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between the ages of 15 and 24 years. In the United States, national statistics estimate that almost 40% of new HIV cases occur in youth ages 13–29 (Centers for Disease Control and Prevention, 2011). Therefore, a focus on preventing HIV/AIDS among adolescents and young adults is warranted. There has been success in developing efficacious interventions for adolescents that reduce HIV sexual risk behaviors; however, the HIV incidence rates among adolescents remain alarming. This article identifies four areas of intervention development that remain underdeveloped and may guide the next generation of HIV prevention interventions. Family-based interventions, addressing health disparities and understanding the social determinants of health for adolescents, expanding the theoretical models that are relied on in developing interventions, and utilization of new technologies each have promise for successfully assisting adolescents to reduce their risk behaviors and enhance protective factors.

Keywords: adolescents, HIV, interventions

The HIV/AIDS epidemic continues to be one of our most urgent public health issues, with the number of people living in the United States with HIV at its highest since 1981, when the epidemic began to be recognized. The Centers for Disease Control and Prevention (CDC) estimate 1.1 million people in the United States have been diagnosed with AIDS and 1.2 million people are thought to be living with HIV, the virus that causes AIDS. Adolescents and young adults continue to be disproportionately affected with HIV. The World Health Organization estimates that 50% of the 30 million HIV infections worldwide occurred in young people between the ages of 15 to 24 years. National statistics estimate that almost 40% of new HIV cases occur in youth ages 13–29 (CDC, 2011). Therefore, a focus on preventing HIV/AIDS among adolescents and young adults is warranted.

HIV prevention interventions have been implemented with adolescents in a number of settings, including school, community, and health care settings. A recent meta-analysis examining the efficacy of behavioral interventions from 1985 to 2008 to reduce HIV risk among adolescents identified 98 interventions in 67 studies and found that overall, comprehensive behavioral interventions are successful at reducing

HIV Prevention for Adolescents: Where Do We Go From Here?

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The World Health Organization estimates that 50% of the 30 million HIV infections worldwide occurred in young people

Editor's Note. Marguerita Lightfoot received the Award for Distinguished Early Career Contributions to Psychology in the Public Interest. Award winners are invited to deliver an award address at the APA's annual convention. This article is based on the award address presented at the 120th annual meeting, held August 2–5, 2012, in Orlando, Florida. Articles based on award addresses are reviewed, but they differ from unsolicited articles in that they are expressions of the winners' reflections on their work and their views of the field.

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risky sexual behavior (B. T. Johnson, Scott-Sheldon, Huedo-Medina, & Carey, 2011). There has been success in developing efficacious interventions for adolescents; however, given the alarming incidence of HIV and other sexually transmitted infections (STIs) in adolescents, developing interventions for adolescents must remain a priority. This article identifies four areas of intervention development that remain underdeveloped and may guide the next generation of HIV prevention interventions. I discuss the potential of family-based interventions, social determinants and health disparities, new theoretical models, and new technologies to inform and move the field forward in addressing the HIV epidemic in adolescents.

Family-Based Interventions

Adolescents do best when their relationship with their parents is positive (Dittus & Jaccard, 2000) and communication is open (Akers, Holland, & Bost, 2011). Parents who engage in what are viewed as good parenting practices, such as continuing to monitor their adolescents and establishing family routines and rituals, are more likely to have adolescents with healthier developmental outcomes (e.g., engage in more prosocial behaviors and fewer behavioral problems; Grusec, 2011). These parenting practices, however, are often the most difficult to continue when children become adolescents because parent-child relationships can be more conflictual, less warm, and less cohesive during adolescence, especially early adolescence (Smetana, Campione-Barr, & Metzger, 2006). Families clearly need support during this transitional period when adolescents are also maturing sexually and may engage in unsafe behaviors that put them at increased risk for HIV infection (Sandler, Schoenfelder, Wolchik, & MacKinnon, 2011). Developmental and other research suggests the need for and importance of family-based interventions for adolescents who are at risk for HIV (T. K. Taylor & Biglan, 1998).

Unfortunately, there are relatively few HIV interventions that target families. The CDC is charged with disseminating efficacious interventions through their Diffusion of Effective Behavioral Interventions (DEBI) and Replication Effective Programs initiatives. Unfortunately, only eight of the current 28 DEBI programs being disseminated focus on youth and only one program includes parents (Wu et al., 2003). Furthermore, most HIV interventions for adolescents that involve parents focus on teaching parents how to communicate with their adolescents about sexual topics and substance use (Coyle et al., 1999; Crawford et al., 1990; DiIorio, McCarty, Resnicow, Lehr, & Denzmore, 2007; DiIorio et al., 2006; Forehand et al., 2007; Guilamo-Ramos et al., 2011; Huston, Martin, & Foulds, 1990; B. C. Miller et al., 1993; O'Donnell, Myint-U, Duran, & Stueve, 2010; Schuster et al., 2008). These interventions have been efficacious in increasing knowledge about safe sex practices and intentions to communicate about sex but have not been as successful in demonstrating positive adolescent behavioral outcomes, such as

increased condom use. The lack of behavioral outcomes may partially be due to the interventions targeting parents when their children are early adolescents, before risk behaviors are initiated. However, the lack of involvement of adolescents in the interventions may also account for the lack of behavioral outcomes.

These interventions treat parents and adolescents separately and not as a family unit. More accurately, many of these interventions are really parent-based (or parenting) interventions. Very few interventions are family-based interventions, bringing parents and adolescents together in at least one session (Baptiste et al., 2009; Brody, Kogan, Chen, & McBride Murry, 2008; Milburn et al., 2012; Pantin et al., 2003). Consequently, the current literature and arsenal of efficacious interventions are limited, without bringing parents and adolescents together to build the skills necessary for reducing the risk behaviors of children, missing an important opportunity to leverage the important and influential parent-adolescent relationship. Having parents communicate information and their values about sex to their adolescents is valuable and necessary. However, behavioral change is more likely to occur if the family, in a safe and supportive environment, is able to discuss the contexts in which sexual risks occur, as well as practice together the negotiation, communication, and condom skills necessary to enact safer sex behaviors. Likewise, helping parents to understand that parental monitoring remains important for adolescents; however, the family is likely to be more successful in enacting a monitoring plan if the parent and adolescent are brought together to negotiate and mutually agree on issues such as curfew and household rules.

Consequently, there remains a significant need to develop truly family-based HIV interventions. The literature provides direction about what topics or constructs these interventions should address: parent education, fostering positive relationships, strengthening communication skills, and parental monitoring. Parents are the primary and preferred providers of sexual information (Martinez, Abma, Copen, & National Center for Health Statistics, 2010), and having parents provide accurate and up-to-date information to their children is crucial.

Although a family-based approach is suggested, there remains the need for parents to spend some time without their adolescents to learn about developmental growth and reproductive health, as well as to recognize their own attitudes and clarify their own values. Providing parents with accurate information is particularly important as prior research has found that parents, even when they provide information to their adolescents, often have inaccurate or incomplete knowledge about contraception and other sexual health topics (M. E. Eisenberg, Bearinger, Sieving, Swain, & Resnick, 2004). Parents also require accurate information regarding adolescent development to help place their adolescents' behavior into a healthy context. Parents' attitudes towards ad-

olescent sexual activity influence their adolescents' behavior and must be addressed in any parent education. Prior research has found that adolescents who perceive their parents as permissive about adolescent sexual activity are more likely to engage in sexual risk behaviors. Conversely, parental disapproval of adolescent sexual activity is associated with lower sexual risk behaviors (M. F. Cox, 2007; Dittus & Jaccard, 2000; K. S. Miller, Kotchick, Dorsey, Forehand, & Ham, 1998; Parkes, Henderson, Wight, & Nixon, 2011). Adolescents are least likely to engage in sexual risk behaviors when parents are clear about their attitudes and expectations and discuss them with their adolescents (Rotheram-Borus, Stein, & Lester, 2006).

A warm, nurturing, supportive relationship between parent and adolescent has been associated with delayed sexual initiation, increased condom and contraceptive use, and lower pregnancy rates (M. F. Cox, 2007; Dittus & Jaccard, 2000; Donenberg, Paikoff, & Pequegnat, 2006; Jaccard & Dittus, 2000; K. S. Miller et al., 1998; Parkes et al., 2011). Therefore, a family-based approach would include building a supportive parent-adolescent relationship. In general, families that report a warm bond and whose members feel close to each other are less likely to have adolescents with negative developmental outcomes (Braverman, 1999; M. J. Cox, Brooks-Gunn, & Research Consortium on Family Risk and Resilience Summer Institute, 1999). Furthermore, the amount of conflict in and satisfaction with the parent-adolescent relationship is associated with engagement in sexual behaviors (Dittus & Jaccard, 2000; McBride, Paikoff, & Holmbeck, 2003). A supportive relationship allows parents to set and enforce rules with their adolescents, which is also important in maintaining positive adolescent behaviors (Parkes et al., 2011). Having a positive parent-adolescent relationship creates the foundation for communicating, conveying, reinforcing, and internalizing parental values and providing parental support.

Another construct known to be protective for adolescents is increasing the quantity and quality of communication between parents and their adolescents. Prior studies have found that when adolescents can recall a parent communicating with them about sex, they are more likely to report condom use and delay sexual initiation (Huebner & Howell, 2003; Hutchinson, Jemmott, Jemmott, Braverman, & Fong, 2003; Longmore, Manning, & Giordano, 2001; Meschke, Bartholomae, & Zentall, 2002). Parents must also learn that effective communication also includes listening to their adolescents, because when a parent dominates the conversation, the adolescent is less knowledgeable about sexual health (Lefkowitz, Kahlbaugh, Au, & Sigman, 1998; Whalen, Henker, Hollingshead, & Burgess, 1996). Therefore, family-based interventions should focus on (Akers et al., 2011) (a) frequency of communication, particularly about sex, reproductive health, and condoms; (b) communication skills, such as asking open-ended questions, active listening, providing verbal support,

and nonjudgmental responses; (c) content of the communication, by assisting parents and adolescents to determine and rehearse what they would like to convey; (d) increasing communication self-efficacy in order for the family to feel more confident, competent, and comfortable having discussions about sex and other HIV-related topics; and (e) increasing intentions to communicate.

Finally, parental monitoring has been found to be protective against adolescent risk behaviors, including inconsistent condom use, multiple sex partners, recent marijuana and alcohol use, and STIs (Baptiste, Tolou-Shams, Miller, McBride, & Paikoff, 2007; DiClemente et al., 2001; Li, Feigelman, & Stanton, 2000). Monitoring operates by minimizing opportunity and involvement of adolescents in risky situations and reduces unsupervised exposure to negative media content and peer influences (Brown et al., 2006; Huebner & Howell, 2003; Li, Feigelman, & Stanton, 2000; Li, Stanton, & Feigelman, 2000; Wight, Williamson, & Henderson, 2006).

Therefore, the future of HIV interventions for adolescents requires a focus on developing efficacious interventions for the family that bring both parents and adolescents together to address the areas discussed here. There are few adolescent-focused interventions and fewer family-based interventions that are efficacious in producing the behavioral outcomes to reduce HIV transmission. Clearly, more efforts are required in this area.

Social Determinants and Health Disparities

African American and Latino/a young people continue to be disproportionately represented despite numerous HIV prevention efforts that have targeted adolescent populations (Morris et al., 2006; Rangel, Gavin, Reed, Fowler, & Lee, 2006). For example, African Americans, who represent only 13% of the U.S. population, accounted for 55% of all HIV infections reported among young people ages 13–24 years (CDC, 2005), and the rate of HIV infection among Latino/a young people was 2.5 times that of European Americans (CDC, 2010). The increasing prevalence of HIV/AIDS among African American and Latino/a adolescents is in stark contrast to the declines in sexual risk behavior observed among adolescents in the United States during the past decade. An analysis of the Youth Risk Behavior Survey, a representative sample of adolescents in the United States, found from 1999 to 2001 a 16% decrease in the proportion of high school students reporting ever having sex and that the proportion reporting four or more partners decreased by 24% (CDC, 2002). Further, the last decade has seen a 27% decrease in adolescent pregnancies (Santelli et al., 2004; Ventura, Abma, Mosher, & Henshaw, 2004).

The principal assumption for the prevention of HIV infection and transmission among young people has focused on individual-level risk-taking behaviors. As such, the interven-

tions that derive from this assumption are framed from behavioral theories that rely upon individual-level factors such as motivation, self-efficacy, and behavioral skills (e.g., Bandura, 1977; Fishbein & Ajzen, 1975; Fisher & Fisher, 1992; Koniak-Griffin, Lesser, & Henneman, 2008; Koniak-Griffin et al., 2003; Prochaska & DiClemente, 1983). These interventions often address adolescents' perceptions of their ability to change their behavior (e.g., self-efficacy), their motivation for doing so, and the learning of specific skills for behavior change (e.g., how to ask a partner to use a condom, how to put on a condom, etc.).

However, research demonstrates that African American and Latino/a adolescents have developed these protective behavioral skills. A growing number of studies have examined racial/ethnic differences in HIV sexual risk behaviors and differences using individual-level factors. Those studies have found that individual factors do not explain the continued health disparity in STI rates, including HIV (Crosby, Holtgrave, Stall, Peterson, & Shouse, 2007; Ellen, Aral, & Madger, 1998; Hallfors, Iritani, Miller, & Bauer, 2007; Harawa et al., 2004; Harawa, Greenland, Cochran, Cunningham, & Visscher, 2003; Heckman, Kelly, Bogart, Kalichman, & Rompa, 1999; Ku et al., 2002; Peterson, Bakeman, & Stokes, 2001; Rhodes, Yee, & Hergenrather, 2006; Sifakis et al., 2007; Tanfer, Cubbins, & Billy, 1995; Torian, Makki, Menzies, Murrill, & Weisfuse, 2002). These studies indicate African Americans and Latino/as exhibit comparable or lower rates of individual-level HIV risk behaviors (e.g., similar levels of condom use) when compared to other ethnic/racial groups. For example, Hallfors and colleagues (2007) found that for European American young people, engaging in high-risk behaviors resulted in elevated HIV risk. However, for African American young people, even when they did not engage in high-risk behaviors, they were at elevated risk for HIV. Further, African American and Latino/a adolescents report higher rates of condom use than their European American counterparts (CDC, 2004, 2011). Thus, empirically, individual-level factors have been found to be inadequate for fully understanding the prevalence of HIV infection and transmission among African American and Latino/a adolescents. These findings underscore the need to expand beyond the examination of individual-level factors, which has dominated the discourse on HIV/AIDS risk and health disparities among adolescents.

While a focus on individual risk-taking behaviors has merit, this focus alone is insufficient for informing an approach to reducing the existing health disparity in the prevalence and transmission of HIV among African American and Latino/a adolescents. Social and structural factors deserve greater attention to more fully understand how to best intervene to ameliorate the health disparity in HIV. More specifically, additional research is required to examine how social and structural factors can be incorporated into the development of HIV behavioral interventions for African

American and Latino/a adolescents (Dean, Steele, Satcher, & Nakashima, 2005; Dowsett, 2003; Muñoz-Laboy, Weinstein, & Parker, 2007). Social and structural factors, such as economic, geographic, and cultural factors, can assist in understanding the broader context for sexual risk in African American and Latino/a adolescents. These factors can also direct efforts to intervene and reduce the health disparity in the prevalence of HIV infection and transmission among African American and Latino/a adolescents by promoting protective and healthy behaviors.

The conditions in which individuals are born, live, and develop are critical influences on health outcomes and are likely to be significantly affected by the distribution of power, money, and resources. Macroeconomic and social forces, including poverty, racism, sexism, and homophobia, have been found to underpin the HIV/AIDS epidemic (Adimora & Schoenbach, 2002, 2005; Lane et al., 2004). For example, data are emerging that suggest HIV prevalence is higher among people who are poor (Denning & DiNenno, 2010). The pathway between HIV infection and poverty may be mapped by decreased access to care and reduced treatment for HIV and other STIs (Aral, 1999). Further, when examining economic social and structural factors, one study found that income inequality and social capital were significantly correlated with AIDS case rates (Holtgrave & Crosby, 2003). In addition, stigma and internalized homophobia have also been associated with higher rates of unprotected sexual intercourse (Preston et al., 2004; Radcliffe et al., 2010; Ross, Rosser, & Neumaier, 2008). Stigma can also exist towards people living with HIV regardless of sexual orientation. Higher levels of this stigma were also associated with not being tested for HIV, inaccurately assessing one's risk for HIV, and not participating in HIV prevention programs (Darrow, Montanea, & Gladwin, 2009). Furthermore, the epidemiology of illicit drug use in the community, ratio of men to women, and racial segregation have been found to influence sexual behavior both directly and indirectly through various mechanisms, such as the destabilization of partnering patterns (e.g., more partners; Adimora & Schoenbach, 2005). Evidence for geographical factors is emerging as recent studies on social networks of African American young people indicate that low-risk women often may be exposed to STI infection through sexual linkage to a higher risk group (Fichtenberg et al., 2009).

While some of the emerging research in examining the social/structural factors in HIV prevention for African American and Latino/a adolescents is summarized here, important areas remain for further research. The change mechanisms, or how social and structural factors produce sexual behavior, have not been adequately examined empirically. In addition, while interventions that have incorporated social and structural factors, such as culture, have had mixed success in deterring high-risk sexual behaviors, there is little work on the process that enables these social and structural factors to

be effective (e.g., Belgrave, 2002; Jemmott, Jemmott, Braverman, & Fong, 2005). More formative qualitative work is needed to more fully understand how, for example, ethnicity/racial pride and *familismo* (e.g., family closeness, interconnection, loyalty, and solidarity) can be used in HIV programs and interventions to eliminate health disparities among African American and Latino/a adolescents.

New Theoretical Models

In a review of adolescent HIV preventive intervention trials, Pedlow and Carey (2003) found that only 57% of interventions were effective in reducing sexual risk behavior. Most of the included interventions (18 of 22) were theoretically and conceptually based on social cognitive theory (Bandura, 1986, 1994). The limited success of previous interventions suggests the need to expand our current models. Other theoretical models, such as the theory of gender and power and socioecological theory, have proven to significantly contribute to the success of HIV interventions. Psychologists can also contribute to the development of theory for adolescent health behavior change by further examining the influence of emotional regulatory processes on behavior and behavior change.

Most HIV preventive interventions for adolescents focus on social and cognitive risk factors and involve training in problem-solving, social, and condom-use skills (Pedlow & Carey, 2003). However, the underlying systems for global behavior modification may remain unaffected, as potentially evident by the limited success of these interventions. These models assume a rational and thoughtful response to relationships and sex. However, we expect this response from adolescents during a developmental period where such a response is difficult to generate. Most successful interventions try to modify self-regulation through skill acquisition; however, one of the underlying systems for influencing behavior that is often underutilized is the emotional regulatory process. Poor emotion-regulation skills are involved in most forms of childhood psychopathology (N. Eisenberg et al., 2000; Southam-Gerow & Kendall, 2002), low academic achievement (Greenberg, Kusche, Cook, & Quamma, 1995), psychosocial maladjustment (Casey, 1996; Silk, Steinberg, & Morris, 2003), and poor physical health (Salovey, Rothman, Detwiler, & Steward, 2000). Further, emotional regulation is related to a number of adolescent health risk behaviors, such as suicide behavior (Esposito, Spirito, Boergers, & Donaldson, 2003; Fritsch, Donaldson, Spirito, & Plummer, 2000; Nixon, Cloutier, & Aggarwal, 2002), substance use (Husong, 2003; Mezzich et al., 1997; Wills, Sandy, & Yaeger, 2002), and aggressive behavior (Zeman, Shipman, & Suveg, 2002). Consequently, new models and interventions that complement social cognitive theory and address these underlying emotional systems in adolescents may prove successful in reducing HIV-related behaviors.

The literature has underscored the adaptive contribution, both biological and psychological, of emotion to engaging in behavior that is competent and strategic (e.g., Halberstadt, Denham, & Dunsmore, 2001; N. Eisenberg, 2001; Saarni, 1999; Zeman, Cassano, Perry-Parrish, & Stegall, 2006). Because of the systemic connection between cognition, affect, and behavior, adolescents who are better at managing their feelings are better able to manage their behavior (Dwivedi & Gupta, 2000). Thus, externalizing behaviors are a function of an adolescent's emotional regulation skills. Externalizing or out-of-control behaviors emerge when affect is undercontrolled (Valiente et al., 2003). That is, "when affect is experienced as overwhelming, individuals often turn to alcohol or drugs to subdue that affect, or they find themselves engaging in aggression and violence" (Keiley & Seery, 2001, p. 362) or other unhealthy behaviors, such as cigarette smoking (Novak & Clayton, 2001; Stice & Shaw, 2003) and risky sexual behavior (Mezzich et al., 1997). Consequently, future interventions may find success reducing HIV-related risk behaviors by developing an adolescent's skills in emotional awareness (recognizing and identifying internal emotional experience and intense affect), building strategies for tolerating intense affect, and interrupting cycles of maladaptive expressions of affect. By learning more adaptive ways to control or tolerate and express intense affect, adolescents will reduce their negative expression of affect, specifically reduce unhealthy behaviors.

Adolescents must learn to manage their emotionally motivated behavior to promote adaptive functioning and to self-regulate to allow them to negotiate with others in highly charged situations (Shipman, Zeman, & Stegall, 2001). Interventions aimed at increasing emotional self-regulation skills have been successful for adolescents. For example, conduct disorder is an adolescent disorder in which adolescents exhibit a number of antisocial behaviors, such as excessive noncompliance, violence, cruelty, and sexually coercive behavior (Searight, Rottnek, & Abby, 2001). Focusing on an affect regulation framework has proven successful in treating this population (e.g., S. M. Johnson & Greenberg, 1995; Keiley, 2002). Liddle and colleagues have successfully used affect regulation in treating substance-abusing adolescents (Liddle et al., 2001; Liddle, Rowe, Dakof, & Lyke, 1998). Dwivedi and Gupta (2000) asserted that deficits in emotional regulation may underlie a number of adolescent problems, such as disaffection, exclusion, offending, violence, bullying, and substance abuse. They successfully implemented an intervention to increase the emotional regulation skills of adolescent boys who exhibited anger-driven behavior. Therefore, there is much that can be learned from expanding our current intervention targets of cognitions and skills to other behavior-related systems that are particularly important for adolescents. This example of emotional regulatory processes is but one example of how the field of HIV prevention can expand and extend.

Use of Technology

Advances in technology and its increasing availability provide a potentially rich learning and therapeutic aid for adolescents (Dede, 1986; Skinner, Biscope, Poland, & Goldberg, 2003; Smith, Gertz, Alvarez, & Lurie, 2000). Adolescent use of technologies, including computers and the Internet, social networking platforms, and cell phones, are near ubiquitous and provide a unique opportunity for HIV prevention. For adolescents in general and those who respond poorly to didactic instruction or experience difficulty in engaging or gaining insight in the therapeutic process in particular, technology may be a viable way to deliver prevention information and promote skill development. Technology has the potential for enhancing intrinsic motivation, providing individualized feedback, and encouraging active engagement, thereby offering certain advantages over traditional therapeutic strategies. Further, in the settings which youth are most likely to be exposed to psychosocial interventions, schools and youth programs, information is most commonly communicated by means of printed materials (e.g., books) and pamphlets. These materials are inexpensive and informative, but they lack intrinsic appeal and encourage passive learning. Students often read these materials with a minimum of effort, involvement, and retention. Technology-based programs may enhance the attractiveness of such information and the potential for engaging adolescents in preventive behaviors.

Computer-assisted instruction has been used therapeutically with phobic patients (Bornas, Tortella-Feliu, Llabres, & Fullana, 2001; Marks et al., 2003; Newman, Consoli, & Taylor, 1997), depressed patients (Christensen, Griffiths, & Korten, 2002; Marks et al., 2003; Osgood-Hynes et al., 1998; Selmi, Klein, Griest, Sorrel, & Erdman, 1990), overweight patients (Rothert et al., 2006; Turnin et al., 2001; Williamson et al., 2005), persons with obsessive-compulsive disorder (Greist et al., 2002), and patients with eating disorders (Andrewes et al., 1996; Bara-Carril et al., 2004; C. B. Taylor, Winzelberg, & Celio, 2001) and has increased patient's behavior management of diabetes (Glasgow, Toobert, Hampson, & Noell, 1995; King et al., 2006) and reduced adolescent substance use and violence (Schinke, Di Noia, & Glassman, 2004). As a result of these successes, technology-based interventions have been widely advocated in the fields of health education and prevention (Casazza & Cicazzo, 2006; Goodman & Blake, 2005; Sampson & Kruboltz, 1991), yet there are few successful models for HIV prevention and even fewer instances of evidenced-based programs being used in practice (Noar, 2011). While there is empirical support for technology-based HIV prevention, much work is still to be done.

The relevance of using technology with adolescents is further supported and particularly important given adolescent's widespread use of the Internet, social networking, and mobile technology. Among adolescents ages 12–17 years, 93% are going online, and 63% are going online everyday

(Lenhart, Purcell, Smith, & Zickuhr, 2010). The numbers are similar across racial/ethnic and socioeconomic groups. Further, the Internet is becoming a primary resource for health information, with 31% of online adolescents getting health, dieting, or physical fitness information from the Internet (Lenhart et al., 2010). Seventeen percent of adolescents report going online to gather information about health topics that are hard to discuss with others, such as drug use.

Similarly, the use of socially interactive technologies (e.g., social networking sites, text messages) is common among adolescents. Social networking happens across a number of platforms and includes sites such as Facebook, YouTube, and Twitter; gaming and virtual worlds, such as Second Life, the Sims, and World of Warcraft; video and photograph sites such as YouTube, Pinterest, and Instagram; and blogs. Engaging with these technologies is a routine activity for adolescents, with 82% of 14- to 17-year-olds using social networking sites, up from 55% in 2006 (Lenhart, 2010). These sites are a portal for adolescents' entertainment, communication, and connection. Given the recent launch of social networking, the literature is emerging for social networking as a promising prevention tool. A recent study that used Facebook to deliver an HIV prevention intervention found small to moderate, short-term impact on condom use and protected sex acts (Bull, Levine, & Santelli, 2011).

Mobile technology is another medium with incredible potential as a tool for HIV prevention. Upwards of 82% of 12- to 19-year-olds in the United States own a cell phone, and use increases with age (Lenhart, 2009). The use of mobile phones has become a centerpiece of adolescent communication, with short message service, more commonly known as text messaging, becoming a preferred mode of contact with peers. In the United States, 89% of adolescents use text messages, and the monthly average number of text messages sent and received is 2,899 (Neilson Wire, 2009). Over half of adolescents (54%) text-message daily, and two thirds of adolescent texters say they are more likely to text friends than to talk to them via a cell phone (Lenhart, 2010). Furthermore, frequency of text-message use has overtaken the frequency of other common forms of interaction with their friends, such as talking on a cell phone or landline, talking face to face, using social networking sites (e.g., Facebook), instant messaging, or e-mail (Lenhart, 2010). These findings are consistent across all racial/ethnic groups. Text messages have distinct advantages: (a) Messages are accessible at any time and virtually anywhere, (b) text messages are an almost instantaneous and interactive medium, (c) they are easy to use, and (d) they are inexpensive (Fjeldsoe, Marshall, & Miller, 2009). Cell phones are increasingly used to promote sexual health (Fjeldsoe et al., 2009; Leach-Lemens, 2009; Lim, Hocking, Hellard, & Aitken, 2008), and promising findings have been found for smoking cessation (Obermayer, Riley, Asif, & Jersino, 2004), diabetes (Franklin, Waller, Pagliari, & Greene, 2006), and adult weight-loss programs (Hurling,

Catt, & Boni, 2007). While the capabilities of mobile technologies vary, the broad availability and utilization of text messaging, particularly among adolescents, hold strong potential as a vehicle for diffusing health messages.

Conclusion

Psychologists have been instrumental in developing HIV prevention interventions that have proven successful at reducing the sexual risk behaviors of adolescents. To date, most efficacious interventions have targeted adolescents and sometimes their parents to increase the cognitive, social, and behavioral skills that have resulted in increasing condom use, reducing or delaying sexual intercourse, safer sex negotiation skills, and acquiring condoms over time. While these successes are to be commended, the HIV and STI incidence for adolescents remains alarming. Thus, it is imperative that work to develop prevention interventions for adolescents continue. However, given the field's limited success in changing the course of the HIV epidemic among adolescents, consideration should be given to other models and modalities for delivering preventive interventions to adolescents. A review of the empirical literature and recent data on trends in adolescent culture has suggested four new directions that intervention development can expand. Family-based interventions, addressing health disparities and understanding the social determinants of health for adolescents, expanding the theoretical models that are relied on in developing interventions, and utilization of new technologies each have promise for successfully assisting adolescents to reduce their risk behaviors and enhance protective factors.

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