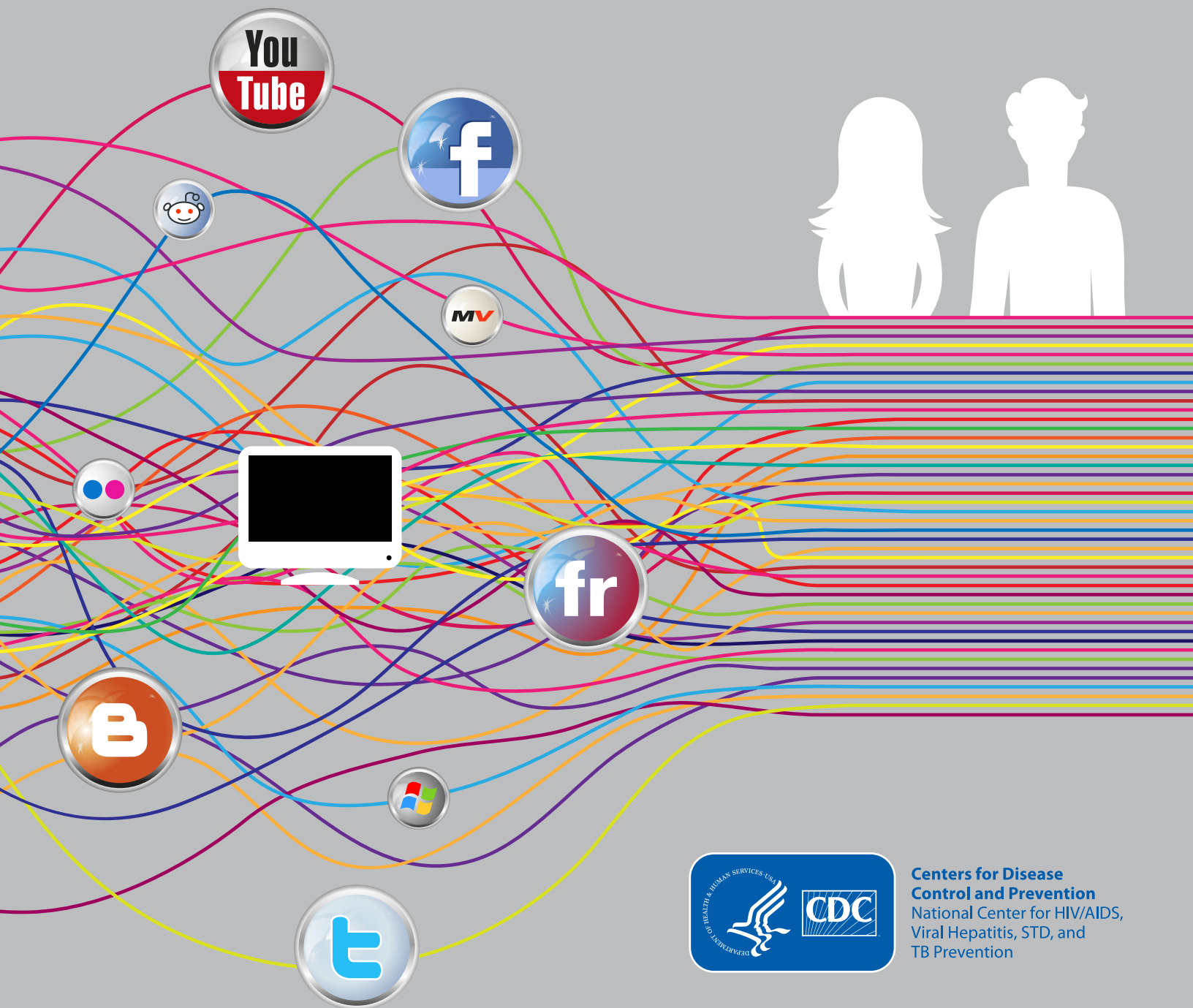# Adolescents, Technology and Reducing Risk for HIV, STDs and Pregnancy

Centers for Disease Control and Prevention
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention

cont

ents

Executive Summary

Digital technology, including the internet, mobile phones, and gaming, increasingly influences the lives of adolescents. Ninety-three percent of youth, aged 12–17 years, are online, 75% have a mobile phone (Lenhart et al., 2010a), and 97% play video games (Lenhart et al., 2008). These technologies allow youth to engage in age–old behaviors such as chatting, flirting, and dating in novel ways. They also provide youth with anonymous avenues for seeking health information in general and sexual health, in particular.

While technology has changed the way in which teens interact and access information, they remain a vulnerable population when it comes to sexual risk. The burden of sexually transmitted diseases (STDs) among people aged 15–24 years accounts for nearly half of all STDs reported in the U.S. (Weinstock et al., 2004). The U.S. pregnancy rate among youth aged 12–19 years is one of the highest in the developed world (National Campaign to Prevent Teen and Unplanned Pregnancy, 2010). Adolescents are also especially vulnerable to sexual risk because they are undergoing rapid cognitive, behavioral, emotional, and social development. Targeting youth who are using emerging digital technology is important for ensuring sexual health equity for adolescents.

This white paper is intended for practitioners and others who work with adolescents and provides an overview about the ways in which digital technology can be used to improve the sexual health of adolescents. We begin with a brief summary of adolescent characteristics, including their demography, development, and sexual behavior. We then provide a basic overview of the new digital technologies and media

that youth are using such as social networking sites (SNS), video sharing, blogs, instant messaging, mobile technology, and virtual worlds. We examine technology's potential for use in sexual health promotion, as well as the risks associated with misuse of digital technology. Finally, we present examples of innovative adolescent sexual health interventions that have used digital technology to improve their reach and effectiveness. We expect that this document will serve as a resource for improving adolescent sexual health and will offer new tools to reach youth.

I. Introduction

Adolescents today are adopting new digital technologies almost as quickly as they are being introduced. These technologies, such as the internet, social networking sites, and mobile phones are considered by adolescents to be an integral and essential part of their lives (Consumer Electronics Association, 2008). The vast majority of adolescents are online regularly (Lenhart et al., 2010a), have mobile phones (Lenhart, et al., 2010a), and play video games (Lenhart et al., 2008). Adolescents use technology for many reasons— to communicate with one another, as a form of self-expression,

for entertainment, and to look for information (Foehr, 2006). Each of these reasons offers an opportunity for outreach, education, and intervention to promote sexual health.

However, for adults who are involved in programs to improve the health of adolescents, it is often difficult to stay abreast of every new and emerging technology; understand all the ways adolescents use these technologies; and make sense of how to adopt new technologies for our efforts. It is our collective challenge (and perhaps duty) to learn and understand these popular technologies as well as to creatively use them to educate, empower, and motivate adolescents to adopt healthier behaviors.

SOCIAL MEDIA

This document was developed in recognition of the need for a basic summary of how U.S. adolescents currently use the various technologies. We realize, however, that technology evolves much faster than the development of a document and recognize that some sections of this white paper could quickly become outdated. We hope that by summarizing the interaction between adolescents, technology, and sexual health and by providing examples of current efforts, we add a valuable, foundational piece to the toolbox for adolescent sexual health promotion activities.

We begin this document by presenting a definition of adolescence including age ranges and a brief overview of adolescent development. The next section describes various aspects of adolescent sexual health including sexual initiation, sexual behaviors and rates of disease. The document continues by providing a broad overview of the various technologies currently popular with youth, how they are using them, and ways that technology can be used for sexual health and STD/HIV prevention efforts. We use the terms "new media," Web 2.0, and technology to refer to current popular technologies such as social networking sites (e.g., Facebook), microblogging (e.g., Twitter), online video sites (e.g., YouTube), online games, and mobile phones and mobile phone-related activities (e.g., texting). This section also touches upon how technology creates sexual risk for adolescents. The final section presents examples of current technology-based sexual health programmatic efforts that could inform the development of future health promotion activities. Five divisions and one center from across the Centers for Disease Control and Prevention (CDC) came together to create this document: Division of STD Prevention (DSTDP), Division of HIV/AIDS Prevention (DHAP), Division of Adolescent and School Health (DASH), Division of Reproductive Health (DRH), Division of Violence Prevention (DVP) and the Office of the Associate Director for Communication (OADC), formerly the National Center of Health Marketing (NCHM). Although our division-specific missions are different, we all share a common population—adolescents—and a common objective—to improve their overall health, safety, and sexual well-being.

II. Adolescence

Definition of adolescence. Adolescence is a unique and pivotal developmental period marked by physical maturation, psychological and social changes, increased independence, and the experimentation with or establishment of new behaviors. The course of adolescent development is influenced by the adolescents as well as the people and world that surround them (Bronfenbrenner, 1979). In this white paper, we define youth as ages 8–19 years, comprised of the preteenage ages of 8–12 years, frequently referred to as "tweens," and "teens" ages 13–19 years. We use the terms "youth" and "adolescents" interchangeably throughout this document.

A. Demographics

In 2012, adolescents aged 8–19 years, who were born during 1993–2004, are popularly known as Generation Y or the Millennial Generation, which includes cohorts born between the early 1980s to early 2000s. The Millennial Generation is noted for being the first "connected" generation; influenced by communication technologies such as email, cell phones, instant messaging, and social networking sites (Taylor & Keeter, 2010).

Since the 1990s, the number of adolescents ages 10–19 in the United States has increased and is expected to continue to grow through 2050 (U.S. Census Bureau, 2004). According to the 2010 Census, there are approximately 41 million youth, ages 10–19, currently living in the U.S. (Howden & Meyer, 2011). The adolescent population is more racially/ethnically diverse than the overall population. In 2010, about 24% of youth ages 14–17 belonged to racial and ethnic minorities (U.S. Census Bureau, 2010 www.census. gov/compendia/statab/2012/ tables/12s0010.pdf). Furthermore, although white, non-Hispanics comprise a majority of both the overall and adolescent populations, the adolescent population has

a greater percentage of Blacks[1], Hispanics, Asian/Pacific Islanders, and American Indian/Alaskan Native[2] than the population as a whole. It is expected that the racial/ethnic diversity of the adolescent population will continue to increase during the next 40 years (U.S. Census Bureau, 2004). In the U.S., the largest number of adolescents live in the South (15.1 million), followed by the Midwest (9.2 million), Northeast (7.4 million), and West (7.3 million). The heterogeneity of race/ethnicity among adolescents differs by region as well. The Northeast and Midwest have the largest proportions of white, non-Hispanic adolescents, whereas the South has the largest proportions of Black, non-Hispanic adolescents and the West has the largest percentage of Hispanic,

American Indian/Alaska Native, and Asian/Pacific Islander adolescents (U.S. Census Bureau, 2008).

Additionally, this group, as a whole, suffers from a higher incidence of poverty compared to the overall population. The poverty rate for people under the age of 18 was higher than both the rates for people 18–64 years old and those 65 and older (18.0% compared to 10.9% and 9.7%, respectively). Poverty rates also differ by race/ethnicity. Hispanic and Black children are more than twice as likely to live below the federal poverty line compared to whites (U.S. Census Bureau, 2007).

Socioeconomic factors like race/ethnicity, geographic location, and poverty are important to consider

[1.] The estimates included in 'Black Alone' apply to only one race and include both Hispanic and Non-Hispanic Blacks. http://www.census.gov/population/www/socdemo/compraceho.html

[2.] The estimates included in 'American Indian/Alaska Native Alone' apply to only one race and include both Hispanic and Non-Hispanic Blacks. http://www.census.gov/population/www/socdemo/compraceho.html

because they influence access to and use of digital technology among adolescents and should be considered when making decisions about what technologies to use in public health efforts.

B. Adolescent Development

During adolescence, there are significant changes in cognitive, behavioral, emotional, and social skills. Here, we briefly describe core developmental constructs.

In this discussion of adolescent development, we recognize how technology has become embedded in the lives of adolescents and may be an influencing factor, particularly on processes of identity and relationship formation, information-gathering, and decision-making.

i. Cognitive development. During adolescence, there is an increase in intelligence and content-specific knowledge (McCall, Appelbaum, & Hogarty, 1973). In addition, there is a cognitive maturation from concrete to abstract thinking, which enables youth to think about the future, solve problems, examine their own thoughts, and set individual goals (Gullotta, Adams, & Markstrom, 1999; Keating, 1990; Piaget, 2008).

ii. Identity development. Adolescents' cognitive maturation lays the foundation for the important developmental task of the construction of an adult identity. An identity is a complete sense of self that develops from an examination of beliefs and experiences, a reconciliation of conflicting self-views, and a commitment to a relatively stable set of self-images and roles (Erikson, 1950, 1968; Marcia, 1980). A coherent identity helps individuals interpret their world and guides their decisions and behaviors. Theory predicts that adolescents who have clear and positive self-views are motivated to act in ways that maintain their positive identity, and

research demonstrates that a less coherent sense of identity is linked to problematic behaviors (Jones, 1992; Kaplan, 1986; Marcia, 1980). Adolescents' use of technology may play an increasingly important role in their identity development allowing youth to explore aspects of their identity with varying amounts of anonymity, expression, and/or parental monitoring.

iii. Behavioral development.

Experimentation with new behaviors is a normal part of adolescence (Michaud, Blum, & Ferron, 1998) and occurs in both real and virtual spaces. Some of these behaviors, such as drinking alcohol and having sex, may pose a risk to their health and safety. Behavioral experimentation can serve an adaptive function by being a way for adolescents to further strengthen their problem-solving and critical-thinking skills and to refine their views of themselves, others, and their world (Ponton, 1997). Research also demonstrates that many risk behaviors (e.g., violence, substance use) occur less frequently as adolescents transition into adulthood (Chen & Kandel, 1995; Department of Health and Human Services, 2001), suggesting adolescent risk behaviors do not always result in life-long risk and related problems. Some experimental behaviors, however, can have serious consequences (e.g.., unprotected sex) resulting in immediate and long-term negative outcomes (e.g.., HIV infection, teenage pregnancy) for adolescents' physical, emotional, behavioral, and academic development.

iv. Social and environmental factors and adolescent development. All aspects of adolescent development described above are influenced by individual characteristics as well as multiple interpersonal spheres of influence including their family, peers, and schools. Other factors exist beyond these spheres of influence that also impact adolescent development. These include nested levels of the environment that consist of concepts like social networks, organizations and institutions, community norms, and cultural ideologies. Technologies play significant roles on all levels of an adolescent's individual,

interpersonal, and environmental life, as they communicate information and reinforce cultural norms, thus influencing personal identity and behaviors.

As adolescents become more independent from their families, relationships with their peers become increasingly important. Peer associations influence adolescent development because peers function as important sources of information; serve to expose youth to values and behaviors that differ from their families; provide opportunities to develop interpersonal skills; and act as references as adolescents explore their identity and make

behavioral choices (Antonishak, Sutfin, & Reppucci, 2009; Scholte & Van Aken, 2008). Peer influence extends to technology and media consumption, with peers influencing each other when it comes to online content. Adolescents report that most of the websites they view and the video content they download come from their friends (Deloitte, 2007).

Although the parent-child relationship changes and becomes more egalitarian as youth transition from childhood to adolescence (DeGoede, Branje, & Meeus, 2009), parents and families retain an influential role in adolescents' goal-setting, decision-making, identity formation, and behavioral choices (Peterson, 2009). Parents and other caregivers can play an important role in adolescent's use of technology, as well as adolescent sexuality through behavioral monitoring, access to use of technology, and setting rules for appropriate behaviors when using technology.

Furthermore, structured institutions, such as schools and an adolescent's community environment, can influence their level of risk and health. For instance, adolescents who feel a strong attachment, level of support, and connection with their schools are individuals who are significantly less likely to engage in risky behaviors (e.g., tobacco and alcohol use, violence) and more likely to have better academic achievement (Centers for Disease

Control and Prevention [CDC], 2009c). The role of community factors (e.g., social capital and cohesion, accessibility of services) in adolescent development is beginning to emerge and suggests a similar pattern.

III. Adolescents and Reproductive and Sexual Health

A. Sexual Behavior

Nationwide, 46.0% of high school students in 2009 had ever had sex (Figure 1a). There were no statistically significant differences between female and male students who reported having sex. More Black students (65.2%) reported having sex than Hispanic (49.1%) and white (42.0%) students. All of these percentages were statistically signficant from the others. Among the roughly one-third of students who reported being currently sexually active, 61.1% said that they or their partner used a condom during last sex. The prevalence of condom use was higher among male (68.6%) than female (53.9%) students and among white (63.3%) and Black (62.4%) than Hispanic (54.9%) students (Figure 1b). (www.cdc.gov/healthyyouth/yrbs/pdf/slides_yrbs.pdf) According to the National Survey of Family Growth, 44.6% of females aged 15–17 years and 48.4% of males the same age reported having oral sex with someone of the opposite sex. (Chandra, Mosher, Copen, & Sionean, 2011). Among adolescents aged 18–19 years, 62.9% of females and 69.8% of males reported having oral sex (Chandra et al., 2011).

PERCENTAGE OF HIGH SCHOOL STUDENTS WHO EVER HAD SEXUAL INTERCOURSE BY GENDER AND RACE/ETHNICITY, 2009.

Figure 1a

46% Total

50% MALE

50% FEMALE

42% White

65% Black

49% Hispanic
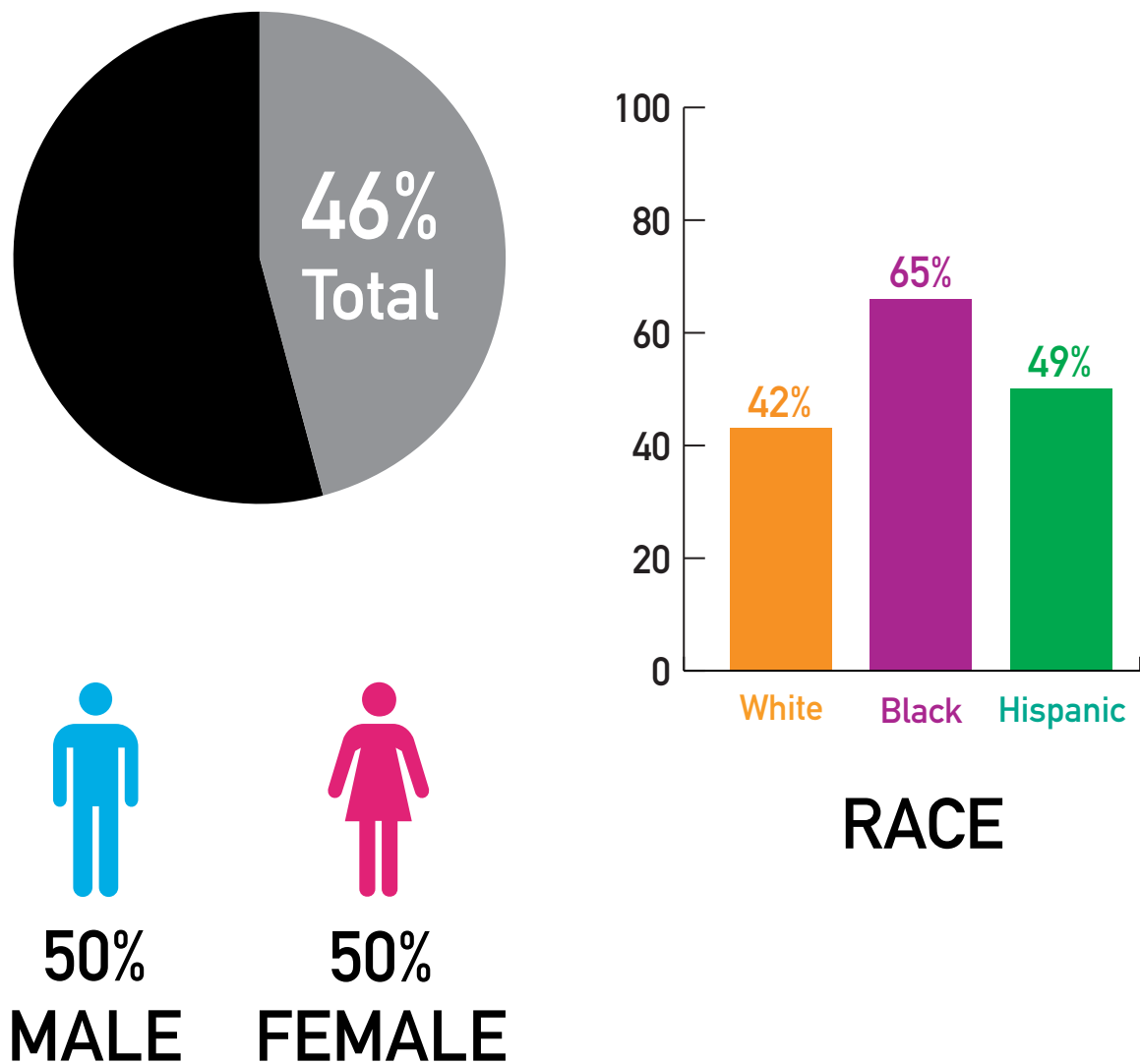
RACE

Source: National Youth Risk Behavior Survey, 2009.

PERCENTAGE OF HIGH SCHOOL STUDENTS WHO USED A CONDOM DURING LAST SEXUAL INTERCOURSE,* BY GENDER AND RACE/ETHNICITY, 2009.

61%
Total

69%
MALE

54%
FEMALE

63% White
62% Black
55% Hispanic

RACE

Figure 1b

Source: National Youth Risk Behavior Survey, 2009

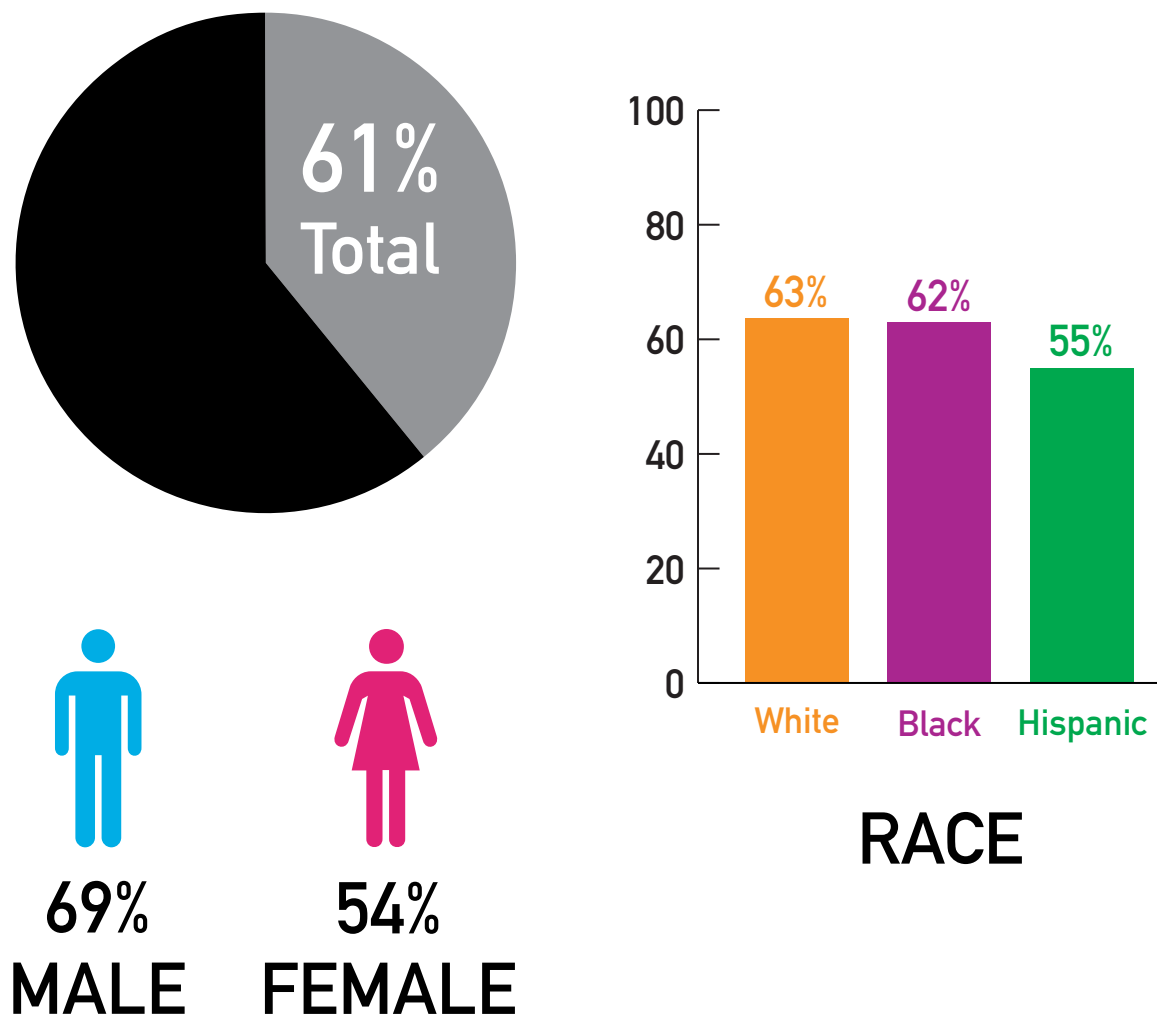* Among 34.2% of students nationwide who had sexual intercourse with at least one person duting the 3 months before the survey.

14-year downward trend in which the teen birth rate fell by 34% from its all-time peak in 1991 (CDC, 2009b). However, in 2008, births again fell 2% for youth, ages 15–19, to 41.5 per 1000 (Hamilton, Martin, & Ventura, 2010).

C. HIV/AIDS

The number of young people in the U.S. infected with HIV/AIDS has been increasing (CDC, 2009a; Rangel, Gavin, Reed, Fowler, & Lee, 2006). Whereas the estimated number of newly diagnosed HIV or AIDS cases decreased from 2004–2007 among children and among adults ages 30–39, it increased among young people, ages 15–29 (CDC, 2009a). It is estimated that by the end of 2006, 56,500 young people ages, 13–24 years were living with HIV/AIDS (CDC, 2008b). More than half of all HIV infections in this age group are reported among Black youth (Morris et al., 2006). Population estimates indicate a 20-fold gap in the prevalence of HIV among Black, non-Hispanics (4.9 per 1000) compared to youth ages 18–24 years of other racial and ethnic groups (0.2 per 1000) (CDC, 2005b). Young men who have sex with men (YMSM) are also at increased risk. In five cities participating in the National HIV Behavioral Surveillance system

B. Adolescent Pregnancy and Births

In 2004, an estimated 2.4 million pregnancies occurred among U.S. females less than 25-years old, with 30% of those pregnancies occurring among adolescent females, ages 15–19 years and less than 1% among females under the age of 15 years (Ventura, Abma, Mosher, & Henshaw, 2008). In 2008, a total of 435,000 births occurred to adolescent mothers, ages 15–19 years, with almost one third occurring among adolescents, ages 15–17 years (Hamilton, Martin, & Ventura, 2010). Between 2005 and 2007, the birth rate for youth ages 15–19 years rose 5%. This was the first increase since 1991 and followed a

where HIV testing was conducted, 14% of YMSM 18–24 years of age were infected with HIV (CDC, 2005a). Girls and young women are also disproportionately affected by the epidemic, representing a larger proportion of HIV/AIDS cases among adolescents (31% of 13–19 year olds) than adults, ages 20–24 (23%) and ages 25 and older (26%) (CDC, 2008a).

D. Sexually Transmitted Diseases
Adolescents and young adults, ages 15–24 years have the highest rates for the three most common STDs, chlamydia, gonorrhea, and HPV. It is estimated that adolescents and young adults acquire nearly half of all STDs, although they represent only 25% of the sexually active population (Weinstock, Berman, & Cates, 2004). Reasons for the increased rates include biologic susceptibility, risky sexual behaviors, and limited access to health care (CDC, 2007). Of the three most common STDs, chlamydia is the most frequently reported among all age groups of young persons. The prevalence of chlamydia among adolescents, ages 14–19 years is somewhat greater among females (4.6%) than among males (2.3%) (CDC, 2009d). However, the trend is the opposite among young adults, ages 20–29 years, for whom chlamydia prevalence is greater among males (3.2%) than among females (1.9%) (CDC, 2009d).

HPV is also common; in 2003–2004 the overall prevalence among females, ages 14–24 years was 33.8%, representing approximately 7.5 million females with HPV infection in the U.S. (Dunne, et al., 2007).

E. Summary

This overview provides a glimpse into the sexual lives of American adolescents. Improving the sexual health of adolescents, including reducing pregnancy, STDs, and HIV/AIDS, remains an urgent public health concern. The following section will provide an introduction to technology and how it is used by adolescents.

IV. Technology: How It's Used by Adolescents

Most adolescents use any technology at their disposal—the internet, social networking sites, mobile phones, games—to do those activities they like best—communicating with one another, gossiping, making plans, expressing themselves, and as a creative outlet (Foehr, 2006). Technology is also a vehicle for adolescents to quickly gain access to information. Additionally, adolescents use multiple technologies simultaneously because new technology is making

multitasking easier and faster (Foehr, 2006). Eighty percent of teens say they can't imagine a day without technology (Consumer Electronics Association, 2008).

> *"I multitask every single second I am online. At this very moment, I am watching TV, checking my email every two minutes, reading a newsgroup about who shot JFK, burning some music to a CD and writing this message." – 17 year old boy (Lenhart, Rainie, & Lewis, 2001, quoted in Foehr, 2006)*

Recognizing the multitude of technologies being used by adolescents can help us better understand the risks that adolescents face and how technologies can be used as tools to improve adolescent health. The intention of this section is to provide a general overview of the prominent and emerging technologies and how adolescents are using them. The section concludes with a brief discussion of how some of these technologies pose potential risks to adolescent sexual health. Examples of the various uses of technology for targeted prevention efforts will be discussed in a later section.

A. Internet

The internet has potential to reach possibly the greatest number of adolescents about a diverse range of sexual health topics. The internet can house websites full of information, videos clips for skill building, and games for behavior change, many which can also be accessed via mobile phones. For the vast majority of public health efforts, a presence on the internet is necessary. More and more websites function as repositories for information, including videos, blogs, and social networks.Ninety-three percent of youth ages 12–17 are online (Figure 2), and 76% have broadband internet access at home (Lenhart, Purcell, Smith, & Zickuhr, 2010b). Youth, with broadband and wireless internet, access the internet much more frequently than those with dial-up service, an important fact to consider given that the type of internet connection impacts the type of information to which youth have access. Those with broadband or wireless internet access have faster access to such things as videos, games, and websites using animation software such as Adobe Flash Player.

Most adolescents, regardless of race/ethnicity, go online at least once a day, if not several times per day (Figure 3).

WHO'S ONLINE?
THE INTERNET BY AGE GROUPS.
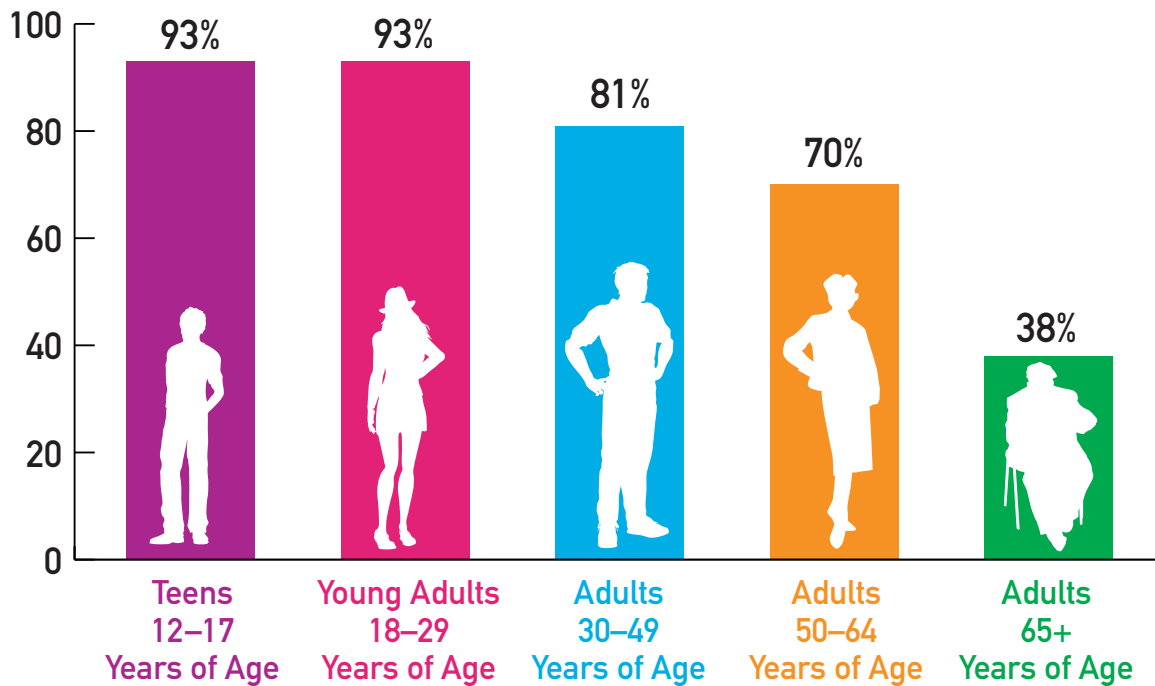
Figure 2

Teens (12–17) data from September 2009.
Adults (18+) data from December 2009.
Source: Lenhart et al., 2010b

Research suggests that adolescents mainly go online for entertainment and information (Figure 4), but 31% of online teens report using the internet to search for health information (Figure 5a). Seventeen percent report using the internet to search for sensitive health topics such as drug use, depression, and sexual health (Figure 5b) (Lenhart et al., 2010b). Girls and low-income youth are more likely to seek sensitive health information online; however, these differences are not seen among racial/ethnic groups or by educational level.

FREQUENCY OF TEEN INTERNET USE BY RACE/ETHNICITY.

White **Black** **Hispanic**

Figure 3
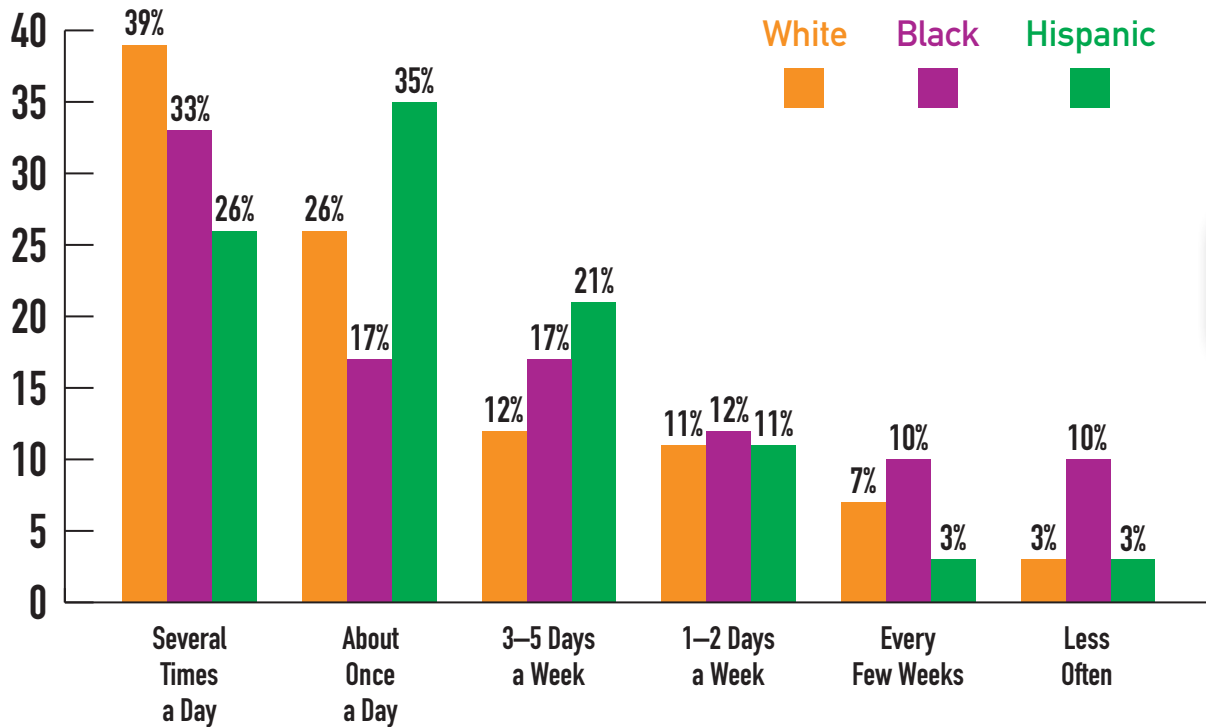
	Several Times a Day	About Once a Day	3–5 Days a Week	1–2 Days a Week	Every Few Weeks	Less Often
White	39%	26%	12%	11%	7%	3%
Black	33%	17%	17%	12%	10%	10%
Hispanic	26%	35%	21%	11%	3%	3%

Percentages are for teen internet users ages 12–17. September 2009 data.

Source: Lenhart et al., 2010b

Today the internet is increasingly vast and contains more than static websites. Next, we explore varying technologies on the internet which are frequently used by adolescents.

i. Social Networking Sites (SNS). Social networking sites, such as Facebook and Club Penguin, provide a virtual community where users can connect with people with similar interests and/ or "hang out" with others. On many
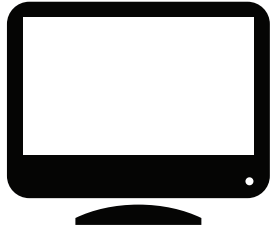
PROPORTION OF RECREATIONAL COMPUTER TIME 8–18 YEARS OF AGE SPEND IN VARIOUS ACTIVITIES.

Figure 4

Video sites — 16%

Other Web sites — 12%

Other — 5%

Graphics/Photos — 5%

E-mail — 6%

Instant messaging — 13%

Playing games — 19%

Social Networking — 25%
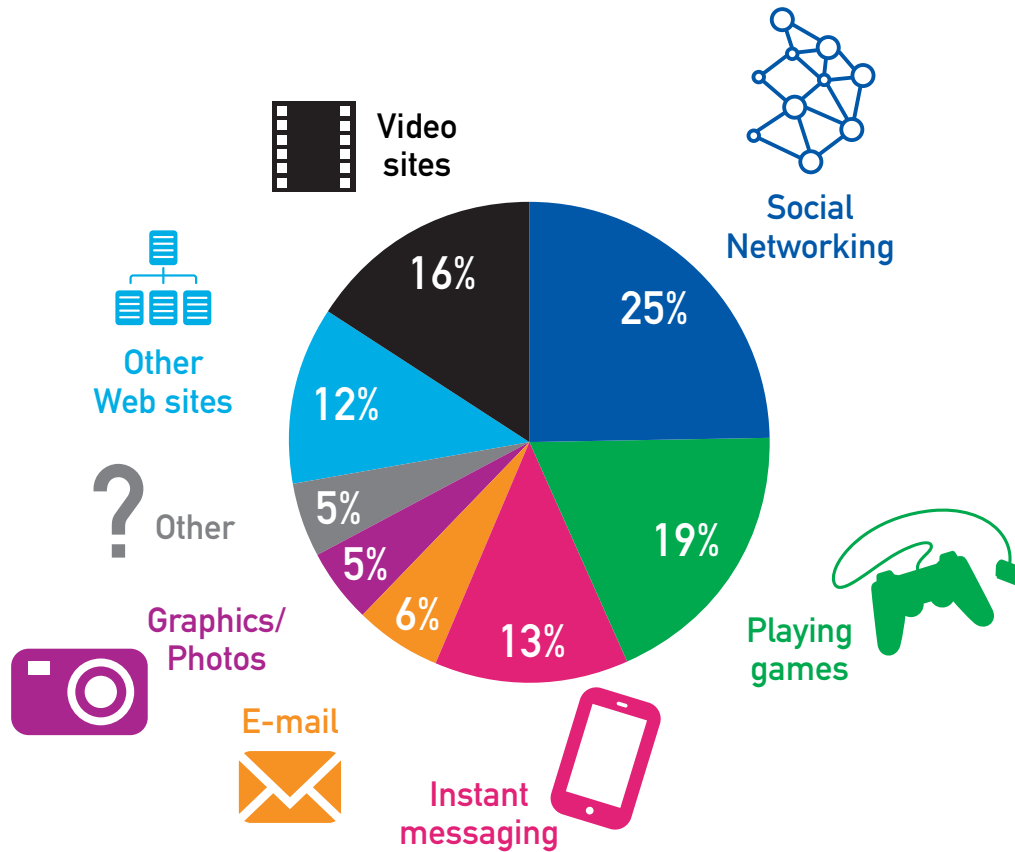
Source: Rideout, Foehr, & Roberts, 2010

of these sites, members can create a profile with personal data (usually biographical), upload/post pictures, describe their likes and dislikes, chat, e-mail, blog, videoconference, and/ or text message each other (many of these utilities are described in greater depth below). Many SNS offer small software applications (also known as widgets or "apps") that users can install on their profile or send to their friends. Applications
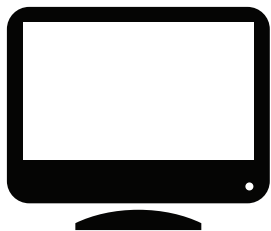
TEENS SEARCHING FOR GENERAL HEALTH, DIETING, OR PHYSICAL FITNESS INFORMATION ONLINE.

31%

All Online Teens

13% 12–13 **38%** 14–17

Years of Age

27% Boys **35%** Girls

Gender
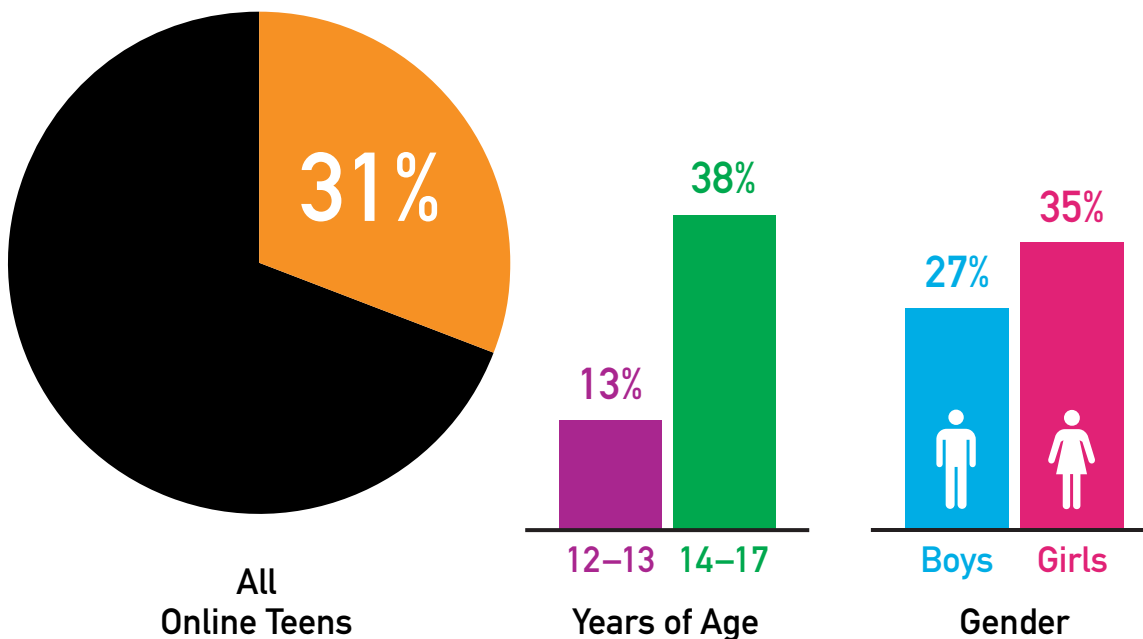
Figure 5a

Percentages are for the internet 12-17 years of age.
Source: Lenhart et al., 2010b

encourage users to remain online and use the website for longer periods of time and can come in various forms such as games (e.g. Farmville on Facebook), surveys, or virtual trinkets (e.g. buttons or bumper stickers).

These sites are extremely popular among today's youth. Approximately 81% of youth ages 12–17 report having a profile on at least one SNS, with older youth more likely than younger youth to use SNS.
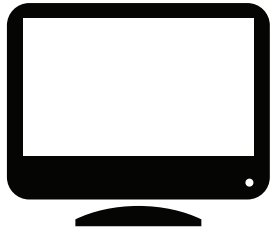
TEENS SEARCHING FOR SENSITIVE HEALTH INFORMATION ONLINE.

Figure 5b

17%

All Online Teens

13% **19%**

12–13   14–17

Years of Age

27% **35%**

Boys   Girls

Gender
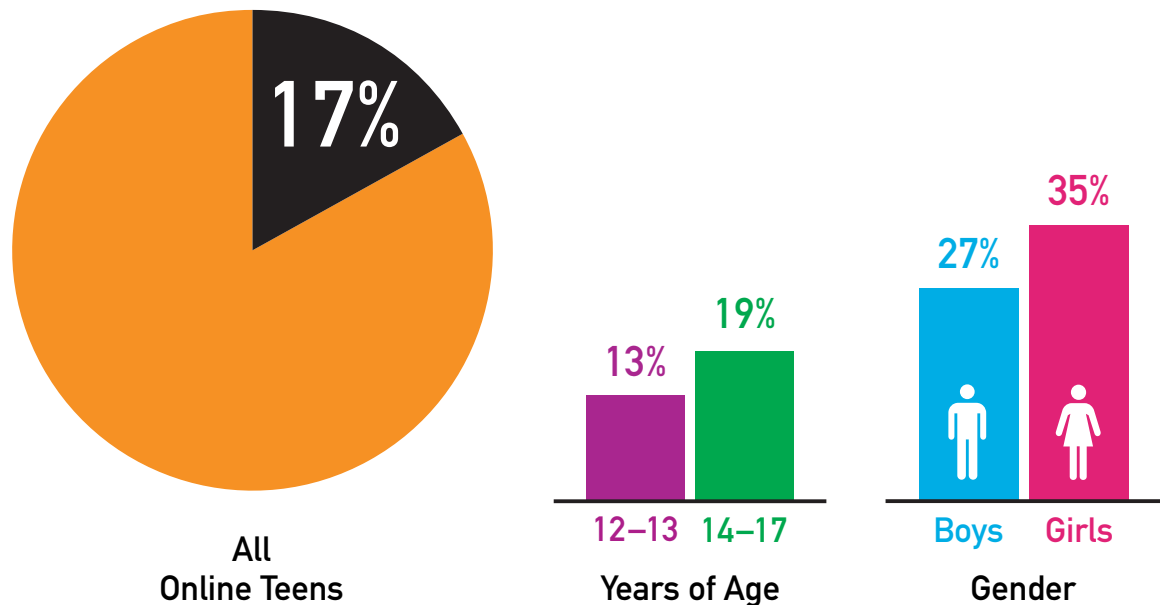
Percentages are for the internet 12–17 years of age.
Source: Lenhart et al., 2010b

About 65% of 12–13 year olds have an online profile, compared with 89% of 14–17 year olds (Figure 6). Race/ethnicity and income are not, however, predictors of SNS use (Madden et al ., 2013b). Virtually all adolescents who use SNS say they do so to keep in touch with friends (91%), while about half (49%) say they use the sites to meet new friends, and some (17%) use SNS sites to "flirt" (Lenhart & Madden, 2007).

PERCENTAGE OF ONLINE TEENS ON SOCIAL NETWORK SITES.

81%
Total Teens

65%
12–13 years
of age

89%
14–17 years
of age
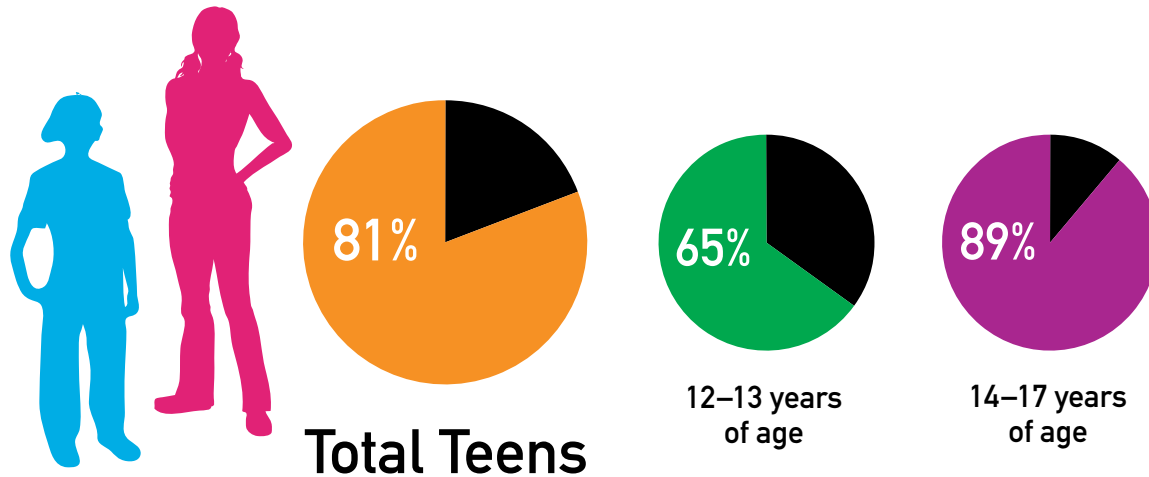
Figure 6

July – September 2012 data.
Source: Madden et al., 2013b

There are noteworthy distinctions between social networking, dating, and "hook-up" sites. All SNS are created to connect people with similar interests, but "traditional" SNS are primarily intended for meeting new people or enhancing existing relationships. Dating and hooking-up can result, but is not the primary focus. Dating websites, such as Match, eHarmony, JDate, or OkCupid, are primarily for people looking for romantic and/or long-term relationships, though friendships and/or hook-ups can happen. Hook-up sites, such as Manhunt or AdultFriendFinder, are sites for people looking to find sex partners. Friendships or serious relationships may occur among members on these websites, but that is not the primary mission of the sites. Unfortunately, there is a lack of available data about adolescent usage of dating and hook-up sites.

Social networking sites are extremely popular and are powerful marketing and communication tools. How effective these sites are for disseminating sexual and reproductive health information is not fully known. Efforts have been made to use SNS for providing simple information such as clinic location and hours of operation as well as for more complex efforts such as housing a national campaign. Additionally, SNS can be used and has been used to advertise health messages or campaigns, such as HIV testing days and the development and sharing of applications and widgets. Other potential uses of SNS include recruitment of participants into research activities, creating groups for people with similar interests, conducting focus groups with youth, social listening, and monitoring trends.

ii. User-Generated Content (UGC).
User-generated content (UGC) is the creation of various types of media content by users themselves. UGC includes creating blogs, personal webpages, or webpages for a school, friend, or organization; sharing original creative content online, such as artwork, photos, stories, podcasts, or videos; or remixing content found online into a new creation (Lenhart

& Madden, 2005). Remixing online content by youth is done when material found online, such as songs, text, or images, is re-created into other unique artistic creations (e.g. mash-ups) (Lenhart et al., 2010b). In 2005, 57% of online youth, or about 12 million people, created content for the internet (Lenhart & Madden, 2005). The ability to create, express, and share content, connecting users to one another, is one of the defining elements of the internet today. (Lenhart et al., 2010).

iii. Video sharing. Video sharing websites are sites where users can watch, share, upload and distribute video clips. Popular with adolescents, videos can be effective health information tools. In addition, video sharing sites, like Youtube, make it easy for users to upload and share videos with anyone with internet access. Eighty-one percent of 8–18 year olds say they have watched a video on the internet (Rideout, Foehr, & Roberts, 2010). There are dozens of video-sharing sites on the internet. YouTube is the most popular source of online video for teens, followed by social networking sites and sites such as Hulu, a popular online video library which hosts many current TV episodes (Nielsen Company, 2009).

iv. Blogs. Web logs (blogs) and video blogs (vlogs) are online diaries or journals used for commentary on any subject. Blogs are in written text form and vlogs are in a video format. Most blogs have a comment feature, which allows readers to respond to posts.

Blogging has declined in popularity with adolescents. Currently, 14% of online 12–17 year olds say they blog, compared to 28% in 2006. This decline in blogging may be a result of the rise in popularity of SNS status updating and microblogging

(e.g. Twitter) (Lenhart et al., 2010b). It is worth noting, however, that there are more blog readers than there are blog writers (Lenhart et al., 2010b). About half (52%) of SNS users ages 12–17 commented on their friends' blogs (Lenhart et al., 2010b). Although blogs are not particularly popular with teens, they can be a useful vehicle to reach those who provide care and services to adolescents such as parents, teachers, and healthcare providers.

Microblogging, or truncated or very small messages or blogs, has gained popularity with the rise of the website Twitter.com. Twitter allows users to "tweet," or share a 140-character message, and to follow friends, companies, causes, or any other Twitter account. Users log on to view real-time tweets from Twitter users they are following with the capability to search for topics or other users of interest. Though Twitter's main function is microblogging, it also serves as a social networking site. Twitter use continues to rise in popularity among adolescents, according to the Pew Internet and American Life Project (Madden et al., 2013). Twenty four percent of teens now use twitter, up from 16% in 2011. (Figure 7)

Older teens (14-17 years) and girls are significantly more likely to use twitter than younger teens (12-13 years) and boys, respectively. African American teens are also more likely to use twitter than white teens, a pattern seen since the early days of Twitter (Figure 7) (Madden et al., 2013).

v. Instant messaging. Instant messaging is a capability provided by some websites, software installations, and mobile phones (e.g. AIM or Gmail chatting). It allows you to see who, among people you've chosen to befriend, is online and ready to chat. Users can send one another text messages that pop up on the recipient's screen if they are "online," or signed into the instant messaging service. This is often referred to as "IMing." Among youth, instant messaging and social networking have largely replaced emailing as online communication tools. Only 16% of youth ages 12–17 report that they send email daily (Lenhart et al., 2010a), and it's considered a technology of last resort to adolescents (Lenhart, Madden, Macgill, & Smith, 2007). Overall, 62% of online youth ages 12–17 report sending instant messages to friends, with 24% instant messaging daily (Lenhart et al., 2010a).

TEEN USE OF TWITTER— CHANGES OVER TIME.

% of Teen Internet Users Who Use Twitter, Over Time.

Figure 7

Teen Twitter Users

Year	%
2009	8%
2011	16%
2012	24%
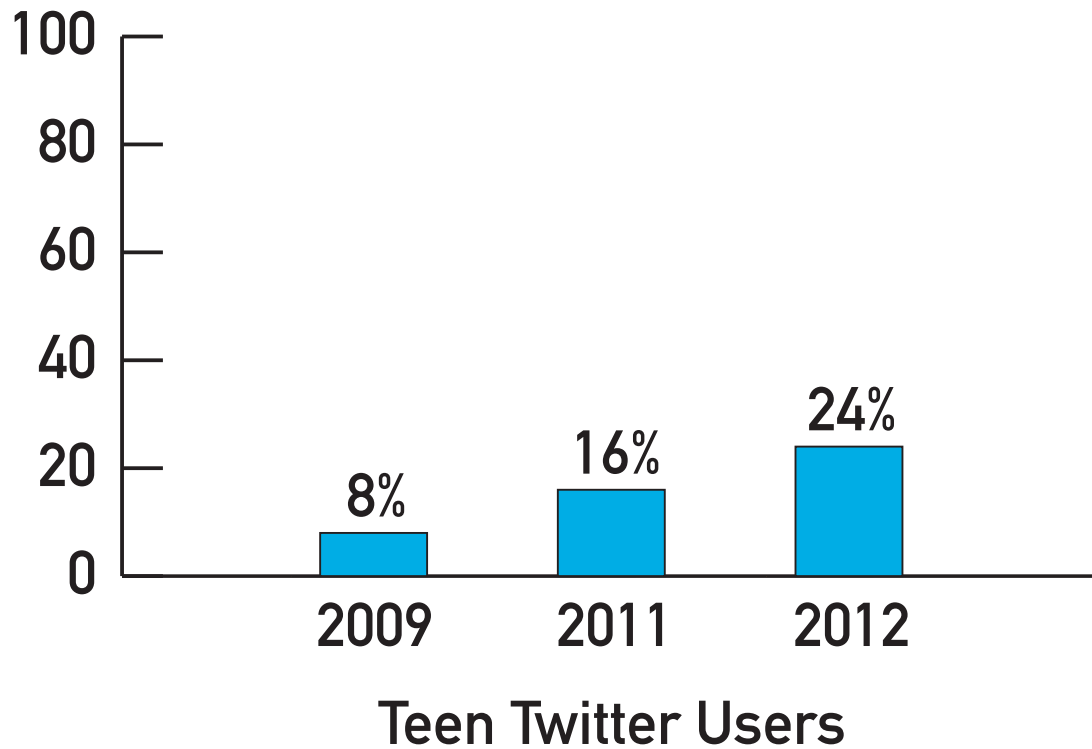
Source: The Pew Research Center Internet & American Life Project Teen & Parent surveys.
Source: Teen data taken from surveys of teens age 12–17 conducted October–November 2006,
September–November 2007, November 2007–February 2008, June–September 2009,
April–July 2011, and July–September 2012 (n=802).

B. Mobile Devices

The term "mobile devices" refers to portable communication technologies such as cell phones, personal digital assistants (PDAs), and "smart phones" that combine the functionalities of cell phones with those of PDAs, (e.g., Apple iPhone, BlackBerry, or Android). Mobile devices are ubiquitous in today's world because of their portability, affordability, and capacity to provide instantaneous communication regardless of geographic boundaries. In fact, every

DEMOGRAPHICS OF TEEN CELL PHONE USERS.

Figure 8

Total Teens	75%
Boys	74%
Girls	77%
Age	
12–13	66%
14–17	80%
Race/Ethnicity	
White, Non-Hispanic	78%
Black, Non-Hispanic	75%
Hispanic (English- and Spanish-speaking	68%
Household Income	
Less than $30,000 yr	59%
$30,000 – $49,999	76%
$50,000 – $74,999	73%
$75,000+	87%

Lenhart et al, 2010a, Pew Research Center's Internet & American Life Project,
Teen and Mobile Phones Survey conducted from June 26 – September 24,
2009. N=800 teens ages 12-17 and the margin of error is+4%

year the percentage of American homes that at are wireless-only homes, meaning no landlines, increases. Currently approximately 25% of American homes are wireless-only. (Blumberg & Luke, 2010).

The sophistication of mobile devices continues to grow, allowing users to send text messages, access the internet, take pictures, play video games, and record and watch videos. It can be expected that internet access via mobile devices will become more common in the foreseeable future. In the U.S., 75% of youth ages 12–17 have a mobile phone (Figure 8), including 58% of 12-year-olds (Lenhart et al., 2010a). Children are getting phones younger; today approximately 46% of tweens (8–12 years) have personal cell phones, while nearly none did ten years ago (Nielsen Company, 2008; Williamson, 2010). Cell phone ownership increases with age (Figure 9) and there are some discernable differences in cell phone

3. ˮ Data for mobile phone users younger than age 18 is unavailable.

use by age. For example, older teens are more likely to use their mobile phones to text, take pictures, and go online (Lenhart et al., 2010a).

There is no difference in mobile phone ownership across race/ethnicity and gender; however, adolescents from lower income families are less likely to have a mobile phone (Lenhart et al., 2010a). Differences by gender and race/ethnicity begin to emerge when we look at *how* cell phones are being used, but these differences are slight. For example, girls spend more time texting than do boys, while teens from lower income households are more likely to report never sending texts. Low income teens as well as teens of color are more likely to report accessing the internet via their mobile phones than their high income and white counterparts, respectively. In addition, girls are more likely to take and send or receive pictures than boys. (Lenhart et al., 2010a)

Mobile phones are also used for health information seeking. Thirty-one percent of all cell phone owners (42% of those ages 18–29*) have used their phones to look up health or medical information (Fox, 2012). Mobile phones have been used to provide

various sexual health resources to youth, such as connecting adolescents to testing locations (www.sextextsf. org/), answering their questions about sex (http://appcnc.org/brdsnbz-text-message-warm-line), and serving as a reminder for birth control (http://bedsider.org/reminders). The growing mobile applications (described below) for healthcare provision make cell phones a valuable tool for healthcare providers as well (Newell et al., 2005; Mir, 2011). Given the increasing use and reach of mobile technologies, it is worthwhile to consider if and how mobile phones can be best incorporated into sexual health and STD/HIV prevention efforts.
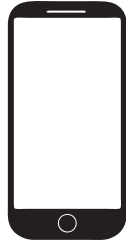
MOBILE PHONE OWNERSHIP BY U.S. CHILDREN AND TEENS, BY AGE, 2004 & 2009.

% of respondents in each group

Figure 9

8–10 years of age

Phone Icon = 4%

31%

11–14 years of age

69%

15–18 years of age

85%

Kaiser Family Foundation, "Generation M2 – Media in the lives of 8-18 year olds", January 20, 2010.

i. Text messaging. There are numerous functionalities of mobile phones; currently the most popular is text messaging. Text messaging (texting) allows mobile phone users to send short alphanumeric messages to other mobile phone users. Today, virtually every phone on the market is equipped for text messaging. Among adolescents, text messaging is incredibly popular. Seventy-two percent of teens, or 88% of all teen cell phone users, text-message (Lenhart et al., 2010a). Mobile phone owners ages 13–17 are the most frequent users of text messaging, sending and receiving an average of 3,705 texts per month. Eighteen to twenty-four year olds have the next highest average of 1,707 texts sent and received per month (Nielsen Company, 2010a). Texting is the most common form of interaction among teens, ranking higher for daily contact among 12–18 year olds than talking face-to-face, by phone, on a social networking site, or by instant messaging (Lenhart et al., 2010a). In a typical day, 46% of 8–18 year olds report sending text messages on a cell phone (Rideout, Foehr, & Roberts, 2010). Girls report slightly more texting than boys, and African-American youth report more texting than whites, with Hispanics falling somewhere in the middle (Rideout, Foehr, & Roberts, 2010).

ii. Mobile software applications. Another popular feature of mobile phones is "apps" or mobile software applications. Apps are downloadable pieces of software to a mobile phone, which allow users to engage in a variety of activities such as listening to music, playing games, or accessing a social networking site. These pieces of software are different from the standard functions of a mobile phone such as the ability to take pictures or record video. The use of mobile apps is increasing in popularity among adolescents. Thirty-eight percent of 13–17 year olds report downloading apps onto their mobile phones, a 12% increase over the previous year, with teen males downloading apps more than female teens (Nielsen Company, 2010b).

Nine percent of mobile phone owners (15% of those ages 18–29*) have downloaded apps to help them manage their health, such as for counting calories, logging fitness workouts, providing health tips and keeping personal health records. (Fox, 2012). Individuals with a wireless device or mobile internet phone are more likely to use the internet to gather and share information and engage in health-related social media such as posting health-related comments and reviews online (Fox, 2010).

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4. * Data for mobile phone users younger than age 18 is unavailable.

iii. Future of mobile technology. As previously mentioned, mobile phones are quickly becoming increasingly sophisticated. Today mobile phones are being used for banking, to scan bar codes, and to stream television shows and movies. In addition, more phones are enabled with Global Positioning System (GPS). Mobile systems that allow for advanced operations such as the secure transfer of financial data allow us to see the same potential for sensitive medical information. Activities and capabilities such as these set the stage for using mobile phones for future sexual health efforts and bode particularly well for the adolescent population.

Mobile phone use is increasing worldwide and everything is going mobile including dating, sex seeking, and the buying and selling of goods. Sexual health professionals should continue to seek ways to incorporate mobile phones into their adolescent STD/HIV efforts.

C. Video games

A video game is an electronic game where a player uses a controller to generate feedback on a video screen. Video games can be played on many devices such as computers, arcade consoles, home television sets, game consoles (e.g. Nintendo Wii, Sony Playstation, Microsoft XBox), handheld game devices (e.g. Sony PSP), and

mobile phones. Additionally, video games can be played by a single individual or groups of players.

There are various types of electronic or online games that can be played. "Casual" games are common to most people and include electronic versions of familiar games such as Scrabble or Sudoku. In role-playing games (RPGs), players create and assume the role of an "avatar," a virtual representation of oneself that does not have to be an accurate representation of the user. A massively-multiplayer online role-playing game (MMORPG) is a type of online RPG in which a large number of players interact with one another in a virtual, persistent world. MMORPGs are distinguished from single-player or small multi-player RPGs by the large number of players and the game's persistent world, which continues to exist and be played by others even while other players are away from the game (Wikipedia, 2011). World of Warcraft is a popular and a well-known MMORPG. "Serious" games are usually educational or political in nature. For example, Re-Mission is a video game developed for teenagers and young adults with cancer. In a randomized, controlled trail, participants who played Re-Mission showed more consistent treatment adherence, and an increase in cancer knowledge and in self-efficacy. (Pediatrics, 2008)

Popular Video Game Consoles

Nintendo Wii

Sony Playstation 3

Microsoft Xbox 360 with Kinnect

Cover art for the game Little Big Planet
on the Playstation 3 platform.

Avatar from Little Big Planet

> **"Gaming is a ubiquitous part of life for both boys and girls."**
> — *Amanda Lenhart, senior research specialist, Pew Internet
> & American Life Project, in a statement, September 2008*

Approximately 97% of American youth ages 12–17 play video games. Of these, 86% play on consoles, 73% play on computers, 60% play on portable devices, and 48% play on a cell phone. (Lenhart et al., 2008).

Game preferences vary by gender as well as age. Girls tend to be more interested in puzzles, racing, and rhythm games while boys prefer action and sports games. Additionally, younger teens, 12–14 years, play video games more frequently than 15–17 year olds (Lenhart et al., 2008).

Games provide an opportunity for users to find health information as well as rehearse health behaviors and other meaningful activities (Edgerton, 2009). Given the popularity of video games and virtual worlds, more public health professionals are turning to these channels as tools for health promotion as well as examining the effects of games on health.

There is growing support for the use of console games for physical health promotion as seen in recent years with the introduction of the Nintendo Wii and other recently-developed technologies, such as Kinect for Xbox 360 (Schiesel, 2007; Murphy et al., 2009). Additional work is needed to determine if there is a role for console games in sexual health promotion among adolescents.

As the realm of gaming continues to grow, the research must also expand to evaluate efforts to improve health knowledge, attitudes, and behavior through games. The lack of information on this topic draws attention to the need for continued study on the use of gaming for adolescent sexual health promotion, as well as possible unintended effects.

i. Virtual worlds. Virtual worlds are online sites where users interact and socialize, typically through customizable avatars. There is considerable overlap between virtual worlds and games. While many games include virtual world elements, not all virtual worlds are games themselves. Some virtual worlds do not require game-like progress, such as point acquisition or conquests but rather provide users a virtual space to interact with others.

Only 8% of youth ages 12–17 say they visit virtual worlds, with younger teens using virtual worlds more often than older teens (11% of online teens ages 12–13 compared to 7% ages 14–17) (Lenhart et al., 2010b). This has been spawned by an increasing number of virtual worlds targeting adolescents and children (e.g. Club Penguin and Moshi Monsters). In 2009, there were 112 virtual worlds aimed at adolescents worldwide, and another 81 in development (Williamson, 2009). There are no differences in the use of virtual worlds by race/ethnicity, gender, or income level groups (Lenhart et al., 2010b).

D. Risk and Dangers

Despite the many ways that technology can aid in reaching adolescents with important health information, technology can also expose youth to inappropriate content or behaviors, such as online sex seeking and sexual imagery, making them vulnerable to unwanted contact and situations. Many reports of these dangers have been highlighted and sometimes sensationalized in popular media. Here we will briefly present some of the risks associated with technology and media as well as direct readers to more in-depth resources.

TECHsex USA: Youth Sexuality and Reproductive Health in the Digital Age

is a white paper released by ISIS, Inc and The Ford Foundation that provides information on the ways in which youth and young adults currently use technology to learn and discuss sexual and reproductive health information, as well as gauges youth interest in receiving sexual/reproductive services and information through new digital programs. The report can be accessed: http://www.isis-inc.org/ISISpaper_techsx_usa.pdf

i. Internet and sexual risk. A number of surveys have attempted to provide information about the online risks that youth encounter and what factors make them vulnerable to online sexual risk. In 2000, one in five youth (ages 10–17) had received a sexual approach or solicitation via the internet, one in 33 received an aggressive sexual solicitation, one in four had an unwanted exposure to naked/sex pictures, and one in 17 was threatened or harassed in the past year (Mitchell, Finkelhor, & Wolak, 2001). In 2005, youth using the internet reported an increase in aggressive sexual solicitations

and requests from others for sexual photos (Mitchell, Finkelhor, & Wolak, 2007). The *Growing Up With Media Survey* in 2006 found that 35% of youth using the internet reported being a victim of internet harassment or unwanted sexual solicitation. Of those experiencing harassment or unwanted sexual solicitation, 8% reported being targeted at least monthly (Ybarra & Mitchell, 2008).

At greatest risk for unwanted sexual solicitation over the internet were girls, African-American youth, older teens, frequent internet users, chat room participants, those engaging in sexual behavior online (i.e., using a sexual screen name or talking about sex online with someone not known in person), and those experiencing physical/ sexual abuse offline (Mitchell, et al., 2001; Mitchell, et al., 2007). Recent studies suggest that sharing personal information alone is not related to online victimization. Youth must be engaging in conversations about sex online to increase their risk (Ybarra, Mitchell, Finkelhor, & Wolak, 2007). Risk factors for experiencing online sexual risk are also related to adolescent offline behavior and environment. Youth who reported

internet harassment and unwanted sexual solicitations have a number of other risk factors, including substance use, poor emotional relationships with primary caregivers, and close relationships with persons who engage in delinquent behaviors (Mitchell, et al., 2007).

One pressing concern about adolescent technology use is the development of online, intimate relationships that are taken "offline" (meeting in person) where sex or other potentially risky behaviors can occur. Sexual risk related to online activity has been studied mainly in populations over the age of 18 and primarily among men who have sex with men (McFarlane, Bull, & Rietmeijer, 2000; Rhodes et al., 2010). Many internet-initiated sex crimes start in social networking sites, several of which use avatars as a way for users to interact with each other (Noll, Shenk, Barnes, & Putnam, 2009). One study which examined how provocative self-presentations (through avatars) of female adolescents (aged 14–17) are related to online sexual advances and offline encounters found that an adolescent who presents herself as provocative based on body and

clothing choices is more likely to have online sexual advances (Noll et al., 2009). In addition, results indicate that adolescents who have experienced relatively high rates of online sexual advances are more likely to agree to offline meetings (Noll et al., 2009). Although this study has implications for sexual solicitations, there is still little known about adolescent use of the internet for purposefully seeking out sex partners, dating, or long-term relationship-seeking, or its influence on the development of romantic and/ or sexual relationships. Additionally, little is known about the influence of the internet on the development of feelings of intimacy and the speed and intensity at which they occur.

For more information about adolescent use of technology and its risks and danger, see the resources listed below:

- *Cyber bullying and electronic violence: Electronic Media and Youth Violence — A CDC Issue Brief for Educators and Caregivers*
  http://www.cdc.gov/ncipc/dvp/YVP/electronic_agression_brief_for_parents.pdf

- *Technology and Youth — Protecting Your Child from Electronic Aggression*
  http://www.cdc.gov/violenceprevention/pdf/EA-TipSheet-a.pdf

- *National Center for Victims of Crime – Cyberstalking*
  http://www.ncvc.org/ncvc/main.aspx?dbName=DocumentViewer&DocumentID=32458

- *Internet Safety Technical Task Force – Enhancing Child Safety and Online Technologies*
  http://cyber.law.harvard.edu/research/isttf

A chief concern for parents, educators, law enforcement, and politicians is the potential for an adolescent to develop an intimate relationship with an older stranger, that is, romancing of youth by adult strangers for the purpose of forming offline sexual relationships. While this concern is valid, a study conducted by the Internet Safety Technical Task Force, a workgroup formed to specifically look at this issue, found that only a small percentage of youth who are sexually solicited online by adults meet in offline environments for the purpose of engaging in sexual relationships (Internet Safety Technical Task Force, 2008).

ii. Mobile devices and sexual risk.

Studies have looked at the phenomenon of sending or receiving sexually explicit material via cell phones, or "sexting." A 2008 survey among 13–26 year olds found that about 20% of young people had posted online, or electronically sent, nude or semi-nude photos or videos of themselves, and more than half of those who had done this were young girls ages 13–16 (The National Campaign to Prevent Teen & Unplanned Pregnancy [The National Campaign], 2008b). More than 40% of young women report "pressure from guys" as a reason for sending or posting these messages or

images. The survey also found that sexually suggestive messages via text, email, and instant message were even more prevalent than sexually suggestive images. Among 13–19 year olds, 39% reported sending or posting sexually suggestive messages (37% of girls versus 40% of boys) and 48% of teens say they have received such messages (The National Campaign, 2008b).

Despite the fact that many adolescents are sending these messages to their boyfriends and girlfriends (71% of girls versus 76% of boys), others are sending the material to potential "hook-up" partners. Thirty-nine percent of adolescent boys and 21% of adolescent girls say they have sent such content to someone they wanted to hook up with or date Moreover, nearly one in five young people who send sexually suggestive messages and images send them to people they only know online. These photos and messages rarely remain anonymous or private. Thirty-nine percent of boys and 38% of girls say they have had sexually suggestive text messages or emails meant for someone else shared with them, and a quarter of teen girls and more than a third of teen boys have had nude or semi-nude images originally meant for someone else shared with them. Teens report this behavior as common and that exchanging these materials makes the advent of dating or hooking-up more likely (The National Campaign, 2008b).

A similar study conducted by the Pew Internet and American Life Project, which focused only on the use of cell phones to send sexual content and images, found that 4% of cell phone owners' ages 12–17 years reported having sent a sexually suggestive, nude, or nearly nude image of themselves to someone else's cell phone (Lenhart, 2009). Fifteen percent reported having received this kind of image of someone they know personally on their cell phone. Older teens are more likely to "sext;" especially those who pay for their own phone bill (Lenhart, 2009). Similar to the findings from the National Campaign study, focus group findings from the Pew study found that "sexting" occurs most often in one of three scenarios: between romantic partners like a boyfriend and a girlfriend and the text is not intended to be shared further; between partners and then the text is shared outside the relationship; or between two people who are not in a relationship, but one person in the text exchange hopes to be (Lenhart, 2009). Images are usually shared as part of or in lieu of sexual activity (Lenhart, 2009).

E. Summary

As with most activities that youth engage in, there is certainly a level of risk associated with technology use; however, the benefits that technology brings, such as enhancing relationships, facilitating communication and providing a new avenue for accessing information, seems to outweigh the negative. These new media are just the newest format for youth to act out traditional behaviors, such as flirting, bullying, playing, gossiping, and keeping up with popular culture. In the next section, we will explore the many opportunities that new media present for prevention activities with adolescents.

V. Technology: A Tool to Improve Adolescent Sexual Health

There is great potential for technology to improve the sexual and reproductive health of adolescents while reducing health risks through education, interventions, and provision of resources. It may be in the best interest of public health practitioners to use the most efficacious tools available to improve adolescent sexual health, including emerging technologies and new media.

In this section, we highlight a few examples of how popular technologies are being used to positively engage adolescents, increase awareness and knowledge, and promote behavioral change. There are many other examples beyond what we describe here.

Source: http://www.gytnow.org

A. Examples of Multimedia Campaigns

Launched in 2009, **GYT: Get Yourself Tested** (GYTNOW) is a multi-media, youth-focused sexual health campaign which seeks to normalize testing for and discussions about STDs. The campaign was developed in response to 2008 data that one in four teens has an STD (Forhan et al., 2009). It is a partnership between the CDC's Division of STD Prevention, MTV networks, the Henry Kaiser Family Foundation, and Planned Parenthood of America. The campaign purposefully incorporates

many social media elements to reach sexually active 15–25 year olds. The website for the campaign, www.gytnow.org, serves as the information focal point and is the center from which all other activities stem. Within the main website, the campaign has incorporated multiple types of information in various formats to keep users engaged and on the site. From the website, users can find local STD/HIV testing centers; watch videos of celebrities talking about the importance of getting tested; share elements of the campaign with others (e.g. posting GYT logos onto their Facebook profile); learn about STDs and HIV. To date, there have been more than one million unique visitors to the GYTnow.org website, and approximately 40,000 resource downloads (Hoff et al, 2010).

The GYTNOW campaign uses Facebook as one of its main marketing platforms. The GYT Facebook page contains STD information, facts, and videos as well as provides links to the main campaign website and other various informational sites. The page provides youth with the opportunity to get involved by becoming a fan of the page, making comments to the profile and allows fans to

stay updated with current GYT events and news. Currently, there are over 13,000 Facebook fans.

The GYT Twitter account (more than 2,000 followers) allows for further dissemination of messages, promotes resources, and provides an easy way for other to share or "retweet" (reposting "tweets" shared by the GYT Twitter account) GYT messages.

A final aspect of the GYTNOW campaign that highlights its availability on multiple platforms is its short message service (SMS) texting code. By texting a zip code to GYTNOW (498669), users will receive the names and phone numbers of nearby STD/HIV testing centers. The SMS service has been accessed over 50,000 times since the campaign's launch.

In addition, GYT messages are also promoted through partner websites and social media profiles. For example, in 2010, the CDC promoted GYT messages through the CDC's Twitter profile (more than 37,000 followers), Facebook page (more than 55,000 fans), and through targeted e-Health SMS (text) messages (7,569 female subscribers).

GYTNOW was launched on April 1, 2009, to coincide with STD Awareness Month. As a result of the positive response, the campaign was continued and has expanded every year since.

Source: http://www.nationalcampaign.org

The National Campaign to Prevent Teen and Unplanned Pregnancy is another example of a web campaign that focuses on sexual health. Its goals are to prevent teen and unplanned pregnancy, especially among young single adults, and improve the lives of future children born into committed families. The National Campaign's strategies include the development and promotion of materials, videos and online products, as well as the use of digital media to expand their mission and goals. The National Campaign maintains several web properties targeted toward different audiences, including professionals and parents, teens, and young adults. The campaign's main website, www.thenationalcampaign.org, serves as a hub for information about teen and unplanned pregnancy and hosts its sister sites: "StayTeen" (www.stayteen.org/), "Pregnant Pause: Getting Bloggy about Teen and Unplanned Pregnancy" (http://blog.thenationalcampaign.org/pregnant_pause/) and "Bedsider" (http://bedsider.org/). Each of these sites offers information to readers in a format that is geared toward their target audience.

Since launching in 1996, the National Campaign has had 14 million visits to their websites, given out 7.6 million pieces of educational material and videos, and urged 3 million teenagers and over 200 organizations and websites to take part in their annual online National Day to Prevent Teen Pregnancy (The National Campaign, 2008a). In 2010, the National Campaign's websites combined had over 2.2 million visits and nearly 6 million page views. The new design of StayTeen, launched in November 2010, has allowed for more user interaction with the site. It has also resulted in an increase of traffic to the website, including a 20% increase in time spent on the site, increased page

depth, thousands of poll responses and written comments, more return visitors, and more Facebook fans and Twitter followers (L. Lloyd, personal communication, January 28, 2011).

The National Campaign has also hosted user-generated video contests where users can submit videos around a selected theme. Stay Teen features several of these videos and PSAs, which are all filmed by teens, for teens. In 2010, the videos had over 1.1 million views on the National Campaign's official YouTube channel, an increase of 77% from 2009 (L. Lloyd, personal communication, January 28, 2011). This type of video sharing can allow for peer-to-peer health communications, which can establish positive behavioral norms, provide role modeling, and affect change.

Source: http://www.stdcentral.org/SitC/

B. Example of Online Intervention

Safe in the City (www.stdcentral.org/ SitC/) is a behavioral intervention that consists of a 23-minute educational HIV/STD video that has been proven effective to reduce new STD infections and impact risk behavior among STD clinic patients (Warner et al., 2008). The intervention consists of a series of video montages that follow different couples as they negotiate various sexual scenarios. A study of the video series, conducted in STD clinic waiting rooms, found a reduction in new infections by nearly 10% (Warner et al., 2008). While DVDs of the videos have been made available to STD clinic waiting rooms nationwide, uploading them to Youtube.com has expanded the videos' reach to a much larger and more diverse audience. Some of the videos in the series, such as the one on how to properly use a condom, have been viewed over 370,000 times (SafeintheCityVideo, 2008).

Source: http://blog.AIDS.gov

C. Example of Blogs

As mentioned previously, blogs can be a useful mechanism for sharing resources and information with people and organizations which work directly with target populations.

For example, **AIDS.gov**, a program in the Office of HIV/AIDS Policy at the U.S. Department of Health and Human Services, is a website that provides access to federal HIV information, policies, programs and resources. Among other things, AIDS. gov maintains a blog specifically to foster a public discussion on using new media to effectively respond to HIV/AIDS. Readers of the blog will find an overview of the various new media tools available, how to get started in this emerging area, ways in which new media and technologies can be used to reach

communities, and examples from the field. AIDS.gov is a valuable resource for those in the sexual health field who use or want to use new media to reach their target populations (M. Samplin-Salgado, personal communication, June, 30, 2011).

D. Example of Social Networking Site

In addition to CDC.gov, the CDC also maintains a profile on Facebook (www.facebook.com/CDC), multiple Twitter accounts (www.cdc.gov/ SocialMedia/Tools/Twitter), a YouTube channel (www.youtube. com/CDCstreamingHealth/) and a Flickr account (www.flickr.com/ photos/CDCsocialmedia) through which they provide information and materials on a variety of health topics. While the general public can access the information from these various sites, the CDC social media profiles are also great resources for other organizations that provide services directly to the population. From the CDC profiles, partner organizations can find and use tools such as widgets, buttons, and banner ads to help raise awareness about any number of health topics, including STDs and HIV. In recognizing that they can be a valuable resource for other organizations, the CDC provides

easy-to-use products for others involved in prevention efforts (CDC, 2010b). The CDC has 12 Facebook pages that reach over 200,000 fans, 31 Twitter profiles with a collective reach of over 1.6 million followers, and the CDC YouTube channel videos, which have been viewed over 4 million times (CDC, 2011).

The CDC's Social Media Toolkit provides guidance on how to use social meida to improve the reach of your messages.

http://www.cdc.gov/healthcommunication/ToolsTemplates/SocialMediaToolkit_BM.pdf

E. Example of Computerized Intervention

Computerized, technology-based interventions are somewhat different from the other mediums already discussed in this paper but are related in that computerized interventions use technology to reach youth via a medium with which they are familiar. Computerized interventions are software programs that are made accessible via technology, typically by uploading them to a desk or laptop computer, although interventions can

also be distributed and downloaded from the internet (also known as internet-based interventions). They provide another avenue to reach youth for attitude, knowledge and behavior change. (Di Noia, Schinke, Pena, & Schwinn, 2004, Kiene & Barta, 2006; Lightfoot, Comulada, & Stover, 2007; Roberto, Zimmerman, Carlyle, & Abner, 2007a).

Some advantages of computerized interventions are lower implementation costs, compared to human-delivered interventions; increased control over content (whether for standardization or tailoring); dissemination flexibility; and opportunities to include new technologies (Noar et al., 2011). Because they allow for features such as attention-grabbing graphics, interactive games, tailored, real-time feedback, video stories, and role models, computerized interventions may increase the motivation of young people to participate in these interventions (Lightfoot, 2008). Moreover, unlike group interventions, computerized ones can be tailored to meet the demographics and needs of each participant (e.g. only presenting content intended to address deficits indicated by an

assessment of knowledge or skills) and provide a greater degree of privacy for addressing sensitive topics such as sexual behavior (Bull, Pratte, Whitesell, Rietmeijer, & McFarlane, 2009). Additionally, effective computerized interventions can be easily replicated thereby expanding the reach to more adolescents.

Additional advantages of computerized interventions include 24-hour accessibility by anyone with a computer and internet access. This ease of access makes internet-based interventions very appealing, especially for youth in sparsely populated areas where it may be difficult to bring adolescents together for services at a central location.

However, computer interventions pose certain challenges. A primary challenge of multi-session internet interventions is the difficulty of recruiting and retaining youth (Bull et al., 2009; Roberto, 2007b). Monetary incentives have been necessary to achieve acceptably high retention rates (Bowen, Williams, Daniel, & Clayton, 2008). Additionally, only those interventions with multiple sessions, versus single session interventions, have shown behavior

change (Kiene & Barta, 2006; Lightfoot et al., 2007; Roberto et al., 2007a). More work is needed to develop interventions that balance ease of access and sufficient dosage with likelihood of intervention completion. Additional research with appropriate control groups and sufficient follow-up periods also is required to establish the degree of effectiveness of these innovative interventions.

Source: Noar et al., 2011

Tailored Information Program for Safer Sex (TIPSS) is a computer-based intervention targeting sexually active, heterosexual, African Americans ages 18–29 years. The intervention consists of one, individually tailored session that seeks to increase consistent and correct condom use (Noar et al., 2011). As a computer-based intervention, TIPSS does not require

a human counselor or facilitator to deliver the intervention. The program is currently being tested through a randomized controlled trial at a large, publicly-funded STD clinic. If TIPPS is found to be efficacious, it will offer an innovative, low cost prevention tool for HIV prevention practitioners (Noar et al., 2011) and has the potential to be delivered wherever there is computer access.

For a discussion about the ethics and considerations of conducting research on social networking sites, see:

Case Study: An Ethics Case Study of HIV Prevention Research on Facebook: The Just/Us Study" by Sheana Bull et al, 2011, Journal of Pediatric Psychology. http://jpepsy.oxfordjournals.org/content/early/2011/02/02/jpepsy.jsq126.full.pdf+html

Source: http://www.sextextsf.org/

F. Examples of Mobile Efforts

i. Mobile efforts to reach teens.

In response to rising rates of chlamydia and gonorrhea among San Francisco's African-American youth, Internet Sexuality Information Services, Inc. (ISIS), in collaboration with the San Francisco Department of Health, STD Prevention and Control Branch, developed SEXINFO, a text messaging service for young people in San Francisco which provides mobile access information on STDs, HIV, birth control, and other sexual health services. The program works entirely through cell phone text messages. Users must opt-in to the program by sending the word "SEXINFO" to a five digit number. Users then receive a text message back containing various codes. Each code provides different information. For example, a user will be prompted to text back the code B2 if they think they are pregnant. An evaluation of the project found consistent positive associations between campaign awareness and demographics/risk factors of the target populations, specifically among African-American youth, youth living in target neighborhoods, youth ages 12–18, those without a college education, and those with the least expensive cell phone provider (Levine, McCright, Dobkin, Woodruff, & Klausner, 2008).

Push technology: Push technology is a style of communication where content is pushed out to a user. Often (and ideally) the content is based on user preferences expressed in advance. Push technology. (2011, April 4). In *Wikipedia, The Free Encyclopedia.* Retrieved 21:23, April 4, 2011, from http://en.wikipedia.org/w/index.php?title=Push_technology&oldid=422372771

Source: http://www.appcnc.org/projects-services/brdsnbz-text-message-warm-line

The BrdsNBz Text Message Warm Line (BrdsNBz) sponsored by the Adolescent Pregnancy Prevention Campaign of North Carolina offers a similar service. The text line was developed to provide 14–19-year-old North Carolina youth with a trusted source of medically accurate sexual health information in a medium that youth are comfortable using. Youth can text any sort of sexual health

question to 36263 and will receive a response from a staff member within 24 hours. The program was developed in response to the high pregnancy and STI rates in this population. Early evaluations of the resource have found that adolescents trust BrdsNBz and are more likely to follow-up on an answer from BrdsNBz than from other available resources (Phillips, 2010).

Pull technology: Pull technology is a style of communication where a user requests content and the information is sent to the user. Pull technology. (2011, February 6). In *Wikipedia, The Free Encyclopedia.* Retrieved 21:28, April 4, 2011, from http://en.wikipedia.org/w/index.php?title=Pull_technology&oldid=412323683

ii. Mobile efforts for clinical services.
Mobile devices can also be used for sexual health provision and services. Research has already shown that mobile phones can improve health clinic efficiency via appointment and test result reminders and improve time to treatment (Wei et al., 2011), and aid in diagnosis (Newell, 2005). For example, Menon-Johansson et al. (2006) reported that their texting program resulted in improved time to patient diagnosis and treatment of

chlamydia (the mean number of days to diagnosis was significantly shorter in the text message group then was the median time to treatment—8.5 days versus 15 days) and saved 46 hours of staff time. Another case study reported on a patient who used the video and camera features on his cell phone to take pictures of lesions on his penis, which aided the physician in diagnosing the patient with genital herpes (Newell, 2005).

Mobile phones have been adopted for medication and vaccine adherence and to facilitate partner notification and diagnosis. A randomized control trial (RCT) in Kenya found that those patients receiving text messages from study nurses had a significantly improved medication adherence and viral load suppression than those without SMS reminders (Lester et al., 2010). And a clinical case reported on a patient presenting for STD testing and treatment as a result of a text from a recent sex partner (Newell, 2001).

Other health fields have been using mobile technology for health promotion and disease prevention which could have applications or implications for STD/HIV prevention.

For example, text messaging could be used for behavior change, to collect clinical and behavioral data, and for providing psychological support (Wei et al., 2011).

G. Examples of Games Targeting Sexual Health

As early as 1989, public health professionals recognized the value of computer games for sexual health. Changes in technology and the increasing sophistication of gaming systems have made it possible to create highly engaging and interactive games that are more accessible than ever. However, creating a computerized game can be time consuming and cost intensive, and as a result, few successful sexual health games have been developed to date.

Source: L. Snyder, 2011

NightLife is a recently developed, safer sex video game which targets African-American men ages 18–26 years old and seeks to promote condom use, HIV and STI testing, and risk reduction through oral sex and mutual masturbation. The game was developed over three years and recently underwent RCT to assess the impact of the intervention. Although the data from the RCT are currently being analyzed, preliminary data analysis found user acceptance of the game, an increase in behavioral intentions to get tested for STDs/HIV in the next three months, and an increase in STD knowledge and risk reduction (L. Snyder, personal communication, April 7, 2011).

Source: http://www.thatsnotcool.com

H. Examples of Websites that Address Technological Risks

That's Not Cool (www.thatsnotcool.com) is a national, public education campaign developed by Futures Without Violence (formerly the Family Violence Prevention Fund), in partnership with the Advertising Council and the Department of Justice's Office on Violence Against Women. The campaign seeks to prevent teen dating abuse and discourage and prevent risky technological/digital behavior among adolescents. The campaign focuses on a website where young people can learn about teen dating abuse and find tools to help them respond to unwanted digital contact or harassment. The site also offers a message board for teens to voice their experiences with harassment/bullying, interact with others, receive

advice, and watch videos that role-play and model how best to handle some of these uncomfortable situations. Additional resources on what constitutes abuse and where to get help are provided also.

I. Summary

The examples in this section provide just a snapshot of how technology and new media are currently being used to engage youth and reduce sexual health risks. There are many more examples than have been covered here that further illustrate the potential of and the creative ways in which technology can be used to reach youth and improve their health and well-being.

VI. Conclusion

In today's technology-laden world, health information is readily available. As a result, more people turn to technology for information, and support for their health needs. Adolescents, in particular, rely on their cell phones and the internet for their social lives and school-related activities, as well as for health information, and thus, it is important to provide access to sexual health information and programs through new media. Incorporating

technology and new media into prevention efforts can improve access to adolescents and provide innovative ways to improve adolescent health. Although the various technologies and communication platforms noted in this document are popular and in wide use today, platforms and patterns of use will undoubtedly change. It is important to consider current trends when developing or adapting programs to determine their relevancy and appropriateness for reaching your target audiences. As such, periodic assessment of what is popular among your target audience and how they are using new technologies is strongly recommended.

We hope that this document will be used as a guide to better understand how adolescents use technology and social media and will serve as a resource for innovative programs and interventions to improve the overall and sexual health of adolescents.

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