately after the study, the intervention group had higher rates of condom use compared to the control group, but this effect disappeared by the six month follow-up. The researchers concluded that social networking sites may be viable venues for providing sexual health education interventions, but more work is needed regarding the specific longer-term impact of these types of interventions (Bull et al., 2012).

Kofinas et al. (2014) also examined the use of social media as an approach to supplement contraceptive counselling. They recruited 143 females aged 18 to 45 years² who were visiting a clinic for gynecologic or postpartum care. Participants were randomly assigned to either: 1) receive individual counselling from a provider about contraception followed by 30 minutes to review a patient education pamphlet, or 2) receive the same counselling and then have 30 minutes to explore a Facebook page created for the study. The Facebook page contained the same information as the pamphlet, but presented it in video, diagram, and game formats. Before receiving counselling, the women completed a survey regarding contraceptive knowledge, demographics, and contraceptive use. After the intervention, they completed a survey containing the same contraceptive knowledge questions, and also answered questions related to their contraceptive preferences and satisfaction with the counselling they had received. Women who had viewed the Facebook page scored higher on the contraceptive knowledge questions than those in the pamphlet group. Overall, those who received post-counselling information from the Facebook page rated their satisfaction with counselling as 10 out of 10, compared to the pamphlet group which had a median satisfaction level of 6 out of 10.

² This study was not conducted with adolescents, but the conclusions of the study are still relevant for understanding the usefulness of social media for the purposes of sexual health education.

The researchers concluded that social media holds promise as a method for increasing contraceptive knowledge among women (Kofinas et al., 2014).

4.2 Computer-based Interventions

To determine the effects of interactive computer-based interventions (ICBI) for sexual health promotion, Bailey et al. (2010) searched more than thirty databases for randomized controlled trials (RCTs). A total of 15 RCTs of ICBI were located. Analyses revealed the following effects for sexual health related factors: moderate effect on sexual health knowledge; small effect on safer sex self-efficacy; small effect on safer-sex intentions; and an effect on sexual behaviour. ICBI was found to be more effective for sexual health knowledge than face-to-face sexual health interventions. Bailey et al. (2010) concluded that ICBI are effective tools for learning about sexual health, and so far have shown positive effects on self-efficacy, intention, and sexual behaviour.

5. Recommendations Related to Online Sexual Health Education and Youth Social Media Use

5.1 Developing Online Sexual Health Education Platforms

The following section outlines five main categories of observations and recommendations developed by Boyer et al. (2011) for creating online platforms for sexual and reproductive health education for youth. This information is based on a cumulative analysis of data collected from interviews, a national survey, and focus groups during the course of Boyer et al.'s examination of youth sexuality and reproductive health in the digital age. Consideration is also given to real world problems which arise in sexual health education based on the authors' years of experience in the field.

Table 3. Observations and Recommendations for Developing Online Sex Education Platforms

	Observations	Recommendations
Communication Style	<p>1. Youth are actively searching for accurate, helpful, and in-depth information about sex and sexual health.</p> <p>2. When it comes to talking about sex, trust and stupid are key words. Youth want information and people they can trust. They also know that actions such as not using a condom or getting pregnant are “stupid.”</p>	<ul style="list-style-type: none"> • Recommendation 1: Consider ways information provided online can be verified for accuracy and lack of bias. • Recommendation 2: Ensure that the tone of the online communications resonates with youth. It should be forthright and intelligent, with a touch of humour. • Recommendation: Utilize the words ‘trust’ and ‘stupid’ in online communications to youth about sex.
Discretion and Privacy	<p>3. Youth and young adults want discretion and privacy in online communications about sex, preferring programs and services that do not leave digital trails.</p> <p>4. Many focus group respondents were concerned about getting random texts, images, or videos on their phones without their consent.</p>	<ul style="list-style-type: none"> • Recommendation: Develop programs that allow users to protect their privacy. • Recommendation: Consider programs that push content per users’ requests only and avoid those that deliver content that users may not want or are not ready to examine.

	Observations	Recommendations
<p>Platforms</p>	<p>5. An Internet search is often the starting point for research.</p>	<ul style="list-style-type: none"> • Recommendation: Make better use of search engine optimization to improve search ranking and the promotion of sexual and reproductive health sites.
	<p>6. The Internet is one of many ways youth learn about sex.</p>	<ul style="list-style-type: none"> • Recommendation: New technologies complement other forms of communication about sex. Do not abandon existing offline or online programs in favour of the next new thing.
	<p>7. Recognize the power of pornography. Almost all youth have some contact with pornography in their formative years.</p>	<ul style="list-style-type: none"> • Recommendation: Leverage the “arousal” component of pornography to reach youth with sexual health information in a constructive manner.
	<p>8. The mobile phone is a widely used platform among youth, with text messaging available on almost all phones as the lowest common denominator.</p>	<ul style="list-style-type: none"> • Recommendation: Investigate ways other fields are using text messaging for health behaviour change and learning. Consider context and tone when text messages are sent and recommend actions when creating text message campaigns and services for youth.
	<p>9. Smartphones and apps are the wave of the future.</p>	<ul style="list-style-type: none"> • Recommendation: While it may be a few years before the majority of youth (including those with the lowest socioeconomic status) own smartphones, developing apps for current users will foster word-of-mouth distribution when mainstream smartphone use begins.

	Observations	Recommendations
	<p>10. Despite their widespread popularity among youth, social media networks are often awkward channels for sharing personal, sensitive information.</p>	<ul style="list-style-type: none"> • Recommendation: While their public nature makes them the wrong platform for private discourse and content, social media networks can be utilized as supplemental channels for marketing, feedback, interaction, and dialogue.
	<p>11. Youth are doing what they used to do on the “open” Internet (e.g., email, chat, IM) within closed networks such as Facebook.</p>	<ul style="list-style-type: none"> • Recommendation: Consider switching primary communication with youth and youth leaders, including one-on-one private communications such as email, to services within “closed” social networking sites.
	<p>12. Men are more likely than women to play online games via consoles, watch online video, and download apps.</p>	<ul style="list-style-type: none"> • Recommendation: Investigate ways to incorporate learning for young adult men into these education/entertainment platforms.
	<p>13. Twitter, Foursquare, and other emerging services are not universally used among youth currently.</p>	<ul style="list-style-type: none"> • Recommendation: These types of services may not be good places to develop communications and education-based programs currently, but might be good listening channels or outlets to hear from current users and youth marketers outside the health field.

	Observations	Recommendations
Crossplatform	<p>14. Traditional media such as music and television still matter.</p> <p>15. Youth are using multiple sources, often compiling information from friends and family, online, mobile, and health professionals.</p>	<ul style="list-style-type: none"> • Recommendation: Continue to partner with traditional media sources to promote new technologies (e.g., celebrity messages on Twitter). • Recommendation: Develop multimedia programs that help connect some or all of these disparate sources of information and guidance for youth.
Evaluation and Funding	<p>16. Currently, few digital programs for sexual and reproductive health are being rigorously evaluated.</p>	<ul style="list-style-type: none"> • Recommendation: Develop baseline measures of success, then integrate standardized evaluation and research into all digital and new media programs.
Evaluation and Funding continued	<p>17. Costs for mobile and social networking program development is not known, standardized, or shared.</p> <p>18. The ability to duplicate and scale successful programs is a concern among professional stakeholders.</p>	<ul style="list-style-type: none"> • Recommendation: Consider creating public price estimates (i.e., easily accessible estimates of the cost of goods and services) for various technological services such as text messaging and application development. • Recommendation: Consider creation of a platform to share successes and challenges among researchers and program staff nationwide; then standardize best practices within the field.

Deborah Levine (2009), pioneer of the sexual health website Go Ask Alice, cautions that the world of technology is ever-changing and that what is popular one day will likely soon be outdated. She suggests that, in order to stay in touch, sexual health educators should be flexible, interactive, and fresh. Other suggestions she makes are to go to where youth are to keep information current, accurate, and accessible; use each form of technology for what it can do best; engage young people in design, implementation, and evaluation of technological

efforts; and finally, ensure that digital efforts in sexual and reproductive health are comprehensive and accurate.

5.2 Recommendations for Parents and Other Groups Regarding Social Media

Carroll and Kirkpatrick (2011) provide a number of recommendations for parents and caregivers with respect to the use of social media and social networking sites for youth. First, it was suggested that parents and caregivers educate themselves about social media, the ways in which adolescents may use it, and the common risks, to help them understand and navigate the technologies. Second, family discussions were encouraged as they can be positive for adolescents and can result in less risky online behaviours (Cox Communications, 2007). Finally, discussing media content with adolescents was recommended because it can be an effective strategy to reduce the amount of personal information disclosed (Ito et al., 2008).

Specific recommendations were also provided for each of the following: technological providers, health providers, schools, non-profits, and researchers were specifically targeted with respect to the provided recommendations. It was suggested that Internet providers such as Google and Yahoo, as well as social networking sites such as Facebook and YouTube, continue to work with parents and policy makers to create awareness and opportunities for privacy protection of youth. It was also recommended that these providers and sites develop technologies to assist adolescents in staying safe. To assess risk for depression, medical and mental health providers were asked to include routine screenings that consider an adolescent's social media use. Schools were asked to update media literacy guidelines to include explicit information about successful participation with new media forms, online risks, and consequences of adolescents' media use. Non-profit organizations were asked to maximize the opportunity to reach adolescents through social networking sites already used by adolescents. Finally, it was suggested that evaluation research is needed on the effectiveness of social media-based interventions (Carroll & Kirkpatrick, 2011).

6. Summary

Based on the above literature review, there are several key points to highlight:

- North American adolescents aged 8 to 18 years spend anywhere from 6 to 11 hours a day with some form of media (Roberts et al., 2005; Rideout et al., 2010).
- Little of the content in traditional media mentions or depicts the possible risks or responsibilities associated with sexual behaviour (Hust et al., 2008). Potential results of exposure to sexual or sexualized content include increased body dissatisfaction, earlier sexual intercourse, less contraceptive use, and increased unintended pregnancy (Brown & Strasburder, 2007).
- The most commonly used new/social media by teens are text messaging, social networking sites, online video sites, online gaming, and blogging within social networking sites (Lenhart et al., 2010).

- Adolescents mainly go online for entertainment and information, including searching for health information and for information about sensitive health topics such as drug use, depression, and sexual health (Lenhart et al., 2010).
- New forms of media have become important avenues for sex education as they provide access to discussions and portrayals of sexual behaviour that can impact adolescents' conceptions of sexual attractiveness, romantic relationships, and sexual behaviour (Boyar et al., 2011; Brown et al., 2009; Levine, 2009).
- Digital media (e.g., text messaging, Internet) are largely used by youth for exploring and maintaining social, sexual, and romantic relationships because of presumed safety, perceived anonymity, transcendence from adult control, 24/7 availability, and the ability to communicate with peers (Brown et al., 2009).
- Two main concerns related to the use of new media to learn about sex and sexual health are:
 - a) Adolescents may not consider the true credibility of websites and/or may have poor health literacy leading to the use of less credible websites (Cecchino & Morgan, 2009); not all sexual health websites are comprehensive and inclusive (Keller et al., 2004; Noar et al., 2006).
 - b) Teens may rely solely on this form of information and turn away from real people in their lives (e.g., parents, teachers, physicians, community members) who can communicate certain values about sex.
- To date, few media interventions for adolescents' sexual health have been systematically evaluated (Brown et al., 2009; Newbold & Campos, 2011; Talukdar, 2013).
- Most statistically significant impacts of interventions using new digital media to improve adolescent sexual health have been seen for knowledge-based outcomes, which may not translate to meaningful reductions in youth risk behaviours. Measurement of behavioural outcomes is encouraged, but this requires longer follow-up and retention than most studies have attempted (Guse et al. 2012).
- Because the world of technology is ever-changing, what is popular one day will likely soon be outdated. In order to stay relevant, sexual health educators should be flexible, interactive, and fresh. They should also go to where youth are to keep information current, accurate, and accessible; use each form of technology for what it can do best; engage young people in the design, implementation, and evaluation of technological efforts; and ensure that digital efforts in sexual and reproductive health are comprehensive and accurate (Levine, 2009).
- Parents and caregivers should educate themselves about social media and the ways in which adolescents may use it to help them understand and navigate the technologies (Carroll & Kirkpatrick, 2011). As well, family discussions are encouraged as they can be positive for adolescents and can result in less risky online behaviours (Cox Communications, 2007). Discussing media content with teens is also recommended because it can be an effective strategy to reduce the amount of personal information disclosed (Ito et al., 2008).

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