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## RESOURCE REVIEW

# Sexuality Education Goes Viral: What We Know About Online Sexual Health Information

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*Internet use among young people in the United States is nearly ubiquitous; they are online from home computers, from school computers, and from mobile devices. This offers incredible opportunity for sexual health educators to access individuals who are at a critical time in sexual development over the life course. Currently, the research base on how to best educate young people about sexual health via the Internet is thin. This literature review adds to the small body of current research by describing three subject areas: how young people are using the Internet to find sexual health information, what topics they want to know about, and evaluations of Internet-based sexual health interventions. Based on current knowledge, the field needs to create consensus about what works by developing shared recommendations and theoretical foundations on which to build sexuality education resources online. Additionally, young people need to be consulted in a more systematic way about the information they want and how they want it offered.*

**KEYWORDS** *Sexuality education, adolescents, Internet, health promotion, sexual health, information seeking, health education, web-based*

## INTRODUCTION

American teens are online and using the Internet to gather health information. Ninety-five percent of 12–17 year olds have access to the Internet, and 74% have Internet access on a mobile device (Pew Research Center's Internet & American Life Project, 2012b). Ninety-four percent of young adults ages 18–29 use the Internet (Pew Research Center's Internet & American Life

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Project, 2012a). Ninety-three percent of 8–18 year olds have at least one computer in their home (Rideout, Foehr, & Roberts, 2009). Fifty-five percent of 8–18 year olds have ever looked for health information online, and in one study 29% of 15–18-year-old participants had used the Internet to look up sexual health information (Rideout et al.; Keller & La Belle, 2005).

Adolescents are at a heightened risk for sexually transmitted infections, unwanted pregnancy, and high-risk behavior. Just over 40% of young people are having sexual intercourse by the time they are 19 (Martinez, Copen, & Abma, 2011). Adolescents and young adults are the age group at highest risk of sexually transmitted infections (STIs); 62% of new gonorrhea infections and 70% of new chlamydia infections occur among 15–24 year olds (Centers for Disease Control and Prevention, 2012). The United States has one of the highest rates of teen pregnancy in the developed world (Martinez et al.). While the majority of teenagers ages 15–19 are using some form of contraception the first time they have sexual intercourse, at last sex only 52% of girls in this age group and 74% of boys say they used a condom (Martinez et al.). The National Survey of Family Growth found that 48% of girls and 32% of boys had mixed feelings about the first time they had sexual intercourse; part of them wanted to have intercourse and part of them did not (Martinez et al.). This may be symptomatic of any combination of things such as agency, consent, communication, or cultural norms. Regardless, young people deserve to feel prepared and actively involved in the decision to have sexual intercourse for the first time. These discouraging numbers highlight a need for more comprehensive and accessible sexuality education. This will help U.S. adolescents begin exploring their sexuality safely and with the most accurate information available.

The Internet and media are already being used as mediums for sexuality education (Allison et al., 2012; Gerressu & French, 2005). Recent studies have explored the quality of sexual health content online, what topics young people are searching for, how to most effectively go about designing sexual health websites, and ways in which young people's use of new media may relate to their sexual activity (Allison et al.; Borzekowski, 2006; Gray & Klein, 2006; McKee, Green, & Hamarman, 2012; Collins, Martino, & Shaw, 2011). However, there is no consensus in this area of research about methodological considerations such as how to define adolescent or what questions are best for assessing how adolescents look for sexual health information online. Defining consistency and best practice in the way research is conducted is essential for building knowledge of what works when delivering sexuality education online.

The aim of this literature review is to draw a more comprehensive picture of how online sexual health interventions do and do not align with real world habits and interests of adolescents. For the purpose of this review, adolescents are defined as 13–24 year olds. The current paper summarizes three subject areas: how young people are using the Internet to find sexual

health information, what they are searching for and what topics they want included in sexual health websites, and evaluations of Internet-based sexual health interventions. Disparities between what sexual health information is being offered to young people online and what they want will be discussed. These differences outline suggestions for future directions in research and programming.

## METHODS

To be included in this review, eligible studies specifically focused on age groups within the 13–24 age range; were conducted in the United States, Australia, or Europe; and have been published in the last 10 years. Studies either review sexual health interventions delivered via the Internet, review sexual health websites targeting young people in the 13–24 age range, research how adolescents look for information online, or explore which sexual health topics young people would like to learn more about.

Studies were excluded for: (a) asking where young people get sexual health information generally, not specific to Internet sources; (b) reviewing online interventions or educational campaigns that are supplemental to face-to-face interventions; or (c) studying associations between online dating or finding sexual partners online and sexual risk behaviors. Research about online partner notification commonly came up in searches. While outside the scope of this review, this area of research is a meaningful example of one potential use of technology for improving sexual health.

Four databases were searched: Medline, EBSCO, Education Resources Information Center (ERIC), and PubMed. The EBSCO search was limited to an age range of 13–18 due to the age categories offered as terms. Keyword searches differed according to the search language for each database and included the following terms: sexual health, sex education, sexuality, Internet, health promotion, adolescent behavior, adolescents, and information seeking. For PubMed MeSH strategies, see Appendix A. Papers recommended by key informants and reference lists for included articles were also considered for inclusion. The search was considered comprehensive when it seemed that information on the three subject areas had reached a point of saturation.

## SEARCHING HABITS OF 13–24 YEAR OLDS

### How They Are Searching

The majority of research on how young people are searching the Internet for answers to their sexual health questions is qualitative with relatively small samples. There are three common themes that emerge across this limited pool of research. Adolescents use search engines when looking for sexual

health information, they express concern about credibility and accuracy of websites they visit, and they want to stay anonymous when discussing topics related to sexuality.

Overwhelmingly, young people start with search engines to find answers to their sexual health questions (Buhi, Daley, Fuhrmann, & Smith, 2009; Selkie, Benson, & Moreno, 2011). In one observational study, college students were asked to find answers to 12 sexual health scenarios online and 94.1% of participants started with Google (Buhi et al., 2009). In another study, every focus group mentioned Google as a main starting point for sexual health information (Selkie et al.). While it is an easy place to begin, Google presents challenges. Searchers have a much easier time finding general answers to sexual health questions than specific local resources like where they can get tested for STIs (Buhi et al., 2009). Interviews and observations show that young people feel frustrated at the prospect of sorting through pages of results and often just pick one of the first three results of a search (Buhi et al., 2009; Jones & Biddlecom, 2011). It follows then that the reach of a sexual health website is only as good as the site's search engine optimization (SEO), a strategy of increasing the likelihood that a website will rank higher in the results of a search and thereby increasing a website's visibility. This means that organizations with more resources dedicated to SEO are more visible in Internet searches, which may not necessarily align with the best providers of content on sexual health.

A second theme across the qualitative research is that young people are concerned with the credibility and accuracy of sexual health information sources online. How is a young person expected to know whether the information is credible when looking through a list of Google results? Young people in one study mentioned that they look to domain names, saying that the .org or .gov extensions signify more reliable sources. However, when those same young people's search habits were observed they only used these sources to answer, on average, three out of twelve sexual health related inquiries (Buhi et al., 2009). Other research reveals that some young people skip looking online at all because of concerns about credibility. A group of New York City college students who were surveyed said that while most thought the Internet could be a good source of information about sexual health, ultimately they find in person doctors and health professionals more credible (Fogel, Fajiram, & Morgan, 2010). High school interviewees in another study felt wary of the prevalence of user generated content online and said they had more trust in friends, family, school staff, and medical professionals for accurate sexual health information (Jones & Biddlecom, 2011). In a small sample of LGBT youth, 16% of interviewees did not look online for sexual health information because they did not generally trust the Internet as reliable (Magee, Bigelow, Dehaan, & Mustanski, 2012). Lacking clarity about what is credible online is a severe limitation for what has the potential to be a far-reaching and ubiquitous tool for sexual health promotion.

These young people are not wrong to be wary of online sexual health information. Content analysis of 35 sexual health websites commonly listed in Google results found that the websites generally failed to dispel common sexual myths and do not always incorporate the latest clinical guidelines on sexual health (Yen, 2010). Also, research has shown that although a site may appear credible, it is not necessarily free of inaccuracies (Buhi et al., 2010). Clearly young people need more consistent guidelines and messaging about how to tell which sites are reliable for answering questions related to sexual health. More importantly, the variation in accuracy identifies a need for more aggressive fact checking by online curators of sexual health information. Accuracy of information online needs to be made the collective responsibility of those working in sexual health, particularly in the online space.

The third theme across studies is that anonymity is a major concern for young people. They do not want others to know that they are searching for sexual health information, most often because they fear stigma or embarrassment. In focus groups with LGBT youth, 19% listed not wanting to be caught as their main reason for not searching for sexual health information online (Magee et al., 2012). For example, one participant feared that if someone caught him searching for information on HIV they would assume he was HIV positive (Magee et al.). As part of a feasibility study, 13–19 year olds were asked how they would like to receive sexual health information. There was practically no interest in receiving sexual health information via social networking sites (SNS), even though 95% of respondents had a profile (Buhi, Klinkenberger, Hughes, Blunt, & Rietmeijer, 2013). Young people preferred more private forms of communication (Buhi et al., 2013). Another group of 14–19 year olds expressed preferences for private emails and text messages as opposed to communication via SNS (Selkie et al., 2011).

Keeping online sexuality education private does not mean that young people need or even want to stay isolated from one another. In focus groups and interviews with 16–22 year olds, respondents expressed that it was important to them to be able to remain anonymous but that they would like some type of social interaction included in a sexual health website (McCarthy et al., 2012). Teens have privacy concerns, but they still want sexual health information to be readily accessible (Selkie et al., 2011). For the vast majority of teens in the English speaking countries included in this review, the Internet is ultimately accessible. They can log in from home, school, mobile, and at any time of day. Respecting privacy and confidentiality while maintaining a rich discussion of sexual health topics is often the goal of well-designed classroom sexuality education curriculums. These same principles can be applied online out of the contentious climate too often surrounding classroom sexuality education. In fact, that is what young people want.

### What They Are Searching For

Despite their reservations about the accuracy of information, young people continue to think of the Internet as a useful source of information about sexual health (Buhi et al., 2009; Fogel et al., 2010; Keller & La Belle, 2005; McCarthy et al., 2012). Table 1 outlines studies included in this review that detail what sexual health topics young people look for online or would like to see included in a sexual health website. Four of the five studies list topics that include information about STIs including general information, where to get tested, how you know if you have one, and how they are transmitted (Buhi et al., 2009; Gilbert, Temby, & Rogers, 2005; Magee et al., 2012; McCarthy et al., 2012). STIs and HIV are topics almost always covered by sexual health websites, so in this regard websites are well in line with what young people want to learn. A content analysis found that despite inaccuracies in other topic areas, information about STIs was largely reliable on the top thirty-five websites that came up in Google searches of common sexual health questions (Yen, 2010). In this area, online information seems to be on the right track.

However, young people want to know about more than STIs. They want information about sexual pleasure, how to communicate with partners about what they want sexually, and specific techniques to better pleasure their partners (Gilbert et al., 2005; Magee et al., 2012; McCarthy et al., 2012; Suzuki & Calzo, 2004). These are also topics in The Sexuality Information and Education Council of the United States' (SIECUS) guidelines for what should be included in comprehensive sexuality education (National Guidelines Task Force, 2004). In fact, research shows strong correlations between having a self-reported pleasurable sex life and positive health outcomes long term (Diamond & Huebner, 2012). Young people want to know how to pursue a pleasurable sex life, SIECUS recommends educators cover it, and a pleasurable sex life has been linked to longevity (Diamond & Huebner). Yet the topic of pleasure is lacking online. Table 2 summarizes how well pleasure is covered on 12 websites that are frequently mentioned as the best examples for sexual health information targeted at teens. Only one of the sites dedicates a good portion of space to comprehensive information about pleasure ([www.sexunzipped.co.uk](http://www.sexunzipped.co.uk)). This site was designed based on focus group studies with young people who specifically told the designers they wanted to know about pleasure (McCarthy et al., 2012). Space given to topics related to pleasure on the other sites, if given at all, is mostly in the context of masturbation or answering a specific question from a reader. While there is some information on pleasure available, the amount of coverage and space dedicated to the topic is limited on all but one of the sites.

It is evident from the variety of topics in Table 1 that young people want to know about every aspect of sexuality. In fact, when given the opportunity to ask about sex, drugs, or alcohol, their questions are most often related

**TABLE 1** Sexual Health Topics Young People Are Searching for Online or Would Like to See Included in a Sexual Health Website

Article Title	Age of Respondents	Sexual Health Topics (in order of frequency mentioned)
“An observational study of how young people search for online sexual health information” Buhi et al. (2009)	First year college students	[Topics ever sought online] <ul style="list-style-type: none"> <li>● STIs/HIV (70.6%)</li> <li>● Genitalia (58.8%)</li> <li>● Preventing pregnancy (52.9%)</li> <li>● Contraceptives (50%)</li> </ul>
“Sexual health information seeking online: A mixed-methods study among lesbian, gay, bisexual, and transgender young people” Magee et al. (2012)	16–24 year olds	[Coded from qualitative interviews] <ul style="list-style-type: none"> <li>● STIs/HIV (72%)</li> <li>● Mechanics of sexual behaviors (13%)</li> <li>● Relationship advice (13%)</li> </ul>
“The search for peer advice in cyberspace: An examination of online teen bulletin boards about health and sexuality” Suzuki & Calzo (2004)	Youth younger than 23 accessing a teen health bulletin board. On the board, young people initiate threads and answer each other’s questions	<p><i>Among topics posted (% of all topics):</i></p> <ul style="list-style-type: none"> <li>● Sexual health (e.g., ejaculation problems, penis size/shape, menstruation, vaginal infections) (41.8%)</li> <li>● Pregnancy/birth (22.9%)</li> <li>● Techniques (11.8%)</li> </ul> <p><i>Among topics viewed (average number of clicks on threads related to that topic):</i></p> <ul style="list-style-type: none"> <li>● Grooming (M = 510.8)</li> <li>● Interpersonal aspects of sex (M = 480.9)</li> </ul>
“Evaluating a teen STD prevention Web site” Gilbert, Temby, & Rogers (2005)	13–17 year olds visiting www.iwannaknow.org	<p>“What information or topics are you looking for?” [allowed to choose “all that apply”]</p> <ul style="list-style-type: none"> <li>● Sexual expression (e.g., masturbation, oral, anal, vaginal) (61.1%)</li> <li>● Teen sexuality (42.8%)</li> <li>● Virginity (40.7%)</li> <li>● Relationships/dating issues (37.8%)</li> <li>● Contraception (35%)</li> <li>● General information about STDs (33.6%)</li> <li>● Teen pregnancy (32.9%)</li> <li>● STD symptoms and prevention (31.8%)</li> <li>● Puberty (physical and emotional changes) (27.1%)</li> <li>● STD transmission (24.7%)</li> <li>● Specific Sexually Transmitted Diseases (24.2%)</li> </ul> <p style="text-align: right;"><i>(Continued on next page)</i></p>



**TABLE 1** Sexual Health Topics Young People Are Searching for Online or Would Like to See Included in a Sexual Health Website (*Continued*)

Article Title	Age of Respondents	Sexual Health Topics (in order of frequency mentioned)
"What young people want from a sexual health website: Design and development of Sexunzipped" McCarthy et al. (2012)	16–22 year olds	<ul style="list-style-type: none"> <li>● STD testing (23.6%)</li> <li>● STD treatment (22.4%)</li> <li>● Sexual identity and orientation (21.1%)</li> </ul> Topics from focus groups (no frequencies) <ul style="list-style-type: none"> <li>● Sexual pleasure</li> <li>● STIs</li> <li>● Pregnancy</li> <li>● Communicating with partners</li> <li>● How to develop skill in giving pleasure</li> <li>● Emotions involved in sex and relationships</li> </ul>

to sexuality. A chat service was marketed as available for advice on these three "sensitive topics." Teenagers' questions were on the topic of sexuality 86% of the time (Crutzen, Peters, Portugal, Fisser, & Grolleman, 2011). On another general health website targeted at teens, sexuality was the most popular health topic in emails from readers and teens. Questions tended to describe their anatomies and sexual concerns in great detail (Harvey, Brown, Crawford, Macfarlane, & McPherson, 2007). Teens' willingness to go into explicit detail is important because it highlights that teenagers are willing to open up when they feel safe. The anonymity of the Internet offers this safe space. The same study also found that questions often centered on the theme of just wanting to know if experiences teens were having around puberty and other sexuality concerns were normal (Harvey et al.). Young people's questions and concerns about sexuality are not new, but the Internet offers a new space to look for answers and support.

Questions and topics young people pursue online differ by age of the information seeker. In response to why they visited one sexual health website ([www.iwannaknow.org](http://www.iwannaknow.org)), younger teens (13 and 14) listed topics related to puberty whereas older teens (15–17) were more likely to list contraception, information about STIs, and teen pregnancy (Gilbert et al., 2005). However, respondents did not differ by age when it came to topics related to sexual expression, teen sexuality, relationships/dating, prevention, testing, treatment, and sexual identity/orientation (Gilbert et al.). While the research methods and age ranges vary across studies, the basic premise is clear. Teenagers are interested in a comprehensive knowledge of sexuality that goes beyond the traditional STI/HIV and pregnancy prevention model of sexuality education.

**TABLE 2** Do Popular Sexual Health Websites Cover Pleasure?

Website	Coverage of pleasure, how to communicate with a partner about what you want, and/or specific sexual techniques	Is it possible to chat/text/email a question?
Sexetc.org	Article dispelling myth that girls do not masturbate, it's not just a guy thing	No
www.Iwannaknow.org	Clarify that it is OK and normal for girls to masturbate	No
www.scarleteen.com	In the Q&A section—there is one question about how a girl can communicate with her boyfriend about what she wants sexually	Live chat or text
www.plannedparenthood.org/teen-talk	Information about masturbation	Email or chat
Teenagehealthfreak.org	Information about masturbation	Email
www.itsyoursexlife.com	No	Email
www.sexunzipped.co.uk/	Section about pleasure that includes how to talk to a partner about what you want as well as specific techniques	Email
www.goaskalice.columbia.edu	In Q&A section—information on masturbation and tips on how to increase pleasure during sex	Email
www.bedsider.org	Frisky Fridays & Bootylog app, but focus is on birth control	Email
www.stayteen.org	No	Email
Youngwomenshealth.org	No	No
Kidshealth.org/teen	No	No

\*This site was created specifically based on focus groups cited in this review where teens asked for information about pleasure.

## INTERNET-BASED INTERVENTIONS

There are few evaluation studies of Internet-based interventions specifically targeted at youth between 13 and 24 years old. Based on the search strategies employed for this review, there are six that have been published in the last 10 years. The study populations, methods, and main findings are outlined in Table 3. Although all implemented online, the interventions vary in how they aim to communicate with young people. One of the studies uses an automated chat software they refer to as a “chatbot” (Crutzen et al.,

**TABLE 3** Evaluation Studies of Internet-Based Interventions

Study	Study Population	Methods	Main Findings
"Effects of an Internet-based intervention for HIV prevention: The Youthnet trials" Bull et al. (2009)	18–24 year olds (Internet sample, N = 991 & Clinic sample, N = 574)	RCT: <ul style="list-style-type: none"> <li>• 5 module HIV risk assessment education</li> </ul> Between modules: <ul style="list-style-type: none"> <li>• <u>Intervention</u> condition watched pictures &amp; listened to audio of role models matched to their gender and race/ethnicity talking about HIV prevention</li> <li>• <u>Control</u> group got text only generic HIV prevention messages</li> </ul>	<ul style="list-style-type: none"> <li>• Small effect in the online sample's intervention condition:               <ul style="list-style-type: none"> <li>◦ Improved proportion of protected sex acts from before intervention to 2-month follow-up</li> <li>◦ Effect moderated by the condom norms construct of their model</li> </ul> </li> </ul>
"An artificially intelligent chat agent that answers adolescents' questions related to sex, drugs, and alcohol: An exploratory study" Crutzen et al. (2011)	Mean age of 15 years old (N = 929)	Survey: <ul style="list-style-type: none"> <li>• Server registrations to track use</li> <li>• Questionnaire to survey reactions to service</li> </ul>	<ul style="list-style-type: none"> <li>• Query topics:               <ul style="list-style-type: none"> <li>◦ 86% of queries were about sex</li> <li>◦ 5% were about alcohol</li> <li>◦ 9% were about drugs</li> </ul> </li> <li>• Reactions to service:               <ul style="list-style-type: none"> <li>◦ Ease of use: low</li> <li>◦ Reliability of information: high</li> <li>◦ Usefulness: moderate</li> </ul> </li> <li>• Chatbot in comparison to search engine:               <ul style="list-style-type: none"> <li>◦ More anonymous</li> <li>◦ Faster</li> <li>◦ More concise</li> <li>◦ Better quality of information</li> </ul> </li> <li>• Preference between chatbot, search engine, or infoline for these types of questions               <ul style="list-style-type: none"> <li>◦ Chatbot: 48%</li> <li>◦ Search engine: 40%</li> <li>◦ Infoline: 2%</li> <li>◦ Other: 10%</li> </ul> </li> </ul>
"The potential influence of a social media intervention on risky sexual behavior and Chlamydia incidence" Jones, Baldwin, & Lewis (2012)	15–24 year olds <sup>a</sup> (N = 70)	Descriptive Study Design: <ul style="list-style-type: none"> <li>• Based on Pender's Health Promotion Model</li> <li>• Evaluated a Facebook page for effectiveness of decreasing rates of chlamydia and risky sexual activity</li> </ul>	<ul style="list-style-type: none"> <li>• Reported increase in intention to use condoms, but not statistically significant</li> </ul>
"Reducing at-risk adolescents' display of risk behavior on a social networking web site: a randomized controlled pilot intervention trial" Moreno et al. (2009)	18–20 year olds with an active MySpace profile who were deemed at-risk <sup>b</sup> (N = 190)	RCT: <ul style="list-style-type: none"> <li>• <u>Intervention</u> condition received 1 email from "Dr. Meg" profile about risks of online personal disclosures</li> <li>• <u>Control</u> condition were not contacted</li> </ul>	<ul style="list-style-type: none"> <li>• Outcomes measured:               <ul style="list-style-type: none"> <li>◦ Set profile to private</li> <li>◦ Eliminated all references to sex</li> <li>◦ Eliminated all references to substance use</li> <li>◦ Completed 1 of these protective factors</li> </ul> </li> <li>• Results: (Intervention vs. Control)               <ul style="list-style-type: none"> <li>◦ 4.2 OR of removing all sex references</li> <li>◦ 1.9 OR of one protective change</li> </ul> </li> </ul>

*(Continued on next page)*

**TABLE 3** Evaluation Studies of Internet-Based Interventions (*Continued*)

Study	Study Population	Methods	Main Findings
"A computer-based approach to preventing pregnancy, STD, and HIV in rural adolescents" Roberto et al. (2007)	10th grade students (N = 326)	Quasi-experimental: <ul style="list-style-type: none"> <li>• Based on the Extended Parallel Process Model (EPPM)</li> <li>• <u>Intervention</u> condition received 6 internet-based activities that were supplemented by an informational website</li> <li>• <u>Control</u> condition received no intervention</li> </ul>	<ul style="list-style-type: none"> <li>• Experimental school scored higher on: <ul style="list-style-type: none"> <li>◦ Knowledge</li> <li>◦ Condom negotiation skills</li> <li>◦ Favorable attitudes toward waiting to have sex</li> <li>◦ Situational self-efficacy</li> </ul> </li> <li>• Experimental vs. Control: <ul style="list-style-type: none"> <li>◦ 2.93 OR of initiating sex between pre- and post-test (span of 5 months)</li> </ul> </li> <li>• No significant effect on number of partners or condom</li> <li>• Overall, students rated the program positively</li> </ul>
"Adolescent use of social networking to gain sexual health information" Yager & O'Keefe (2012)	13–18 year olds (N = 34)	Survey: <ul style="list-style-type: none"> <li>• Evaluations of the Facebook page "Teen Sexual Health Information" targeted at local area teens</li> </ul>	<ul style="list-style-type: none"> <li>• Feedback on helpfulness of site: <ul style="list-style-type: none"> <li>◦ 58% learned more about STIs</li> <li>◦ 15% felt the site provided good sexual health information</li> <li>◦ 12% learned about STI testing locations</li> </ul> </li> <li>• 50/50 on whether site needed more information</li> <li>• Positive results for Facebook as a viable option for communicating with adolescents about sexual health</li> </ul>

Note. RCT = Randomized Controlled Trial.

<sup>a</sup>61 were 18–24.

<sup>b</sup>At-risk defined as: at least 3 references to sexual/substance use behavior in their profile.

2011) to answer teens' questions, three employ pages on social networking sites (Jones, Baldwin, & Lewis, 2012; Moreno et al., 2009; Yager & O'Keefe, 2012), and two use more traditional strategies of health education modules or activities (Bull, Pratte, Whitesell, Rietmeijer, & McFarlane, 2009; Roberto, Zimmerman, Carlyle, & Abner, 2007). Comparing efficacies is difficult because the measurable outcomes are not consistent.

Three of the interventions were based on three different theories of behavior change (Bull et al., 2009; Jones et al., 2012; Roberto et al., 2007). The other three intervention designs were without clear theoretical foundations (Crutzen et al., 2011; Moreno et al., 2009; Yager & O'Keefe, 2012). At a 2011 meeting of experts in the intersection of sexual health and new media, concerns were raised about basing interventions on current social cognition

models for behavior change. Current models do not take into account the significantly improved accessibility of the Internet as well as the possibility of designing interventions that account for someone's changing behavior (Allison et al., 2012). Ways in which current theories of behavior change can be applied to research in this area need more consideration.

The results of these evaluations are not operationalized consistently enough to make direct comparisons, but there are still useful lessons for the field. First, it is worth trying to replicate and continue evaluating the interventions that yielded modest results. Second, online sexual health education is lacking consensus on what is a successful outcome, how to measure it, or what theoretical foundations should be used to build interventions. Third, the evaluated interventions do not echo some primary components of what we know adolescents want from a sexual health website. Anonymity was a concern mentioned across studies with young people; however, only the chatbot intervention was completely anonymous (Buhi et al., 2013; Crutzen et al., 2011; Magee et al., 2012; Selkie et al., 2011). Teenagers in one study listed reading a blog, watching videos, and listening to a podcast as some preferred ways to receive information about sexuality (Buhi et al., 2013). None of the interventions incorporated these elements. Designs could be better aligned with what teens want, however are also not entirely off base. For example, we know that teens like things to be interactive and this was incorporated in the chatbot intervention as well as the two modeled after more traditional health activities (Buhi et al., 2013; Bull et al., 2009; Crutzen et al., 2011; Roberto et al., 2007). It is important for researchers to more effectively incorporate how young people prefer to receive information online into hypotheses of what kind of online sexuality education interventions will be effective.

#### NEXT STEPS

Although research in this area is limited there is a reference point for where to begin designing web-based sexual health interventions. The valuable existing knowledge base for what works in sexuality education can be applied to online interventions. For example, Douglas Kirby's 17 characteristics of effective curriculum-based programs offer one starting point for designing interventions (Kirby, 2007). Similarly, SIECUS has published guidelines for comprehensive sexuality education programs segmented by age for kindergarten through 12th grade (National Guidelines Task Force, 2004). In addition to established classroom guidelines like these, there need to be more conversations about which theoretical models of behavior change are useful for online interventions and how they might be updated in order to be more appropriate to the online setting (Allison et al., 2012). Ultimately, these conversations can lead to general recommendations so that sexual health

websites and web-based interventions have a more common foundation in what is already known to be effective.

Getting young people involved in the conversation about how to develop interventions and websites is essential moving forward. Young people are happy to articulate what they want to know and, as seen in Table 1, it is an extremely wide range of topics. Fourteen- to 19-year-old focus group participants said they liked the idea of having their questions about things like relationships answered by peers while they preferred to have more medical questions like STI facts answered by a health care professional (Selkie et al., 2011). Teens in focus groups for the development of Sexunzipped said that they did not want websites to use too much slang because they felt it made the website authors seem like they were “trying too hard” (McCarthy et al., 2012). Suggestions like these are invaluable and easy to incorporate in web-based programming because it is inherently flexible. The ease of updating and adjusting content according to feedback from site visitors is a tremendous advantage sexual health educators have never had before. This is a strategy that should not be ignored. Unlimited space and potential reach means that websites can target very particular populations of young people. Information can be tailored to specific target audiences so that young people who may feel marginalized in their hometowns can find a safe space online for information sharing. Ultimately, adolescents are the experts on what they like in a website and what questions they want answered. Interventions and websites will become more effectively designed by asking for young people’s opinions.

A few things are clear in the U.S. context: the Internet becomes more ubiquitous every day, practically every young person uses it on a regular basis, and young people want comprehensive sexual health information. Creating websites and web-based interventions utilizes the Internet as a space where information can be targeted in a more specific way than ever before. Putting good sexuality education resources online makes the information less susceptible to small groups of loud voices that create ongoing struggles for comprehensive curriculums in schools. The field of research is far behind the technological advancements and media savvy of today’s adolescents, but this is something that can be changed. The potential for developing effective web-based sexual health education is promising. By creating a shared theoretical foundation, utilizing what we already know, and getting youth involved, sexuality education online would make vital information more widely available than ever before.

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## APPENDIX A: PUBMED MESH TERMS

### Search #1

("sex education"[TIAB] OR "sex education"[MeSH]) AND ("Internet"[TIAB] OR "Web-based"[TIAB]) AND ("2004/01/01"[PDat] : "2014/10/01"[PDat] AND "humans"[MeSH Terms] AND English[lang] AND ("adolescent"[MeSH Terms] OR "adult"[MeSH Terms] OR "adult"[MeSH Terms:noexp]))

### Search #2

("Health Education"[MeSH Terms] OR "Information Storage and Retrieval"[MeSH Terms]) AND "Internet"[TIAB] AND "Sexual Behavior"[MAJR] AND ("2004/01/01"[PDAT] : "2014/10/01"[PDAT])

## APPENDIX B: POPULAR SEXUALITY EDUCATION WEBSITES TARGETING YOUNG PEOPLE

### **Sexetc.org**

This website is published by Answer and most of the content is written by teens covering a wide range of topics typical of comprehensive sexuality curriculums.

### **www.Iwannaknow.org**

The American Sexual Health Association runs this site covering topics like STIs, relationships, LGBTQ topics, and dispelling popular myths related to sexual health.

**www.scarleteen.com**

This incredibly popular comprehensive sexuality education site has been online since 1998 and covers a wide breadth of topics in a blog format that includes message boards and static articles.

**www.plannedparenthood.org/teen-talk**

Planned Parenthood's teen section has a prominent chat option to connect users with a health educator as well as static articles on a range of sexual health topics.

**www.itsyoursexlife.com**

This is MTV's sexuality education resource and features chat, sections on topics related to sexual health, and a section with hotlines and resources.

**www.sexunzipped.co.uk/**

Sexunzipped was designed at the University College London based on focus group research with young people and features sections on relationships, safer sex, and sexual pleasure.

**www.goaskalice.columbia.edu**

A health promotion team at Columbia University answers questions from readers about any health topic and posts them as articles. It is not exclusive to sexual health.

**www.bedsider.org**

Published by The National Campaign to Prevent Teen and Unplanned Pregnancy, the focus is on birth control including general information and resources to help women access it.

**www.stayteen.org**

Also published by The National Campaign, this website targets a younger audience than Bedsider and covers topics including sex, relationships, waiting, and contraception.

**Youngwomenshealth.org**

Boston Children's Hospital runs this website. Topics cover a range of health information relevant to young women including sexual health, nutrition, fitness, and emotional health.

**Kidshealth.org/teen**

This site offers information reviewed by pediatricians and medical experts about general health as well as sexual health. It is run by Nemours Center for Children's Health Media and offers information in Spanish.

## APPENDIX C: MAIN TAKEAWAYS

How they search:

- Young people overwhelmingly start with a search engine, most often Google, when they look for sexual health information online.
- Young people are concerned with the credibility of online sources. While they prefer to get sexual health information in person from a medical professional, they are not opposed to finding this information on the Internet and do seek it out online.
- Young people want to feel anonymous when learning about sexual health online.

What they want to know:

- Young people want to know about STIs and websites that readily come up in searches for this information are largely accurate in this topic area.
- Adolescents want to learn about how to build a satisfying and pleasurable sex life.
- Questions differ by age: younger teens more often want to know about puberty and older teens more often want information related to birth control and STIs. However all ages ask similar questions about things like sexual expression and relationships.

The current research:

- It is worthwhile to begin trying to replicate online interventions that have shown even modest effects on knowledge, attitudes, and behavior.
- Researchers lack consensus about useful theoretical foundations for building online sexual health interventions as well as how outcomes should be measured in evaluation studies of interventions conducted online.
- Online sexual health interventions can better incorporate the preferences of young people into their design process.