

how do sexual networks affect HIV/STD prevention?

what are sexual networks?

Focusing on risk behavior alone does not explain why some persons and communities continue to be infected with HIV and other sexually transmitted diseases (STDs) more than others. Networks help explain why persons can have the same risk behavior and yet one may have a much greater risk of contracting or transmitting HIV.

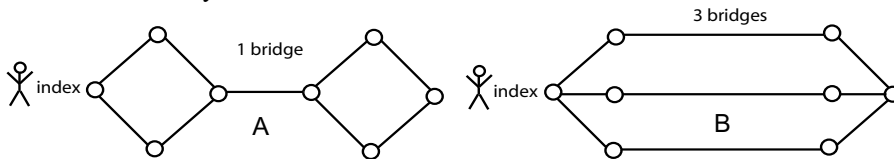
Sexual networks are groups of persons who are connected to one another sexually. The number of persons in a network, how central high-risk persons are within it, the percentage in monogamous relationships and the number of "links" each has to others all determine how quickly HIV/STDs can spread through a network.¹ Sexual networks are distinct from, but often overlap with social networks.

how do networks affect transmission?

The different ways persons select partners affect how quickly HIV/STDs can spread. **Exclusively monogamous** persons are, by definition, not part of a sexual network. If both are HIV-negative they remain so.

***Serial monogamists** are persons who go from relationship to relationship one at a time. If they have unprotected sex, they have a higher risk of HIV/STDs than exclusively monogamous persons. Earlier partners' risk may affect later partners.*

Concurrent relationships involve having more than one sexual partner in a given period and going back and forth between them. This increases the probability for transmission, because earlier partners can be infected by later partners. Further, they can serve as "nodes", connecting all persons in a dense cluster, creating highly connected networks that facilitate transmission. Concurrent partners can connect each of their respective clusters and networks as well. Concurrency alone can fuel an epidemic even if the average number of partners is relatively low.²



The two networks above show that what matters is not simply risk behavior, but risk configuration. Each has 8 persons (circles) connected into 9 relationships. Two persons each have 3 partners, and the other six each have 2 partners. Yet transmission will be less efficient in network A, and prevention will be more difficult in network B. In A, in just two steps from the index person, half the network can be infected and half spared; in B, two steps can result in everyone being infected except for the person on the extreme right. In A, sparing half the population from exposure requires cutting one bridge, while in B, it requires cutting three bridges. In a word, for epidemics, network structure is destiny.³

Says who?

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what are key concepts of networks?

Number of partners. Programs can focus on persons with the largest number of ties to others in a network. With HIV/STDs, this suggests that in addition to promoting condom usage, programs seek to identify those with a high number of unprotected partners.

Random spread broadens transmission. An infection spreads quickest when partnering is random.⁴ When partners select one another within groups such as age, ethnicity, class, religion or other characteristics, diseases may not spread to all subgroups. When partnering is anonymous or random, a disease can spread more quickly through all groups.

Core groups. Core group members have high levels of risky behaviors. They contribute a disproportionate share of HIV/STDs, and can fuel sustained transmission.

Centrality. How central an HIV+ person is to a network deeply influences transmission rates in a community. In Colorado Springs, CO, network analysts found that HIV+ persons had high levels of risk behavior but were located in peripheral areas of risk networks.⁵ This network configuration may have explained the relatively low HIV transmission levels. In contrast, HIV+ persons in New York City, NY occupied central positions within their needle-sharing and sexual risk networks, which helped explain the high observed levels of infection.⁶

can sexual networks help explain racial differences in HIV/STD rates?

Yes. Sexual networks and partner selection help explain racial differences in HIV/STD infection rates. For example, African American gay and bisexual men may take no more risk than white men, but appear to get infected much faster.⁷ In the same way, Asian American gay and bisexual men report similar risk levels but get infected at lower rates.⁸

In one national study, it was shown that heterosexual African-Americans were getting infected with bacterial STDs at rates almost five times faster than whites after controlling for individual level risk factors. Sexually transmitted infections remain in African American populations because their partner choices are more segregated than other groups. In addition, non-core African-Americans (with few partners) are more likely to choose "core" sexual partners. Non-core whites tend to choose non-core partners.⁹

what interventions influence networks?

Partner notification. Many public health departments have developed highly confidential and sound techniques of partner notification and, through network analysis, have learned to trace "up" the chain of transmission to the transmitter rather than "down" the chain to those infected.¹⁰ This allows transmitters to be identified for treatment and HIV/STD prevention counseling.

Message development. *In addition to promoting condom use and counseling, media messages can be tailored to encourage network fragmentation by encouraging serial monogamy ("one partner at a time") rather than overlapping partners.*

Community dialogue. Community-based organizations (CBOs) can play a key role in facilitating community dialogue about difficult questions about networks: How should communities balance sexual freedoms of all—including those at highest risk—with the health and future of their entire community? What community and cultural norms contribute to risky sexual networking? Additionally, CBOs should distinguish between traditionally-defined "risk groups" and those individuals with the very highest levels of risk to focus resources on them.

Addressing venues which facilitate partner mixing. *In many settings, identification of partners may be impossible. However, by focusing on venues which facilitate sexual mixing between members of both high- and low-risk networks, HIV/STD prevention workers may be able to reduce transmission. For example, many men with syphilis report meeting partners over the internet and in commercial sex venues.^{11, 12} Working with bathhouse and sex club managers and internet service providers to negotiate respective roles in promoting safer behaviors should be a priority for HIV/STD intervention workers.*

In San Francisco, CA, AIDS educators and sex club owners developed a shared set of guidelines to reduce risky behavior in the clubs.¹³ In the Netherlands, the gay dating internet site www.dateguide.nl provides interactive safer sex education for every man as he logs on.¹⁴

what still needs to be done?

At the beginning of the epidemic, network analysis helped explain some of the most important features of AIDS and helped explain its causes.¹⁵ It can still be useful now for agencies, communities, and researchers to work together to encourage sexual networks that discourage HIV/STD transmission. It has long been known and understood that some individuals contribute much more to the spread of HIV/STDs than others. Ignoring that fact, and ignoring the role of sexual networks in fueling the epidemic, hampers our ability to slow HIV/STD transmission.

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