



CHAPTER FIFTEEN

THE LIMITS OF BEHAVIORAL INTERVENTIONS FOR HIV PREVENTION

Dan Wohlfeiler, Jonathan M. Ellen

For the past twenty-five years, prevention of HIV has relied heavily on behavioral interventions aimed at reducing individual risk behaviors, including unprotected sex and sharing contaminated needles, which have been found to lead to infection. Whereas numerous studies have been conducted that demonstrate the effectiveness of behavioral interventions in increasing knowledge, changing attitudes, and reducing risky behaviors, fewer studies have demonstrated the impact of behavioral interventions on reducing HIV infections. This is significant since reducing infections is ultimately the goal of primary prevention efforts.

Behavioral interventions are a necessary but insufficient component of HIV prevention. This is due to their moderate success in reducing risky behaviors, their lesser success at decreasing infections, and sadly, their lack of demonstrated effectiveness at altering the course of HIV epidemics. Structural factors, such as economic and racial disparities, fuel the HIV epidemic. Often they act by affecting sexual networks—the web of sexual partnerships.

In this chapter, we argue that reducing HIV infections requires more than relying on individual behavior change. We suggest two new directions for HIV prevention practitioners to take. The first is to take cues from other fields of public health, most notably injury prevention and tobacco control, which have used policy as an integral part of the strategy to achieve desired outcomes. These fields, with more years of experience than HIV's quarter-century, have achieved greater

success at developing economic, policy, environmental, and technological strategies that allow their prevention efforts to be more self-sustaining and less reliant on a constant infusion of public health resources, whether these are staff or financial support. This requires public health professionals to be facilitators of change in addition to service providers. Second, as part of a strategy that relies more heavily on structural interventions and policies, we suggest developing interventions that will directly affect the sexual networks that facilitate viral transmission.

Most of this chapter will rely on examples from the United States. This is not meant to diminish the importance of interventions in other countries. The relatively high level of resources available for behavioral interventions in the United States, the rich diversity of behavioral interventions, and the epidemiologic and sociopolitical context of the HIV epidemics in the United States make many aspects of the U.S. epidemic unique.

Epidemiology of HIV in the United States

By the end of 2004, more than 944,000 people had been diagnosed with AIDS in the United States, of whom 529,000 (56 percent) had died (Centers for Disease Control and Prevention [CDC], 2005a). Gay men and African Americans are the two communities most profoundly affected by HIV in the United States, which found fertile ground in these marginalized populations (Valleroy et al., 2000). However, the experiences of the gay and African American communities in confronting HIV are very different from each other.

Gay men and men who have sex with men (MSM) continue to make up the largest segment of infections (65 percent among adult males), even though the percentage of men who have sexual contact with other males is estimated at between 3 and 9 percent of the general population (Anderson & Stall, 2002; Laumann, Gagnon, Michael, & Michaels, 1994; Sell, Wells, & Wypij, 1995).

The AIDS epidemic, similar to other diseases and to other sexually transmitted diseases (STDs), is also increasingly marked by profound racial disparities. The CDC (2005a) reported that non-Hispanic African Americans, who represent 12.3 percent of the U.S. population, accounted for half of the HIV/AIDS cases diagnosed in 2004. Hispanics, who represent 19 percent of the adult population, account for 18 percent of the infections. Among adolescents diagnosed during 2003, 66 percent of those infected are African American; 21 percent are Hispanic. These disparities in infection rates cannot be explained by differences in risk behaviors. Numerous studies have concluded that individuals of different ethnicities report very similar rates of condom usage. Possible explanations and strategies to address these marked disparities will be addressed later in this chapter.

The HIV epidemic among the gay population is the only one in the world that is not correlated with poverty. The high STD and HIV rates among African Americans are often correlated with high levels of poverty, depletion of social capital, neighborhood disintegration, and community fragmentation (Fullilove, 1998; Fullilove, Green, & Fullilove, 2000). The gay community has fewer needs (for example, for improved jobs and housing) and fewer competing priorities (existence of high crime rates) that can affect a community's interest and ability to participate individually and collectively in HIV-specific interventions.

Roots of HIV Prevention

Shortly after the first cases were reported in the United States in 1981, HIV quickly spread through gay communities and through networks of injection drug users. By the mid-1980s, approximately one-half of the gay men in San Francisco and one-half of injection drug users in New York City were infected. Many of these people began developing illnesses rarely seen in young, otherwise healthy adults. By studying the characteristics of those who were first affected by these illnesses, epidemiologists were quickly able to determine that the disease was being transmitted sexually (Auerbach, Darrow, Jaffe, & Curran, 1984) and through injecting needles (CDC, 1982).

Many gay men quickly reduced their high-risk behavior. Most notably, they reduced the number of partners with whom they had unprotected sex (McCusick et al., 1985; Winkelstein et al., 1987). This was demonstrated both by numerous survey studies and through epidemiologic surveillance and modeling. In fact, the rates of infection plummeted almost as quickly as they had increased initially, largely as a result of the reduction in the number of partners.

A careful examination of the history of HIV/AIDS, particularly among gay men, reveals that profound behavior changes took place before any governmental support and funding became available. Early organizers used grassroots mobilizing and information distribution through the press, brochures, and posters to provide people at risk with the information they lacked about this new disease. For example, in San Francisco, reductions in risk behavior occurred as the gay community formed organizations and later engaged in more formal education efforts. Although many contemporary community-based interventions attempt to replicate the strategies used in these early community mobilizations, it is unlikely that they will ever have the impact or reach the scale of the early mobilizations, primarily because it is impossible to replicate the social context in which they occurred. In particular, it is unrealistic to hope to mobilize communities to the same extent as when HIV first took hold, when it had no known etiology or treatment.

Types of Behavioral Interventions and Their Success

Individual-Level Interventions

HIV testing to date has for the most part been accompanied by brief pretest and posttest counseling sessions that aim to inform an individual as to what the HIV test will and will not reveal, what strategies can reduce risk, and what sources of medical and social support are available in case of a positive result. This ambitious scope for brief sessions has long served as a mainstay of HIV prevention. Meta-analyses of multiple studies have demonstrated that the impact of counseling and testing is greatest for HIV-positive individuals, most of whom will take significant measures not to expose anyone else to the virus. The impact on HIV-negative individuals, however, is less pronounced (Weinhardt, Carey, Johnson, & Bickham, 1999).

Client-centered counseling offered by well-trained staff has been shown to help reduce STD transmission. A key study, Project Respect, demonstrated that client-centered counseling was more effective than either interactive counseling or didactic messages in reducing new STD infections (Kamb et al., 1998).

One of the most intensive and broad-based individual-level interventions, Project Explore, recruited more than four thousand high-risk gay and bisexual men to ten onetime counseling sessions. The intervention also included quarterly sessions aimed at maintaining the effect of the counseling sessions (Koblin, Chesney, & Coates, 2004). This is a level of intensity and scale that is much higher than the vast majority of HIV interventions are able to offer. Nevertheless, although the infection rate was lower in the intervention group than in the standard comparison group, the difference was not statistically significant.

Group-Level Interventions

Group workshops have long been used in public health to promote healthy behaviors and provide social support for them. AIDS prevention programs have relied on group-level interventions to reduce participants' risk in gay men and MSM of all ethnicities (Carballo-Dieiguez et al., 2005; Peterson et al., 1996; Valdiserri et al., 1989), women (Kelly et al., 1994), injection drug users (el-Bassel & Schilling, 1992), and adolescents (Jemmott, Jemmott, & Fong, 1992; Rotheram-Borus et al., 2003). These have been used to convey information, to promote norms favoring risk reduction, and to recruit volunteers for further educational efforts. Both professional and volunteer facilitators have led these sessions. Studies have demonstrated that group workshops have been effective at reducing both sexual and

drug-related risk behavior. Some group interventions convene only once; others may continue for weeks or months. Many of these interventions have recruited individuals who did not know each other previously and are unlikely to meet again except by chance after the intervention. Others recruit members of social networks, with the hope that the conversations and dynamics that emerge during the formal intervention will be more easily sustained afterward.

One example of a group-level intervention provided four group sessions lasting four hours each to sexually experienced African American girls aged fourteen to eighteen. Compared to a control group, participants reported more condom use and fewer new vaginal sex partners. The study also found small but promising declines in chlamydia infections and self-reported pregnancies (DiClemente et al., 2004).

Although many interventions have succeeded in reducing risk, there is less evidence of their effectiveness in reducing the incidence of HIV infections.

Community-Level Interventions

Community-level interventions often include both individual- and group-level interventions and aim to support the effectiveness of these interventions by supporting communitywide norms favoring risk reduction even among individuals who do not participate in the most intensive one-on-one and group-level interventions. These have relied heavily on diffusion models. Diffusion describes the processes whereby messages and norms are conveyed throughout a community. Rather than having to reach every individual, practitioners aim to reach a segment of the population, often popular opinion leaders who can then diffuse the message or norm throughout the rest of the community (Rogers, 1962). In some cases, these programs have been generated by the community itself (Wohlfeiler, 1997). Other programs, such as Mpowerment, have been launched by university researchers (Kegeles, Hays, & Coates, 1996). This project organized gay men, aged eighteen to twenty-nine, to conduct small group workshops, formal and informal outreach, and media and social events. Participants decreased rates of unprotected anal intercourse. No biological outcomes were measured, however.

Forces Promoting One-on-One Interventions

Multiple forces working together have pushed the field of HIV prevention to emphasize one-on-one interventions. As the importance of care and treatment increased, it became harder to mobilize volunteers for prevention. Pressures to be accountable to funders also resulted in the creation of programs that were easier to plan, implement, and measure. Finally, the need to constantly seek additional

funding has driven many organizations, both governmental and nongovernmental, to choosing interventions that did not conflict with economic or political interests (Wohlfeiler, 2002).

The Limits of Behavioral Interventions

Behavioral interventions often require substantial resources to decrease the odds of risk behavior by approximately 25 percent (Herbst et al., 2005), which is the level reached by the more successful interventions (Johnson et al., 2002). As the Institute of Medicine (IOM) observes, “A program that achieves statistically significant social and behavioral changes still may not avert large numbers of new infections” (2001, p. 26). For behavioral interventions to succeed in reducing infections across a population, they need to reach a broad sector of the population, be of sufficient intensity, and reach the right individuals. In addition, interventions need to occur in supportive social environments and contexts.

Some of the largest-scale interventions do, in fact, reach significant percentages of their populations. However, most of these interventions are relatively low-intensity, such as one-on-one outreach interventions. These may be as simple as handing out information and condoms or as in-depth as conducting risk assessments, recruiting to more in-depth interventions, and testing for STDs or HIV (or both). These interventions may reach individuals at highest risk, often referred to as the “core group.” Even if these individuals are reached, it is unlikely that a brief intervention will make an impact on their risk behavior, since many of these people have psychosocial needs that are not easily addressed by a workshop or counseling session or even ongoing counseling.

A further limitation of many interventions, particularly at the community level, is that they often offer the same “dose” of prevention regardless of the level of an individual’s risk. For example, outreach workers may be as likely to offer the same messages, condoms, and invitations to workshops to an individual who has occasional unprotected sex with one partner that they would offer to an individual who has a new unprotected partner every week.

One of the largest-scale community-level interventions carried out targeting the entire gay community, the STOP AIDS Project, has been very successful in recruiting large numbers of men. However, the numbers have decreased over the years. In the mid-1980s, STOP AIDS was able to mobilize three hundred volunteers and recruit some seven thousand men (approximately 15 percent of the gay community) annually to workshops. This was a period marked by widespread fear and large numbers of individuals getting sick, visibly deteriorating—and dying. By the early 1990s, when the infection rate had fallen—but still before new treatments

had become available—STOP AIDS was able to mobilize only half that many volunteers and recruit only twelve hundred men to workshops (Wohlfeiler, 2002).

As the lethality of the threat of HIV infection and its sequelae diminishes, thanks to more effective treatment, it becomes less likely that individuals will be motivated to take an active role in community-level interventions. Furthermore, behavioral interventions typically do not directly address the social contexts in which behavior occurs. Behavioral interventions typically recruit individuals to interventions, increase their knowledge, and in many cases, identify triggers to risk behavior, including situations where risk behavior is the most likely to occur. Such triggers may include going to a bar or socializing with peers who engage in high-risk behavior. Many of these contexts are difficult to alter, since they may require a change in social environments, including peer groups. In addition, individuals may have to overcome corporate practices that lead to environments that promote high-risk behaviors.

Corporate practices, including the products sold and promoted in particular neighborhoods, play an important role in shaping the context in which behavioral interventions occur. These practices often overwhelm and contradict behavioral interventions. For example, alcohol abuse and overconsumption are associated with STD acquisition (Cook & Clark, 2005), yet promotion of alcohol is a multi-million-dollar industry, and bars and other purveyors of alcohol are widespread. Considerable variation also exists in the commitment of the adult film industry (CDC, 2005b) and businesses that facilitate partners meeting one another (Internet companies, bathhouses and sex clubs, and large circuit parties) to support risk reduction (Wohlfeiler & Potterat, 2005).

Beyond legitimate questions regarding their effectiveness, behavioral interventions also have faced numerous obstacles related to infrastructure, political barriers, and network- and social-level contextual issues that further hamper their efficacy. Investment in public health and STD prevention has always been insufficient. According to the IOM (1997, p. 2), “Effective STD prevention efforts are hampered by biological characteristics of STDs, societal problems, unbalanced mass media messages, lack of awareness, fragmentation of STD-related services, inadequate training of health care professionals, inadequate health insurance coverage and access to services, and insufficient investment in STD prevention.” In HIV prevention, government agencies have relied heavily on community-based organizations, on the principle that these organizations may be more appropriate than the government itself to reach communities with culturally appropriate interventions, mobilize community support, and gain access to communities that may distrust government agencies. However, with few exceptions, most of these agencies pay prevention management and line staff low salaries. This in turn creates

high turnover rates among staff, which consequently creates a constant need to train new staff in both the theory and the skills necessary to design and implement effective interventions.

Political forces have also hampered scientifically based behavioral interventions. Support for abstinence-only education has increased, although these programs have been found to contain numerous inaccuracies and have little, if any, benefit in reducing incidence of STDs and HIV (Bruckner & Bearman, 2005). Meanwhile, prevention advocates spend considerable time and energy defending behavioral interventions from conservative forces, which means they have less time to spend on prevention efforts themselves.

New Treatments

Biomedical advances, in particular the discovery and widespread use of new treatments, far extend the lives of HIV-infected individuals. Many in the HIV prevention field have feared that “treatment optimism” has so substantially decreased the threat of HIV as to make prevention even more difficult. However, the relationship between optimism about treatment effectiveness and risk behavior is more complex and may not be unidirectional; risk behavior may both predict and be predicted by such treatment optimism (Huebner, 2005). Regardless of the individual perceptions of new treatment options, it is harder to mobilize community members around a “chronic,” if still ultimately fatal, disease.

New treatments reduce individuals’ infectiousness and, if widely used, can do so on a population level (Porco et al., 2004). HIV virulence (ease of infection) in a newly infected individual is high, and treatment can significantly decrease infectivity. In an effort to increase the number of individuals who know their HIV status and can then seek treatment, the CDC launched the Advancing HIV Prevention Initiative in 2003, which also aims to increase the integration of prevention and medical care (CDC, 2003).

Structural-Level Solutions to Preventing HIV

Structural interventions aim to modify the social, economic, and political structures and systems in which we live. These may affect legislation, media, health care, and the marketplace. They may include policy, technology, environmental, and economic interventions. Ideally, structural interventions should rely as little as possible on continued support from the public health sector’s scarce resources. Thus rather than solely relying on outreach workers to surf the Web to answer questions, public health may be better served by working with Internet providers

to provide links to factually correct information and resources. Many HIV behavioral practitioners are aware of the numerous contextual factors that contribute to HIV infection. However, similar to practitioners in other fields of public health, they often continue to pursue individual-level interventions (Millett, Peterson, Wolitski, & Stall, 2006; Wohlfeiler, 2002). As Trostle (2004) points out, behavioral interventions often accept the status quo of existing social dynamics and structures.

Structural interventions often take longer and may not yield immediately measurable benefits in the short term and perhaps not even in the generation in which they are implemented (Fenton & Imrie, 2005). However, given their effectiveness in other areas of public health, they represent a promising area for innovative efforts in HIV prevention.

Structural interventions have a longer history in areas of public health such as violence prevention, tobacco control, and regulation of alcohol consumption than in the prevention of HIV. While many structural interventions have yet to be evaluated in HIV prevention, some have proved effective.

Examples of Structural Interventions in HIV Prevention

Legalizing syringe exchange programs (SEPs), through which injection drug users (IDUs) may exchange used syringes for sterile ones, is one example of a structural intervention. A study of eighty-one cities around the world compared HIV infection rates among IDUs in cities that had SEPs with cities that did not have SEPs. HIV infection rates increased by 5.9 percent per year on average in the fifty-two cities without SEPs but decreased by 5.8 percent per year in the twenty-nine cities with SEPs. The study concluded that SEPs appear to lead to lower levels of HIV infection among IDUs (Hurley, Jolley, & Kaldor, 1997).

Preventing HIV Through Needle Exchange

The nation's first needle exchange program began as a form of civil disobedience in 1986. Incensed by a professor's comment that addicts should not be the focus of HIV prevention efforts because their behaviors could not be changed, Jon Parker, a public health student at Yale University and former heroin addict, began distributing and later exchanging needles and syringes on the streets of New Haven, Connecticut, and Boston, Massachusetts (Lane, 1993).

Parker's belief that addicts' behaviors could and must be changed was particularly relevant in New York City, where as early as 1983 as many as 50 percent of the city's two hundred thousand drug users were infected with HIV (Susman, 2001). New York City

(Continued)

was infamous for its “shooting galleries,” where large groups of people shared needles, meaning that preventing the spread of HIV was intrinsically linked to the behavior of a large population of intravenous drug users (Drucker, n.d.). New York City’s health department attempted to institute a needle exchange program as early as 1985, but the idea was met with immediate protest from law enforcement and from some prominent members of the African American community (Drucker, n.d.).

Many people believed that such a program would encourage drug use in the midst of a “war on drugs,” and others expressed concern about the location of needle exchange facilities. That is, even many of the people who agreed with the concept of needle exchange did and still do not want needle exchanges taking place in their own back yards. To address both concerns, the New York City Department of Health opened an experimental exchange program in 1988 (Lane, 1993).

Injection drug users were accepted into the program only if they agreed to enter treatment and could participate only until a treatment slot became available (Lane, 1993). Each received one syringe imprinted with a health department logo and a photo identification card that exempted them from a law prohibiting the possession of drug paraphernalia. They were allowed to exchange only one syringe on each visit. Because there were difficulties housing the exchange program, it was located in the health department headquarters, far from most clients’ neighborhoods and near the court house and police department (Lane, 1993).

These adaptations to earlier proposals won the support of the current mayor, Edward Koch, but not of his successor, David Dinkins, who in response to vocal community leaders closed the program in 1990, shortly after his election (Lane, 1993).

Subsequently, activists concerned about rising rates of HIV infection attempted to build community consensus for needle exchange programs. Their efforts were aided by Yale Professor Edward Kaplan’s evaluation of the exchange program, which concluded that it had succeeded in reducing HIV transmission and in linking needle exchange with drug treatment and housing. Prevention policy shifted toward needle exchange and won the cautious support of the Dinkins administration (Lane, 1993).

According to Dr. Don Des Jarlais of the Beth Israel Medical Center, before the initiation of the needle exchange program, about 4 to 5 percent of drug users were becoming infected each year (Susman, 2001). The rate was reduced to about 1 percent per year after the exchange program started (Des Jarlais et al., 2000). Though still controversial, needle exchange programs in several cities now receive local, state, and even federal funding (Lane, 1993) because of ample evidence that they are effective in preventing the spread of HIV among intravenous drug users and thus preventing the spread of HIV in the greater community (Satcher, 2000). According to Des Jarlais, “Large-scale syringe exchange and voluntary HIV counseling and testing programs appear to have ‘reversed’ the HIV epidemic among injecting drug users in New York City.” (p. 358).

Source: Prevention Institute.

Bathhouses and sex clubs have long been important institutions in the gay community, providing gay men and MSM an opportunity to meet sexual partners in a venue free from harassment. Considerable debates have taken place within the gay community and even within public health as to what role these institutions may play in facilitating HIV or STD transmission. Bathhouses and sex clubs also provide a good way to compare and contrast two approaches. Individual-level outreach happens in many bathhouses and sex clubs across the country. Structural changes have been attempted in some jurisdictions by instituting policies prohibiting unprotected sex and removing private rooms to enforce these policies. While there are no data to compare effects on infection rates, researchers at the University of California in San Francisco (UCSF) found that men who went to bathhouses and sex clubs in four cities—San Francisco, Chicago, Los Angeles, and New York—all had the same level of unprotected sex overall. But men in San Francisco, where owners have removed the private rooms and enforce rules regarding unprotected sex, reported having less of it in the clubs themselves (Woods et al., 2003). As will be discussed later, this may have important implications for transmission of STDs and HIV through a community's sexual networks. This is an example of how public health practitioners may gain more ground by modifying environments and policies rather than seeking to modify individuals' behavior.

In the Dominican Republic, researchers randomized brothels to two different arms of a study. In one arm, they encouraged voluntary strategies—group workshops and education—to promote condom usage. In another arm, they used those strategies as well as the threat of enforcement through legal strategies. Rather than relying exclusively on reports of changes in rates of condom use, they were able to document changes in the incidence of sexually transmitted infections. These researchers found that the two-pronged approach that used voluntary and policy strategies through mobilizing community and governmental will had a bigger impact than voluntary strategies alone (Kerrigan et al, 2006).

The Structure of Sexual Networks

Many behavioral interventions assume that an individual's risk is the result of his or her individual psychosocial factors. This is partially true. However, the risk to an individual is also determined by his or her sexual partners' levels of risk. Thus an individual's total risk is determined by the patterns and networks of sexual relationships among lower- and higher-risk individuals (Ellen, 2003; Klovdahl, Potterat, Woodhouse, Muth, & Muth, 1992; Morris, 1997; Morris & Kretzschmar, 1997). This has been documented in both young gay males and young African American females (Harawa et al., 2004). For example, young gay men who have

partners older than thirty are at even greater risk than those who report having multiple younger partners or inject drugs, simply by virtue of the fact that their older partners are more likely to be infected (Blower & Service, 1997).

There is even stronger evidence among heterosexual adolescents that individual sexual behaviors are not associated with HIV in the United States. Adolescents at greatest risk for HIV are young men who have sex with men, and young minority women who have sex with men (Wilson et al., 2001). Studies comparing HIV-infected adolescent women to uninfected young women from the same community and similar household structure found no differences in number of recent sex partners (Ellen, Aral, & Madger, 1998). In fact, consistent condom use was higher among HIV-infected girls. Studies of acquisition of other STDs also suggest that individual factors have a limited impact on infection among adolescent women. STDs such as chlamydia and gonorrhea show a similar racial and sex distribution as HIV. A national study of adolescents found that risk factors such as consistency of condom use and alcohol use with sex do not mitigate the risk correlated with ethnicity, age, or gender, which are in turn each associated with sexual norms and sexual networks (Ellen et al., 1998). Interventions that focus on individuals, therefore, are unlikely to alter substantially the relationship between high- and lower-risk individuals or the structure of risk-taking networks.

As we have already explained, racial disparities in infection rates cannot be explained by differences in risk behavior between different races alone. Differences do exist, however, in the patterns and network structure of relationships, with higher rates of mixing between high- and lower-risk individuals taking place among African Americans, for example, than among other ethnicities (Laumann & Youm, 1999). This may be related, in part, to both mixing patterns among ethnicities and a shortage of African American males relative to females, due to disproportionate involvement in the criminal justice system and higher rates of mortality (Thomas & Sampson, 2005). AIDS rates have been found to be correlated with incarceration rates (Johnson & Raphael, 2005). Behavioral interventions that attempt to change individual behaviors while ignoring these factors are unlikely to succeed in reducing such disparities. Differences in network structure have been hypothesized to account for racial differences in both heterosexuals and gay men and MSM (Millett et al., 2006).

Focusing a new generation of structural interventions on sexual networks may hold substantial promise. One area of structural interventions that is likely to be the most promising is to focus on sexual network-level interventions in terms of both feasibility and impact (Johnson & Raphael, 2005; Laumann & Youm, 1999; Millett et al., 2006; Thomas & Sampson, 2005). Network-level interventions may be more cost-effective for a variety of populations, including injection drug users

(Neaigus, 1998). The following five principles of sexual network-level interventions may help guide practitioners (Wohlfeiler, 2005).

1. *Consider altering sexual network structures.* Many interventions promote social norms and facilitate communication of risk reduction messages (see, for example, Kelly, 1992; Latkin, Sherman, & Knowlton, 2003; Valente & Saba, 2001) while leaving networks intact. However, given that network structure itself confers risk (Klovdahl et al., 1992; Potterat, Rothenberg, & Muth, 1999; Rothenberg et al., 1998), practitioners should consider altering network structures themselves to gain an epidemiologic advantage. For example, providing “safe sex only” Internet sites or commercial sex venues may help reduce contact between high- and low-risk individuals.

2. *Focus on institutions that either facilitate partner mixing or disrupt ecologies of communities.* Institutions that facilitate mixing between high- and low-risk individuals and that also link different networks together (De, Singh, Wong, Yacoub, & Jolly, 2004) are particularly important for HIV prevention efforts. These include bars, Internet sites, bathhouses, and circuit parties. While a number of behavioral interventions exist within these settings, these have not been evaluated and are likely to be subject to the same limitations as described earlier in this chapter.

As noted previously, the criminal justice system also has a profound impact on the natural ecology of the African American community. By removing such a high percentage of African American men from communities, they leave in their wake a lower number of men than women, which may significantly contribute to the higher rates of concurrency among African Americans (Adimora & Schoenbach, 2005). Concurrency, which is defined as having multiple sexual partners at one time (Morris, 1997), increases the likelihood of HIV infection because earlier sexual partners can be infected through later encounters with the same sexual partners (Wohlfeiler & Potterat, 2003). (Serial monogamy, in contrast, implies no risk for an individual who ends a relationship with a partner before that partner gets infected.) These patterns of concurrency facilitate HIV transmission more efficiently than monogamy or even serial monogamy. Thus programs that focus on prisoners' transition to outside communities, conjugal visits, and efforts to further diminish the impact of prisons on communities may be particularly important in reducing transmission.

3. *Fragment networks by pulling low- and high-risk individuals apart.* Networks connect high- and low-risk individuals. By fragmenting networks, the potential exists to reduce transmission throughout the entire community. Creating Web sites and venues that attract specific segments may help. The marketplace is already doing this to some extent; for example: separate Internet sites exist for high- and low-risk gay men (Wohlfeiler & Potterat, 2005). Furthermore, the creation of sites that

cater to HIV-positive individuals is an example of a “pulling” strategy that violates no individual rights, gives HIV-positive individuals an opportunity to meet partners without having to risk stigma from disclosing status, and may help reduce transmission to HIV-negative individuals.

4. *Help people make informed choices about their sexual partners.* The Internet may be making it easier for people to find sexual partners, but it also provides public health with a unique opportunity. Disclosing HIV status is often an awkward process, and HIV-positive individuals often risk rejection from prospective partners. On the Internet, profile screens enable individuals to reveal their HIV-status once without having to disclose to a prospective partner each and every time. Web site profiles may also help individuals with low and high risk be more explicit about expressing their risk preferences, even at a site where high- and low-risk individuals mix. Encouraging more Web sites to adopt such practices is likely to become increasingly effective as the Internet becomes a more important means for people to meet partners.

5. *Maintain basic human rights and freedom of choice.* Risk behavior is ultimately a matter of individual choice, regardless of how it affects other people in a community. All of us may choose to smoke in our own homes and eat foods that jeopardize our health. As other chapters in this book attest, public health has sought to protect these individual rights while reducing the likelihood of harm to others (by restricting smoking in public places) and increasing informed choices (through menu labeling). These same principles may help public health practitioners as they seek to complement their behavioral interventions with network- and other structural-level interventions as they apply to HIV prevention.

Conclusion

Behavioral interventions will continue to play a strong and necessary role in the prevention of HIV. As new generations become sexually active and consider drug use and other high-risk behaviors, it is imperative that they have access to scientifically accurate and correct medical information that encourage risk reduction.

However, practitioners must also realize the inherent limitations of behavioral interventions in their depth, breadth, sustainability, and effectiveness. HIV practitioners will need to balance behavioral interventions with biomedical interventions, as well as to understand the complex relationship among these types of interventions. Practitioners would do well to attempt to achieve a balance across the spectrum of interventions, including biomedical interventions that seek to reduce the virulence of HIV-infected individuals. Although many tools exist to help

practitioners understand the effectiveness of different interventions, few tools exist to help practitioners in allocating adequate resources to different interventions (Cohen, Wu, & Farley, 2004). There also remains a lack of understanding as to which of these interventions may have greater or lesser effectiveness in different populations or at different phases of the epidemic (Wasserheit & Aral, 1996).

Public health practitioners should look for new ways of reducing transmission that are cost-effective, promote truly informed choice, and maintain a respect for basic human rights. We contend that structural-level interventions, particularly those that affect the structure of sexual networks, hold particular promise for HIV prevention efforts.

References

- Adimora, A. A., & Schoenbach, V. J. (2005). Social context, sexual networks, and racial disparities in rates of sexually transmitted infections. *Journal of Infectious Diseases*, *191*(Suppl. 1), S115–S122.
- Anderson, J. E., & Stall, R. (2002). Increased reporting of male-to-male sexual activity in a national survey. *Sexually Transmitted Diseases*, *29*, 643–646.
- Auerbach, D. M., Darrow, W. W., Jaffe, H. W., & Curran, J. W. (1984). Cluster of cases of the acquired immune deficiency syndrome: Patients linked by sexual contact. *American Journal of Medicine*, *76*, 487–492.
- Blower, S., & Service, S. (1997). Calculating the odds of HIV infection due to sexual partner selection. *AIDS and Behavior*, *1*, 273–274.
- Bruckner, H., & Bearman, P. (2005). After the promise: The STD consequences of adolescent virginity pledges. *Journal of Adolescent Health*, *36*, 271–278.
- Carballo-Diequez, A., Dolezal C., Leu, C. S., Nieves, L., Diaz, F., Decena, C., et al. (2005). A randomized controlled trial to test an HIV-prevention intervention for Latino gay and bisexual men: Lessons learned. *AIDS Care*, *17*, 314–328.
- Centers for Disease Control. (1982). Pneumocystis pneumonia. *Morbidity and Mortality Weekly Report*, *30*, 250–252.
- Centers for Disease Control and Prevention. (2003). Advancing HIV prevention: New strategies for a changing epidemic, United States, 2003. *Morbidity and Mortality Weekly Report*, *52*, 329–332.
- Centers for Disease Control and Prevention. (2005a). *HIV/AIDS surveillance report, 2004*. Atlanta: U.S. Department of Health and Human Services.
- Centers for Disease Control and Prevention. (2005b). HIV transmission in the adult film industry—Los Angeles, California, 2004. *Morbidity and Mortality Weekly Report*, *54*, 923–926.
- Cohen, D. A., Wu, S. Y., & Farley, T. A. (2004). Comparing the cost-effectiveness of HIV prevention interventions. *Journal of Acquired Immune Deficiency Syndrome*, *37*, 1404–1414.
- Cook, R. L., & Clark, D. B. (2005). Is there an association between alcohol consumption and sexually transmitted diseases? A systematic review. *Sexually Transmitted Diseases*, *32*, 156–164.

- De, P., Singh, A. E., Wong, T., Yacoub, W., & Jolly, A. M. (2004). Sexual network analysis of a gonorrhoea outbreak. *Sexually Transmitted Infections*, *80*, 280–285.
- Des Jarlais, D. C., Marmor, M., Friedmann, P., Titus, S., Aviles, E., Deren, S., et al. (2000). HIV incidence among injection drug users in New York City, 1992–1997: Evidence for a declining epidemic. *American Journal of Public Health*, *3*, 352–359.
- DiClemente, R. J., Wingood, G. M., Harrington, K. F., Lang, D. L., Davies, S. L., Hook, E. W., III, et al. (2004). Efficacy of an HIV prevention intervention for African American adolescent girls: A randomized controlled trial. *Journal of the American Medical Association*, *292*, 171–179.
- Drucker, E. (n.d.). New York, through the eye of the needle: Notes from the drug wars. Retrieved July 25, 2006, from <http://www.drugtext.org/library/articles/89112.htm>
- el-Bassel, N., & Schilling, R. F. (1992). Fifteen-month follow-up of women methadone patients taught skills to reduce heterosexual HIV transmission. *Public Health Report*, *107*, 500–504.
- Ellen, J. M. (2003). The next generation of HIV prevention for adolescent females in the United States: Linking behavioral and epidemiologic sciences to reduce incidence of HIV. *Journal of Urban Health*, *80*(4 Suppl. 3), iii40–iii49.
- Ellen, J. M., Aral, S. O., & Madger, L. S. (1998). Do differences in sexual behaviors account for the racial/ethnic differences in adolescents' self-reported history of a sexually transmitted disease? *Sexually Transmitted Diseases*, *25*, 125–129.
- Fenton, K. A., & Imrie, J. (2005). Increasing rates of sexually transmitted diseases in homosexual men in western Europe and the United States: Why? *Infectious Disease Clinics of North America*, *19*, 311–331.
- Fullilove, R. E. (1998). Race and sexually transmitted diseases. *Sexually Transmitted Diseases*, *25*, 130–131.
- Fullilove, R. E., Green, L., & Fullilove, M. T. (2000). The Family-to-Family program: A structural intervention with implications for the prevention of HIV/AIDS and other community epidemics. *AIDS*, *14*(Suppl. 1), S63–S67.
- Harawa, N. T., Greenland, S., Bingham, T. A., Johnson, D. F., Cochran, S. D., Cunningham, W. E., et al. (2004). Associations of race/ethnicity with HIV prevalence and HIV-related behaviors among young men who have sex with men in 7 urban centers in the United States. *Journal of Acquired Immune Deficiency Syndrome*, *35*, 526–536.
- Herbst, J. H., Sherba, R. T., Crepaz, N., Deluca, J. B., Zohrabyan, L., Stall, R. D., et al. (2005). A meta-analytic review of HIV behavioral interventions for reducing sexual risk behavior of men who have sex with men. *Journal of Acquired Immune Deficiency Syndrome*, *39*, 228–241.
- Huebner, D. M. (2005). Is optimism really the enemy? New research on treatment optimism. *Focus*, *20*(7), 5–6.
- Hurley, S. E., Jolley, D. J., & Kaldor, J. M. (1997). Effectiveness of needle-exchange programmes for prevention of HIV infection. *Lancet*, *349*, 1797–1800.
- Institute of Medicine. (1997). *The hidden epidemic: Confronting sexually transmitted diseases*. Washington, DC: National Academies Press.
- Institute of Medicine. (2001). *No time to lose: Getting more from HIV prevention*. Washington, DC: National Academies Press.
- Jemmott, J. B., III, Jemmott, L. S., & Fong, G. T. (1992). Reductions in HIV risk-associated sexual behaviors among black male adolescents: Effects of an AIDS prevention intervention. *American Journal of Public Health*, *82*, 372–377.

- Johnson, R. C., & Raphael, S. (2005). *The effects of male incarceration dynamics on AIDS infection rates among African-American women and men*. Unpublished manuscript.
- Johnson, W. D., Hedges, L. V., Ramirez, G., Semaan, S., Norman, L. R., Sogolow, E., et al. (2002). HIV prevention research for men who have sex with men: A systematic review and meta-analysis. *Journal of Acquired Immune Deficiency Syndrome*, *30*(Suppl. 1), S118–S129.
- Kamb, M. L., Fishbein, M., Douglas, J. M., Jr., Rhodes, F., Rogers, J., Bolan, G., et al. (1998). Efficacy of risk-reduction counseling to prevent human immunodeficiency virus and sexually transmitted diseases: A randomized controlled trial. *Journal of the American Medical Association*, *280*, 1161–1167.
- Kegeles, S. M., Hays, R. B., & Coates, T. J. (1996). The Mpowerment Project: A community-level HIV prevention intervention for young gay men. *American Journal of Public Health*, *86*, 1129–1136.
- Kelly, J. A. (1992). HIV risk behavior reduction following intervention with key opinion leaders of population: An experimental analysis. *American Journal of Public Health*, *82*, 1483–1489.
- Kelly, J. A., Murphy, D. A., Washington, C. D., Wilson, T. S., Koob, J. J., Davis, D. R., et al. (1994). The effects of HIV/AIDS intervention groups for high-risk women in urban clinics. *American Journal of Public Health*, *84*, 1918–1922.
- Kerrigan, D., Moreno, L., Rosario, S., Gomez, B., Jerez, H., Barrington, C., et al. (2006). Environmental-structural interventions to reduce HIV/STI risk among female sex workers in the Dominican Republic. *American Journal of Public Health*, *96*, 120–125.
- Klovdahl, A. S., Potterat J. J., Woodhouse, D. E., Muth, J., & Muth, S. Q. (1992). HIV infection in an urban social network: A progress report. *Bulletin de Methodologie Sociologique*, *36*, 24–33.
- Koblin, B., Chesney, M., & Coates, T. J. (2004). Effects of a behavioural intervention to reduce acquisition of HIV infection among men who have sex with men: The EXPLORE randomised controlled study. *Lancet*, *364*, 41–50.
- Lane, S. D. (1993). *Needle exchange: A brief history*. Menlo Park, CA: Henry J. Kaiser Family Foundation. Retrieved July 25, 2006, from <http://www.aegis.com/law/journals/1993/HKFNE009.html>
- Latkin, C. A., Sherman, S., & Knowlton, A. (2003). HIV prevention among drug users: Outcome of a network-oriented peer outreach intervention. *Health Psychology*, *22*, 332–339.
- Laumann, E. O., Gagnon, J. H., Michael, R. T., & Michaels, S. (1994). *The social organization of sexuality*. Chicago: University of Chicago Press.
- Laumann, E. O., & Youm, Y. (1999). Racial/ethnic group differences in the prevalence of sexually transmitted diseases in the United States: A network explanation. *Sexually Transmitted Diseases*, *26*, 250–261.
- McCusick, L., Wiley, J. A., Coates, T. J., Stall, R., Saika, G., Morin, S., et al. (1985). Reported changes in the sexual behavior of men at risk for AIDS, San Francisco, 1982–84: The AIDS Behavioral Research Project. *Public Health Reports*, *100*, 622–629.
- Millett, G. A., Peterson, J. L., Wolitski, R. J., & Stall, R. D. (2006). Greater risk for HIV infection of black men who have sex with men: A critical literature review. *American Journal of Public Health*, *96*, 1007–1019.
- Morris, M. (1997). Sexual networks and HIV. *AIDS*, *11*(Suppl. A), S209–S216.
- Morris, M., & Kretzschmar, M. (1997). Concurrent partnerships and the spread of HIV. *AIDS*, *11*, 641–648.

- Neaigus, A. (1998). The network approach and interventions to prevent HIV among injection drug users. *Public Health Reports*, 113(Suppl. 1), 140–150.
- Peterson, J. L., Coates, T. J., Catania, J. A., Hauck, W. W., Acree, M., Daigle, D., et al. (1996). Evaluation of an HIV risk reduction intervention among African-American homosexual and bisexual men. *AIDS*, 10, 319–325.
- Porco, T. C., Martin, J. N., Page-Shafer, K. A., Cheng, A., Charlebois, E., Grant, R. M., et al. (2004). Decline in HIV infectivity following the introduction of highly active antiretroviral therapy. *AIDS*, 18, 81–88.
- Potterat, J. J., Rothenberg, R. B., & Muth, S. Q. (1999). Network structural dynamics and infectious disease propagation. *International Journal of Sexually Transmitted Diseases and AIDS*, 10, 182–185.
- Rogers, E. M. (1962). *Diffusion of innovations*. New York: Free Press.
- Rothenberg, R. B., Potterat, J. J., Woodhouse, D. E., Muth, S. Q., Darrow, W. W., & Klovdahl, A. S. (1998). Social network dynamics and HIV transmission. *AIDS*, 12, 1529–1536.
- Rotheram-Borus, M. J., Song, J., Gwadz, M., Lee, M., Van Rossem, R., & Koopman, C. (2003). Reductions in HIV risk among runaway youth. *Prevention Science*, 4, 173–187.
- Satcher, D. (2000). *Evidence-based findings on the efficacy of syringe exchange programs: An analysis of the scientific research completed since April 1998*. Washington, DC: U.S. Department of Health and Human Services.
- Sell, R. L., Wells, J. A., & Wypij, D. (1995). The prevalence of homosexual behavior and attraction in the United States, the United Kingdom, and France: Results of national population-based samples. *Archives of Sexual Behavior*, 24, 235–248.
- Susman, E. (2001, August 13). New York needle exchange “reverses” AIDS. *United Press International Science News*. Retrieved July 25, 2006, from <http://www.aegis.com/news/upi/2001/UP010805.html>
- Thomas, J. C., & Sampson, L. A. (2005). High rates of incarceration as a social force associated with community rates of sexually transmitted infection. *Journal of Infectious Diseases*, 191(Suppl. 1), S55–S60.
- Trostle, J. A. (2004). *Cambridge studies in medical anthropology: Vol. 13. Epidemiology and culture*. New York: Cambridge University Press.
- Valdiserri, R. O., Lyter, D. W., Leviton, L. C., Callahan, C. M., Kingsley, L. A., & Rinaldo, C. R. (1989). AIDS prevention in homosexual and bisexual men: Results of a randomized trial evaluating two risk reduction interventions. *AIDS*, 3, 21–26.
- Valente, T. W., & Saba, W. P. (2001). Campaign exposure and interpersonal communication as factors in contraceptive use in Bolivia. *Journal of Health Communication*, 6, 303–322.
- Valleroy, L. A., MacKellar, D. A., Karon, J. M., Rosen, D. H., McFarland, W., Shehan, D. A., et al. (2000). HIV prevalence and associated risks in young men who have sex with men. *Journal of the American Medical Association*, 284, 198–204.
- Wasserheit, J. N., & Aral, S. O. (1996). The dynamic topology of sexually transmitted disease epidemics: Implications for prevention strategies. *The Journal of Infectious Diseases*, 174(Suppl. 2), 201–213.
- Weinhardt, L. S., Carey, M. P., Johnson, B. T., & Bickham, N. L. (1999). Effects of HIV counseling and testing on sexual risk behavior. *American Journal of Public Health*, 89, 1397–1405.
- Wilson, C. M., Houser, J., Partlow, C., Rudy, B. J., Futterman, D. C., & Friedman, L. B. (2001). The REACH (Reaching for Excellence in Adolescent Care and Health) project: Study design, methods, and population profile. *Journal of Adolescent Health*, 29(3 Suppl.), 8–18.

- Winkelstein, W., Jr., Samuel, M., Padian, N. S., Wiley, J. A., Lang, W., Anderson, R. E., et al. (1987). The San Francisco Men's Health Study: III. Reduction in human immunodeficiency virus transmission among homosexual/bisexual men, 1982–86. *American Journal of Public Health, 76*, 685–689.
- Wohlfeiler, D. (1997). Community organizing and community building among gay and bisexual men. In M. Minkler (Ed.), *Community organizing and community building for health* (pp. 230–243). New Brunswick, NJ: Rutgers University Press.
- Wohlfeiler, D. (2002). From community to clients: The professionalisation of HIV prevention among gay men and its implications for intervention selection. *Sexually Transmitted Infections, 78*(Suppl. 1), i176–i182.
- Wohlfeiler, D. (2005). Network-level interventions as feasible structural-level interventions with potentially high impact. In *Prevention strategies for STD and HIV prevention: What, where and when*. Amsterdam: International Society for Sexually Transmitted Diseases Research.
- Wohlfeiler, D., & Potterat, J. J. (2003, April). *How do sexual networks affect HIV/STD prevention?* Center for AIDS Prevention Studies Fact Sheet No. 50E. Retrieved July 28, 2006, from <http://www.caps.ucsf.edu/pubs/FS/networks.php>
- Wohlfeiler, D., & Potterat, J. J. (2005). Using gay men's sexual networks to reduce sexually transmitted disease (STD)/human immunodeficiency virus (HIV) transmission. *Sexually Transmitted Diseases, 32*(10 Suppl.), S48–S52.
- Woods, W. J., Binson, D., Pollack, L. M., Wohlfeiler, D., Stall, R. D., & Catania, J. A. (2003). Public policy regulating private and public space in gay bathhouses. *Journal of Acquired Immune Deficiency Syndrome, 32*, 417–423.