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Social Networks and HIV Transmission: The Contextual Dynamics of HIV Risk Behaviors

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INTRODUCTION

Despite advances in public health, biomedical, and social sciences, the Human Immunodeficiency Virus (HIV), which causes Acquired Immune Deficiency Syndrome (AIDS), continues to proliferate. HIV is spread by exposure to infected blood, semen, or vaginal secretions. HIV transmission most commonly occurs because of sexual activities, through the sharing of contaminated needles and other drug paraphernalia, and less frequently, from infected mothers to their newborns (CDC, 2001).

From the first reported case in June 1981 through June 2001, the Center for Disease Control and Prevention (CDC) has reported 793,026 cases of AIDS. The CDC estimates that 650,000 to 900,000 Americans are now living with HIV and approximately 40,000 new infections occur each year (CDC, 2001).

Injection drug users make up the second largest group of people diagnosed with AIDS. Injection drug use is directly or indirectly associated with about one-third of all AIDS cases in the United States (CDC, 2001). As of June 20, 2001, there were 1000 people living with HIV or AIDS in Iowa. Of those, 21% reported having injected drugs (State of Iowa HIV and AIDS Surveillance Report, June 2001).

Injecting Drug Use and HIV Transmission

There are a wide variety of behaviors and social conditions which have been found to be associated with increased risk of HIV infection among drug injectors (Williams and Johnson, 1993). Transmission of HIV can occur through either direct sharing of syringes or indirect sharing of contaminated equipment or through risky sexual behaviors (AED, 1997). Risky sexual behaviors include unprotected anal, vaginal, or oral sex; multiple partners; and lack of treatment of sexually transmitted diseases (STDs). Some drugs, such as crack cocaine, have a disinhibiting effect that may lead to high-risk activities. Many IDUs, both men and women, trade sex for drugs or money to buy drugs or engage in commercial sex, this also increases transmission risks (Chu et al., 1998).

Social Context of HIV Risk Behaviors

Recent studies suggest that the degree of HIV risk associated with drug injection is related to the context in which injection takes place. Contextual factors include the physical setting where the injection occurs, the people with whom injectors interact, the dynamics of sexual or drug-using risk networks and the behaviors that link injectors in drug acquisition, preparation, and the injection process (AED, 1997). Transmission of HIV from one user to another can be rapid when a setting brings together individuals who prepare and inject in a risky way or who have high-risk sex (Latkin et al., 1994).
Social networks may influence the transmission of HIV in two ways. First, as vectors of disease transmission (Klovdahl, 1985), and second, as disseminators of social influence (Neaigus et al., 1994). Condom and clean needle use occurs because an individual acts to provide this self-protection. However, partners, friends, and social groups can influence those individual decisions (Oskamp & Thompson, 1996).

The purpose of this study is to review literature on the epidemiological relationship between social networks and risk of HIV transmission. Understanding the influence of social networks may contribute to the understanding of the epidemiology of HIV infection. This in turn may lead to the development of effective HIV prevention measures.

Review of Literature

Individual human behavior originates in and is perpetuated through social activities and cultural contexts. Risks for HIV transmission include individual behaviors, biological factors, and social and cultural aspects of drug use in people’s lives. Understanding of social networks can be used to inform the development of culturally appropriate and socially effective interventions that address the problems of drug use, HIV infection, and AIDS.

Methods to study the influence of social networks on risk behavior include census methods, snowball methods, and personal network methods. Census methods consist of asking each member of a community to identify their needle sharing or sexual partner. Snowball methods consist of asking injecting drug users to name their contacts and then interviewing those persons named. Personal network methods consist of asking respondents to provide the names of those people with whom they interact and to provide information on those contacts (Wasserman, 1994).

Social networks vary in number of contacts or members, length of interaction, frequency of contact, heterogeneity and strength of emotional ties. Patterns of social network structures influence the transmission of communicable diseases (Klovdahl 1985).

Social networks

Pivnick et al. (1994) used a cross-sectional design to study the relationship between drug use, HIV infection, and social networks. Social networks include family members, sexual partners, household members, persons at risk for HIV infection, and friends. From 1998 to 1999, Pivnick and associates conducted in-depth interviews with women who attended a Methadone clinic in Bronx, New York. Data collected included demographic information, history of drug use, history of reproduction, and HIV status. Subjects were asked to identify blood relatives and those related to the subject by marriage. Each subject’s drug using and non-drug using associates and friends were noted and the associates drug use, relationship, serostatus, and subject’s serostatus were identified.

The researchers charted kinship and social relations using Kinchart Sociograms, a model developed for anthropological studies of kinship. This model starts with those in closest biological or social proximity and moves outward to include persons increasingly distantly related. The authors also used the Kinchart Sociograms to map the prevalence of drug use and HIV infection among subjects’ family and household members.

Of the 126 women who participated in the study, 72% were using illicit drugs. Subjects reported six principal household membership patterns. Thirty-one percent lived
with a sexual partner plus children, 19% lived with only a partner, 23% with only her children, 11% lived alone, 10% lived with relatives, and 6% lived with non-relatives.

Of the 63 women living with a sexual partner, 70% regularly used illicit drugs and 57% of their partners used drugs. Significant association was found between a woman’s use of cocaine and that of her partner (p<.01). All of the women who lived with a crack-using partner used crack themselves. No significant association was found between a woman’s heroin use and her sexual partner’s use of heroin. HIV positive women and HIV negative women were compared in terms of type and frequency of drug use. Significantly more HIV-positive women (46%) reported current use of crack (p<.03).

The data collected and analyzed for this study was by self-report. Given the stigma associated with injecting drug use and that these women were enrolled in a treatment program, the amount of drug use was most likely underreported. As this was a cross-sectional study, the interpretation of the data is limited to how the prevalence of injecting drug use in woman is related to the variables measured.

Sexual Partners of Injecting Drug Users

The close proximity of sex partners to IDUs places them at an elevated risk for initiating or resuming drug injection and thereby becoming vulnerable to parenteral HIV transmission as well as sexual transmission of HIV. Ouellet et al. (1998) carried out a 4-year prospective cohort study to assess the changes in HIV risk behavior and seroconversion among subjects who, at baseline, were non-injection, HIV negative sex partners of drug injectors.

In 1988, 62 non-injecting sex partners of IDUs were recruited from Chicago’s North Side where there is an HIV prevalence rate of 25%. To qualify for inclusion in the sample, members had to be having vaginal, oral, or anal sex with an injection drug user and to have not injected illicit drugs in the previous 6 months. The frequency of sexual contacts and duration of the relationships were not taken into account.

From 1988 through 1991, subjects were interviewed and blood samples were collected. Data collected included demographic characteristics, medical and drug treatment history, and recent drug use and sexual behavior. Interviewers were blind to serostatus of respondents.

Sixteen sex partners (26%) began injecting drugs after baseline. There were two HIV seroconversions, both of which took place after the onset of injection and were attributable to parenteral transmission. Sociodemographic factors and drug use history were associated with drug use history at baseline and onset of injection. Those with no history of illicit drug use beyond marijuana were the most likely to become injectors (39%) compared with those who had used other non-injected drugs and those who had a previous history of injecting drugs. Age, race, ethnicity, sex, education, employment, and selling or trading sex were not significantly associated with the onset of injection.

The generalizability of this study is limited by small sample size, the small geographic area represented and possible misclassification of partners’ drug-using behavior. The study points to the need for prevention interventions targeting sexual partners of injecting drug users to go beyond promotion of condom use and safer sex practices to include the prevention of injection.
Sex Partners and Condoms

As the study of social networks has evolved, studies have emerged that look at specific social factors that relate to sharing of syringes. In a cross-sectional study, Sherman and Latkin (2000) examined the relationship characteristics between 703 drug users and their sexual partners. Researchers approached injecting drug users through street outreach, gave them information, and then asked them to self-refer to the research project. Sex partners (n=1003) were identified through a social network inventory. Participants were interviewed to gather data on sociodemographic background, patterns of drug use, HIV risk behaviors, and social networks. Hierarchical logistic regression was used to examine bivariate relationships between condom use and partner variables.

The characteristics positively associated with consistent condom use were the drug user being HIV infected (OR=2.45 95% CI=1.60, 3.70) and having a sexual partner that smoked crack (OR=1.51, 95% CI=1.12, 2.03). In multivariate analysis, drug users who were HIV positive were 2.9 times more likely to use condoms than those who were HIV-negative (p<0.001, 95% CI=1.84, 4.74).

Variables that were negatively associated with condom use were having only one sex partner (OR=0.47, 95% CI = .34, 0.64), living together (OR = 0.32, 95% CI = .25, .43). Receiving either emotional (OR=0.50, 95% CI=0.34, 0.64) or financial (OR = 0.36, 95% CI = 0.34,0.59) support from their sex partner was also negatively associated with condom use.

These results are supported by another cross-sectional study in which Sherman et al. (2001) interviewed 508 injecting drug users from Baltimore, Maryland to compare gender differences in the social aspects of syringe sharing. Among the sample, women shared syringes with a significantly higher percentage of injecting partners than men. Significant variables associated with males’ and females’ syringe sharing were: sharing drugs daily with female injecting partners, injecting partners provision of drugs when the user was withdrawing from drug use, being sexual partners, and the use of speedballs by the injecting partner. Factors associated with male injecting dyads were: being kin, having an injecting partner who used heroin, daily drug use, and drinking alcohol with their injecting partner.

Limits to these studies include data collection by self-report and the nonrandom selection of the study sample. Recruitment consisted of approaching potential participants during street outreach, explaining the study, and providing a telephone number for the research project. Since they used ‘word-of-mouth’ recruitment, the researchers were not able to control for nonparticipation bias. Injection drug users are a ‘hidden’ segment of our society. This severely limits researchers’ ability to select random samples for comparison.

The study focused on drug users’ perceptions about their sex partners. It did not use information provided by the sex partners. Using data from sex partners may have provided a different perspective on the relationships and would have served as validation of the results.

Despite these limitations, Sherman and Latkin’s (2001) results support findings from other research, which report that condoms are less likely to be used in primary relationships than in casual relationships (Polascek et al., 1999). A phenomenon frequently
attributed to women viewing nonuse of condoms as symbols of trust in their partner and commitment to the relationship (Kwiatkowski et al., 1999).

**Social Support**

Suh et al. (1997) recruited 499 inner-city injecting drug users from Baltimore, Maryland in a cross-sectional study that looked at the association between social support and needle sharing. To be eligible for the study participants had to have injected drugs during the last 6 months and never been enrolled in an HIV prevention program. Participants were interviewed to gather demographic information, substance abuse history, HIV-related risk behaviors, and personal network characteristics.

A substantial proportion of drug sharing network members also provided social support, often through family and sexual partner relationships. The size of the drug network and the amount of support provided were positively associated with HIV risk injecting behaviors. Injecting drug users with drug network members who provided support were more likely to participate in sharing needles within the network (OR=1.87, 95% CI=1.18, 2.96). While, injecting drug users with drug networks that did not provide support were more likely to inject in shooting galleries (OR=2.25, 95% CI=1.26, 4.00).

The volunteers used for this study may not be representative of all injecting drug users. Researchers recruited participants primarily by word of mouth and they offered economic incentives. This may bias the sample towards injecting drug users of lower socio-economic status. This study, as others reported in this paper, relied on self-reported injecting behavior. Gibson and Young (1994) found that self-reported injection behavior was significantly under-reported. Finally, given that this is a cross-sectional study, it is not possible to separate cause and effect. HIV risk behaviors might influence social network characteristics rather than social network characteristics affecting HIV risk behaviors.

**Friends**

In a case-control study, Valente and Vlahov (2001) used a personal network approach to study HIV risk taking behavior among injecting drug users who used a needle exchange program. They administered a risk analysis questionnaire and an HIV test to participants at the Baltimore, Maryland Needle Exchange Program between 1995 and 1997. In addition to demographic and drug use questions, the researchers asked participants to provide the initials of his or her five closest friends. For each friend identified, participants were asked whether they had engaged in any of the following behaviors: (1) injected drugs together, (2) shared syringes, (3) had sex, or (4) drank alcohol. Researchers interviewed each person at baseline and at 2-week, 6-month, 1-year, and 18-month follow-up visits.

Interviews that were missing data on network questions, syringe-sharing questions, or had other missing data were dropped from the study yielding a final sample of 1184. Multiple logistic regression was used to calculate odds ratios. The researchers compared the association between needle sharing between injecting drug users and their close friends versus injecting drug users and non-friends.
In the study population of 203 injecting drug users whom reported using a syringe after someone else, risk taking in the form of sharing needles was not random. Injecting drug users were 30.9 times more likely to share with friends than with non-friends. Needle sharing was more likely to occur with strong-tie close friends (OR=1.52) than with persons who were new to the network.

By comparing dyadic data, the researchers found that sharing syringes with friends was strongly associated with any reported syringe sharing (OR=15.6). Those who reported more friends were more likely to share than those who named fewer friends (OR=1.66) and those who used most frequently were more likely to share syringes than those who used less frequently (OR=1.60). Sharing with a friend other than their closest friend was linked with exchanging sex for money or drugs (OR=2.32).

This data supports the hypothesis that selective risk taking may act to minimize some of the risk associated with syringe exchanging. The fact that injecting drug users are selecting the person with whom they share needles, may partially explain why HIV has not spread as rapidly as expected in the injecting drug using community.

This study only looked at the degree of syringe sharing with friends. The researchers did not collect data from the friends named by the study participants; therefore, the authors could not map characteristics of entire networks. Since participants were recruited from injecting drug users who used a needle exchange program, the data may not be generalizable to injecting drug users that do not participate in a needle exchange program.

While the needle exchange program in this study may have reduced the degree of syringe sharing, it did not completely limit the risk. Injection drug users, whether for ritualistic or social reasons, continued to share syringes with close friends. This may be because injecting drug users consume alcohol and drugs with their closest friends and refusing to share a syringe with these same friends may be perceived as a lack of trust.

Cotton-Oldenburg et al. (2001) reported similar findings in a study that used independent cross-sectional samples of injecting drug users to examine the impact of pharmacy based syringe access on injection practices. Two hundred seventy injecting drug users were interviewed before and 300 injecting drug users were interviewed 1 year after enactment of legislation that allowed pharmacy distribution of syringes. While injecting drug users were more likely to purchase syringes after enactment of the law (OR = 2.66; 95% CI = 1.83, 3.85), they continued to carry syringes (OR = 0.90; 95% CI = 0.63, 1.28). Syringe sharing (OR = 0.67; 95% CI = 0.45, 1.00) and reuse remained the same (OR = 0.67; 95% CI = 0.40, 1.11).

**HIV Status**

El Bassel et al. (1998) designed a cross-sectional study targeting women injecting drug users recruited from three methadone clinics. The goal of their study was to examine different dimensions of social networks, including the association between a woman's HIV status and specific characteristics of her social networks. Variables included the number of injection drug users, the number of non-injecting drug partners, and the number of HIV-positive contacts in a woman’s personal network.
Women were eligible to participate in the study if they were enrolled in one of the methadone clinics and had been in a drug treatment program for at least three months. Face-to-face interviews were conducted to ascertain demographic characteristics, drug use, social networks, and HIV status of the participant and the HIV status of the members of her network. One hundred and fifty-one women were enrolled in this study.

The proportion of non-kin network members who used drugs was double the proportion of kin network members (50% versus 25%). Participants reported actually using drugs with 30% of the non-kin members, compared to 13% of kin network members.

Controlling for respondent ethnicity, drug use, and network size, there was a strong positive relationship between the number of HIV-positive network members and the probability that the participant was HIV-positive. If the participant had two or more HIV-positive network members, the odds of being HIV-positive increased by a factor of 21.1 (CI=5.7, 70.4) compared to those with one or no HIV-positive members in their network. This was the only significant predictor of a respondent’s serostatus.

The number of drug partners in her network was not significantly associated with the odds that a women was HIV-positive. For women whose networks included one injecting drug user, the odds of being HIV-positive increased by a factor of three (95% CI=1.0, 9.0). A woman whose network included two or more injecting drug users also was 3 times more likely to be HIV-positive (95% CI=0.8, 11.4). Neither of these differences was significant.

The study is limited by the fact that participants network members and HIV serostatus were self-reported and it relied on uncorroborated data about the relationship between the participants and her network members. The participants were not followed over time; therefore it is not possible to see if social networks change after a woman learns she is HIV-positive. The use of a non-random sample limits the generalizability of the results. The only contacts reported were the most frequent ones, not necessarily the most salient. Participants were only asked about whether they had shared syringes. They were not asked about the extent of needle sharing or whether they had shared any drug-related paraphernalia.

Recovery

Schroeder et al. (2001) undertook a longitudinal cohort study to determine the relationship between social networks and neighborhoods and their impact on heroin and cocaine use in Baltimore, Maryland. To be included in this study persons had to complete a baseline interview, and participate in 6 month and two semiannual interviews. Participants had to have reported consistent cocaine or heroin use or non-use at all visits. Participants who had intermittent use were excluded in order to allow comparison of those who had achieved abstinence and those who continued to use drugs.

Social network information was gathered by having participants list up to 16 persons whom they had known for at least 1 month. Participants characterized their relationship with each contact as to whether the relationship was emotional, financial, instrumental, or sexual. The study sample consisted of 236 drug users and 106 non-users for 342 participants.
Having drug users in the social network was the characteristic most associated with continuing drug use (OR=5.7, p=0.0001). The only social support correlate was having low financial support (OR=1.94, p=0.025). Neighborhood characteristics that correlated with drug use included total arrests (OR=2.67, p=0.002), drug-related arrests (OR=2.2, p=0.14), and neighborhood poverty (OR=1.92, p=0.0073). Using multivariate analysis, the researchers found that network drug use and neighborhood drug arrests independently predicted participants drug use.

Limitations of this study include reliance on self-report by participants of their own drug use as well as of their network members. The authors used arrest statistics as a surrogate marker for prevalence of drug use. This may be misleading. Differing policing practices may lead to differences among neighborhood arrest records. The fact that people may not spend time, buy drugs, or use drugs in the area where they live may also limit these results.

The results may not be generalizable as it only included persons who were healthy enough to participate in a research program. It did not include those who were ill or experiencing complications from substance use, nor did it include homeless persons.

This study did support previous research that showed that the drug users’ peers, family members, and neighborhood risk factors influence drug use. For persons working with drug users this study reiterates the importance of social networks and the influence they have on drug using behavior. Providers need to develop interventions that increase an injecting drug user success in altering social network composition or treat drug-using network members.

Changes in Networks

A limitation common to all of the studies discussed thus far is that have looked at membership in social networks as a static phenomena. None of the studies attempted to track changes in network membership over time. In order to address this limitation, Hoffman et al. (1997) used a prospective cohort design to look at changes in social networks and how these changes may affect an individual’s risk behavior. During a nine-month period in 1995, Hoffman and his associates collected epidemiological and ethnographic information from 55 injecting drug users. Participants were interviewed first at baseline and again 3-months after baseline. Participants were asked to identify members of their social networks. Network members were then interviewed to investigate the reliability and validity of information provided by the participants.

The researchers controlled for crack use, sexual risk behavior, and homelessness. All of which have been shown to increase the odds that injecting drug users will engage in risky injection behaviors.

When the researchers aggregated data from this study, they found little change in network size or density. However, when they tracked individual members of the network, the results showed that network membership did change over time and these changes had a significant impact on risky injection behaviors. A greater movement of members into a network was significantly associated with an increase in risky injection behavior (OR = 6, 95% CI = 1.2, 28.7). The authors felt that much of this effect was due to the resources available to injecting networks. Members of networks with few resources have to move
around to secure drug supplies, syringes, and places to inject. This forces them to take more risks, such as sharing needles and other paraphernalia.

Like previous studies, small sample size and self-reported data limited this study. The brief period used, 3-months, to follow the injecting drug users and the self-reported data were also limiting. While the authors made inferences about the influence of available resources on network turnover, they did not gather the data necessary to support this claim.

Support Groups

In an intervention trial, Greenberg and Johnson (1996) assessed the role of attending a support group for HIV-positive drug users (cocaine or crack) on the frequency of risky sexual and drug-using behavior. One hundred HIV positive drug users in Atlanta, Georgia were recruited to participate in this study, which lasted from 1991 to 1992.

Dependent variables included frequency of drug use, months free of drugs or alcohol, number of partners, disclosure of serostatus, consistent condom use, and having sex with a prostitute, an injecting drug user, or with an unknown partner. Independent variables included the number of support group sessions attended and level of drug treatment completed.

There was a significant correlation between the level of drug treatment completed and the number of support groups attended. Those who completed 28 days or more of residential treatment were 2.9 more likely to attend four or more support groups (p=0.10). They were also three times more likely to increase time free from all drugs (p=0.014).

After controlling for demographics and level of residential drug treatment, support group attendance was positively associated with reduced frequency of drug use (OR = 3.072, p=0.018), increased time free from drugs (OR = 2.608, p=0.048), reduced frequency of sex while using (OR = 3.426, p=0.034), and disclosure of HIV status to partners (OR = 2.522, p=0.047).

The authors, who felt that denying HIV-positive drug users access to support services would be unethical, did not use a control group for this study. The lack of a control group severely limits the inferences that can be made from the study’s results. In addition, all behavioral data was self-reported. Because the group was a support group, members may have given answers to please group facilitators. Qualitative and quantitative findings were based on a single group, further limiting the generalizability of the results.

Summary and conclusions

HIV transmission requires both risk behavior and an infected partner. The risk of becoming infected is related to the probability of encountering an HIV-infected injection or sexual partner (Burack et al., 1998). Specific behaviors associated with drug use that are risk factors for HIV transmission include shared use of drug injection equipment and unprotected vaginal, oral, or anal sex with multiple partners.

Among injecting drug users, several demographic and behavioral traits are independent predictors of HIV transmission (Burack et al., 1998). Demographic traits include residence in a high prevalence area, minority race or ethnicity, low income, male gender, and a diagnosis of antisocial personality disorder. Behavioral traits include fre-
quency of drug injection, sharing injection equipment, and high-risk sex behavior. Foremost among risk factors is the sharing of injection equipment.

The research projects reviewed for this paper looked at whether peer-group or social network behaviors and attitudes influenced needle sharing. Limitations shared by the studies included limited sample size, reliance on self-reported data, and non-random selection of participants. All of these limitations are inherent in studies of 'hidden' or marginalized populations. Many myths, negative stereotypes, and biases exist about injecting drug users and their lives. These stereotypes and beliefs not only influence the policy and legal environment effecting injecting drug users, but also the design and implementation of research projects.

Further epidemiological research is needed to examine the relationship between social networks and risk for transmission of HIV in injecting drug users (Friedman et al., 1997). Cross-sectional and cohort studies need to be carried out to further delineate how social networks affect HIV seroconversion. Studies need to look at how behavioral, social network and biological variables influence the transmission of HIV within the drug injecting population and between non-injecting and drug injecting populations. Epidemiological research is needed to understand how social networks are shaped by policies on syringe possession, needle-exchange programs, police strategies, and paraphernalia laws.

**Implications for Prevention**

While small sample sizes, lack of random sampling, restricted geographic areas, and failure to validate self-reported data limited the generalizability of the studies; the results consistently point to a need to alter the focus of prevention and treatment programs from individual behavior change to include interventions that target the community to effect social change.

Traditionally, AIDS prevention activities that target injection drug users have focused on how the individual drug injector can reduce or eliminate risk behaviors. HIV prevention providers employ strategies such as drug treatment, needle exchange, street outreach, educational programs, and HIV counseling and testing. These strategies emphasize providing knowledge about HIV transmission and prevention, teaching personal skills to resist pressures to share syringes or have sex without condoms, or seeking treatment for drug dependency.

One the other hand, a community-level intervention is an example of an approach that targets the injector and the injector's social network. Community interventions are designed to effect changes in cultural values, attitudes, and norms of entire communities (Gibson, 1998). Community organizing focuses on population characteristics that create obstacles to HIV risk reduction. Social networks are created to eliminate these obstacles and provide a means for creating health promoting social norms.

Modification of needle sharing or sexual behaviors within a network may be difficult. The bonds among drug injectors are centered on trust. This trust directs needle sharing and sexual behaviors. Refusing to share a needle or using a condom may represent a violation of trust. To the drug injector, this violation may have more significance than the risk of HIV infection.
If a social network's norms and values are inconsistent with AIDS preventative behavior, the network is more likely to engage in processes that inhibit prevention. The strength of this influence depends on the degree of integration and whether members fear sanctions for non-conformity with the network (Fisher, 1988; Valente and Vlahov, 2001). For example, sharing needles with close friends decreases the risk of HIV transmission if the social network is dense and well integrated. It does so by preventing outsiders from introducing new pathogens into the network. Whereas sharing with persons in an open, non-integrated network increases the probability of exposure to new pathogens, thus increasing the risk of HIV infection.

Providers need to reach out to network members and enlist them in HIV prevention activities. By using network members as advocates, change agents, and role models, prevention providers can capitalize on strong ties and close relationships within the injector's social network to exert pressure on the individual user. HIV-positive women who are injecting drug users are more likely to be networked with other HIV-positive women (El-Bassel et al., 1998). Prevention and care providers should encourage these women to develop self-help groups and peer exchanges. As a safe environment, self-help groups can enable HIV-positive women to deal with HIV disease. Self-help groups reduce the spread of HIV by advocating safer sex and non-sharing of injection equipment amongst group members.

Network structure has consequences for individual members and for the network as a whole. These consequences go beyond the effects of characteristics and behavior of the individuals involved (Klovdahl, 1985). Drug use, sexual practices, dependence on partners, and social norms all interact to influence HIV risk behavior (Sherman and Latkin, 2000). These same dynamics can be used to introduce norms that support risk reduction. Social networks provide a context for understanding drug use and HIV transmission. They also provide a context in which to develop prevention efforts.

Communication among members of marginalized groups, such as injecting drug users, tends to be frequent. The diffusion of information within the group or network is typically rapid and pervasive (Dearing et al., 1994). A successful risk reduction strategy will incorporate members of drug using networks, including active drug users, into the planning process. Armed with the knowledge provided by network members, providers and policy makers can develop prevention interventions that are tailored to the needs of specific groups of injection drug users.

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