Networks, resources and risk among women who use drugs

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Abstract

The public health tradition of intervening at the environmental level has not been fully exploited in terms of HIV prevention efforts among drug users. Women who use drugs are at particularly high risk of acquiring HIV and other blood borne and sexually transmitted infections, such as hepatitis B (HBV) and hepatitis C (HCV), and could potentially benefit from environmental level interventions. In a review of the existing literature, we examine the extent to which the linkages among multiple causal levels may contribute to the disease transmission risk experienced by women who use drugs. The multiple causal levels of risk potentially involved in the transmission dynamics of infectious pathogens include biological, behavioral, dyadic relationship, network, and structural levels. Biological and behavioral risk factors have already been examined in depth; yet, little empirical research currently exists for other causal levels. Increasingly, investigators suggest that the character and dynamics of relationships with sex partners may be an important determinant of risk, both for engaging in risk behaviors and for doing so with high-risk partners. The influence of higher-order causal level factors, specifically network and structural factors, are the least well documented, but are posited to be a principal underlying cause of the current differential HIV incidence rates between men and women who use drugs. Future research should focus on these higher-order causal levels, in order to better understand disease transmission dynamics; to better evaluate the limitations, as well as the opportunities, of current intervention efforts; to develop interventions that improve and supplement current HIV prevention efforts among women who use drugs; and to inform public policy debate. © 2001 Elsevier Science Ltd. All rights reserved.

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Introduction

After several decades in which technological advances in epidemiologic method and biochemistry have facilitated the study of individual level disease risk factors, researchers are once again turning their focus to environmental factors as an integral part of public health discourse (Rothman, Adami & Trichopoulos, 1998; Schwartz, 1994; Susser, 1998; Susser & Susser, 1996). Investigators have recently begun to apply this discourse in an effort to better understand environmental contributions to the HIV/AIDS epidemic (Aggleton, O’Reilly, Slutkin & Davies, 1994; Mann, 1991; Rhodes et al., 1999; Zierler & Krieger, 1997); however, the public health tradition of intervening at the environmental level has not been fully exploited in terms of HIV prevention.

While it is not clear that interventions at the environmental level can impact HIV risk behaviors at the individual level, it is important to examine and document relationships at multiple levels in order to: (1) better understand disease transmission dynamics; (2) develop interventions based on both a theoretical and practical understanding of the limitations and opportunities inherent in implementing prevention at any one
Among women who use drugs.

Infection with HIV, as well as with HBV and HCV, among women who use drugs is warranted. More importantly, however, is the need to prevent a high rate of infection among women is warranted. More importantly, however, is the need to prevent a high rate of infection among women such as consistent condom use for all sex acts, careful partner selection, non-penetrative sex, and a limited number of sex partners, as well as several women who use drugs in the United States (US).

Women who use drugs (i.e., heroin, crack and/or cocaine), through either injected or non-injected routes of administration, are at high risk of acquiring HIV and other blood borne and sexually transmitted infections, such as hepatitis B (HBV) and hepatitis C (HCV) (Holmberg, 1996; Irwin et al., 1996; CDC, 1998, 1996). These women are at higher risk of becoming infected with these pathogens than are women who do not use drugs and may be at higher risk than men who use drugs, particularly during the period soon after initiation of injecting drug use (Des Jarlais et al., 1999; Fennema, van Ameijden, van den Hoek & Coutinho, Garfein, Vlahov, Galai, Doherty & Nelson, 1996).

HIV infection among women who use drugs may be diagnosed at a later stage in disease progression than among men (Chaixson, Keruly & Moore, 1995; Schoenbaum & Webber, 1993). Consequently, the rate of progression to AIDS may be faster and the probability of treatment with antiretroviral therapy lower among women than among men. The lack of early identification of HIV infection status among women may be linked to higher levels of morbidity and mortality. HCV is an equally serious disease whose sequelae include cirrhosis of the liver and hepatocellular carcinoma; between 60 and 80% of HCV infected individuals are also chronic carriers of the virus (CDC, 1996; Alter & Moyer, 1998). Currently, there is no vaccine or effective cure available. A very high seroprevalence of HCV has been documented among diverse groups of drug injectors worldwide, with women injecting drug users as likely as men injecting drug users to be infected (MacDonald, Crofts & Kaldor, 1996).

In addition to experiencing a high risk of acquiring infectious pathogens, women who use drugs are at increased risk of transmitting HIV, HCV and infectious HBV to their infants, and may be vectors of transmission to their sex or drug injecting partners. Given the ability of antiretroviral therapies to reduce viral load and, potentially, disease transmission capabilities (Carpenter et al., 1996; Miller, 1999a), early identification of infection among women is warranted. More importantly, however, is the need to prevent a high rate of infection with HIV, as well as with HBV and HCV, among women who use drugs.

In order to prevent infection with HIV, as well as with HBV and HCV, among women who use drugs, and to prevent them from transmitting these viruses to their infants and their drug use or sex partners, the factors that increase women’s risk of acquiring these infections need to be determined. The factors that increase women’s risk may occur at different causal levels. Knowledge about the different causal levels may be used to identify different points of intervention to disrupt disease transmission. For clarity, the multiple causal levels that are potential risk factors for the transmission of infectious pathogens are reviewed separately. However, it is important to recognize that these levels interact with one another, although one or more levels may be dominant depending on the type of risk involved (e.g., the probability of engaging in commercial sex may be increased by differential access to employment). Examples are provided where linkages become more complex.

Potential risk factors for the transmission of HIV, HBV, and HCV

Theoretically, risk factors for infection with HIV, HBV or HCV are at several causal levels and each of these levels may require different types of interventions. Several levels have already been examined in depth, while others are just beginning to be explored. The multiple causal levels of risk potentially involved in the transmission dynamics of these infectious pathogens include biological, behavioral, dyadic relationship, network, and structural levels.

Biological risk factors

Women are almost uniformly biologically more susceptible to sexually transmitted infections than men (Cates & Stone, 1992a,b). HIV and HBV are no exceptions to this rule (Padian et al., 1987; DeVincenzi, 1994; Donovan, 1993); however, HCV is infrequently transmitted sexually (MacDonald et al., 1996). Therefore, differential HCV incidence rates found between men and women who had recently initiated injecting drug use appear to be related to non-biological factors (Garfein et al., 1996).

Behavioral risk factors

Unprotected sex with infected partners accounts for the large part of HIV infections among women (CDC, 1998; UNAIDS/WHO, 1998). There are a number of sex risk reduction practices that are currently available to women such as consistent condom use for all sex acts, careful partner selection, non-penetrative sex, and a limited number of sex partners, as well as several women
controlled alternatives that were proposed over a decade ago, many of which remain in development (Stein, 1990). Several authors have documented perceived or actual barriers that exist for some or all of these strategies for women (Amaro, 1995; Heise & Elias, 1995), barriers that may be exacerbated by women’s drug use. Increasingly, sex risk practices and subsequent HIV infection are being linked to women’s drug use (Holmberg, 1996). Drug use, both injected and non-injected, is likely to be related to increased disease transmission probabilities for women.

Risky injecting drug use practices with infected partners accounts for almost all of the rest of recently acquired HIV infections among women (CDC, 1998; UNAIDS/WHO, 1998). Although fewer women than men report injecting drugs, women’s pathways to injection initiation, which differ from those of men, may affect their probability of infection, particularly at earlier stages of injection experience. Women are more likely to be initiated to drug injecting by male sex partners, while men are more likely to be initiated by friends or peers (Anglin, Hser & McGlothlin, 1987; Rosenbaum, 1981). Moreover, women who use non-injected drugs such as crack cocaine, may also be at increased risk of transitioning to injecting (Irwin et al., 1996). Several studies have found that, shortly after initiation to injecting, women are more likely than men to become infected with HIV, HBV, and HCV (Des Jarlais et al., 1999; Fennema et al., 1997; Garfein et al., 1996). However, no differences in behavioral risk practices, such as the practice and prevalence of sharing drug injecting equipment, have been reported for male and female recent initiates of injecting drug use (Des Jarlais et al., 1999; Fennema et al., 1997; Garfein et al., 1996). While some infection among women who have recently initiated injecting may have been sexually transmitted prior to injection initiation, the interaction between increased disease transmission and gender among novice injectors cannot easily be explained in terms of either behavioral or biological mechanisms, particularly in the case of HCV.

Risk mechanisms other than biological or behavioral appear to be in play, and may be related to the people with whom women participate in risk practices. Moreover, women’s ability to implement risk reduction behaviors may be controlled at another causal level and may be linked to dynamics and norms that function within relationships.

**Dyadic relationship risk factors**

Women who use drugs, relative to men who use drugs, may be at increased risk of coming into contact with infectious individuals, both because of the greater likelihood women face of being initiated into injecting drug use by their older male sex partners who already inject drugs (Anglin et al., 1987; Hser, Anglin & McGlothlin, 1987), and by the increased probability that these older sex or drug using partners are HIV infected (Des Jarlais et al., 1999; Neaigus et al., 1994). Much recent social network literature focuses on the importance of dyadic level relationships, particularly those with primary sex partners, in the spread of infectious pathogens (Neaigus et al., 1995; Padian, O’Brien, Chang, Glass & Francis, 1993; Price, Cottler, Mager & Murray, 1995; Rhodes & Quirk, 1998).

Compared with men who use drugs, women who use drugs are more likely to have male sex partners who are injecting drug users, and less likely to have male sex partners who do not use drugs at all (Anglin et al., 1987; Hser et al., 1987). Sex partnerships with men who inject drugs are associated with an increased risk of acquiring infection. Drug injectors are at increased risk of being HIV infected, because they may engage in HIV risk behaviors, such as sharing syringes. Syringe sharing by sex partners who inject drugs may result from a number of factors, among which are structural constraints, such as a lack of inexpensive and easily available syringes; a personal predisposition to engage in problem behaviors; norms of reciprocity that structure risk behaviors within dyadic relationships; or because of participation in large-scale risk networks (Des Jarlais, Friedman, Choo-panya, Vanichseni & Ward, 1992; Friedman et al., 1997; Irwin & Millstein, 1991; Miller, 1999b; Zegans, 1991). Female sex partners may also be injecting drug users who participate in these same risk behaviors, and, in addition, have unprotected sex with their high-risk male partners. Moreover, male sex partners who inject drugs are often older than their female sex partners and, therefore, may be more likely to have been exposed to HIV and other parenterally transmitted infections, such as HCV and HBV.

Some researchers have suggested that injecting drug users gravitate towards moderating influences, such as forming relationships with non-injecting drug users (Rhodes & Quirk, 1998). Among injecting drug users, this type of relationship has been found to be protective against participation in drug use risk practices (Neaigus et al., 1994; Latkin et al., 1995), but for the non-injector, particularly in a sex partnership, the relationship may lead to initiation (or reintroduction) into drug injecting (Rhodes & Quirk, 1998). However, men who use drugs, (both injected and non-injected use), are probabilistically more likely to select non-drug using sex partners than women who use drugs, simply because more men than women use drugs (Van Etten & Anthony, 1999). This gender difference alone could account for a significant portion of the increased infection risk faced by women. In order to intervene at this level, an improved understanding is required of the relationship characteristics and dynamics (e.g., various forms of dependence, monogamy, social norms, and changes in
these characteristics) that may inhibit or enhance prevention efforts. Answers are most likely to be found at network and structural levels.

**Network risk factors**

Social network methodology has been used extensively in efforts to understand the HIV/AIDS epidemic (Friedman et al., 1997; Klovdahl, 1985; Laumann, Gagnon, Michaels, Michael & Coleman, 1989; Neaigus et al., 1996; Needle, Coyle, Genser & Trotter, 1995; Rothenberg et al., 1998). Refinements include the incorporation of compositional network characteristics as integral to understanding the influence of structural network characteristics of women's risk behavior on HIV risk. For example, Neaigus et al. (1994) have differentiated between social networks, the people among whom there are social interactions with a mutual orientation towards one another that may influence behavior, and risk networks, the people among whom HIV risk behaviors occur. An additional set of dynamics influential in decisions to participate in HIV risk behaviors and implicit in network interactions (but not often investigated in this context), are social support and social isolation.

Risk behaviors in relationships with high-risk network members (e.g., as determined by network members' age, injection history, known serostatus with HIV, HBV and HCV, sexual orientation, and other factors known to be associated with a high risk of infection), have been found to influence both disease prevalence and incidence (Neaigus et al., 1994; Friedman et al., 1997; Garfein et al., 1996; Rothenberg et al., 1998). Some research has already been conducted that specifically assesses the compositional network characteristics of women's risk network members. For example, women who use drugs are very likely to have sex partners who also use drugs, and, not surprisingly, women's injection risk practices have been found to occur in social contexts involving intimate others, particularly sex partners (Barnard, 1993; Gossop, Griffiths & Strang, 1994; Hunter, Donohoe, Stimson, Rhodes & Chalmers, 1995; Neaigus et al., 1995; Pivnick, Jacobson, Eric, Doll & Drucker, 1994). Investigators also report that women tend to participate in receptive syringe sharing with intimate others more frequently, and to have done so more recently, than men (Booth, 1995; Dwyer et al., 1994; Gollub, Rey, Obadia & Moatti, 1998). Additionally, higher proportions of high-risk network members have consistently been found to be associated with participation in sex and drug use risk practices for both men and women, with risky sex partners playing a particularly crucial role for women (Latkin, Mandell, Vlahov, Ozemkowska & Celentano, 1996; Neaigus et al., 1994; Friedman et al., 1997; Miller & Paone, 1998).

Many structural network characteristics (e.g., size, density, multiplexity) have been linked to risks taken by injecting drug users, but these network characteristics have not been fully explored in the context of gender. As a result, interpretation of existing data in terms of how structural network characteristics influence women's risk behavior at the individual level become more speculative. In addition to the size of networks, the structural network characteristics that have been considered include the density or the level of interconnect- edness between network members; the overlap between social and risk network members (i.e., multiplexity); changes in network membership over time (i.e., turnover); the concurrency of risk partnerships; and the central location of the index person within personal (local) networks or within a sociocentric (global) network context.

**Size**

There is some evidence that the size of a woman's network may be limited by problematic relationships with primary partners through either the partner's monitoring and control of the woman's activities or because of shame associated with the relationship (e.g., in the case of bruises from domestic violence that require explanation) (Amaro, 1995; Rosenbaum, 1981; Walker, 1984). Having a primary partner who injects drugs has also been found to increase the possibility of limiting network size (Rhodes & Quirk, 1998). However, it is also possible that some women who use drugs are involved in large networks where drug use may be prominent, as a means to acquire drugs or because of participation in sex work (Friedman et al., 1997; Ratner, 1993; Ouellet, Wiebel, Jimenez & Johnson, 1993). Empirical evidence suggests that larger network size at baseline is related prospectively to sharing syringes (Latkin et al., 1996). Larger drug networks may indicate a greater frequency of injecting with others or that some members of large networks share among themselves and may exert social pressure for others to share as well. However, the sample used in this research was predominantly male (81%). Subsequent analyses of these data to examine gender differences found that the size of a woman's network was not significantly related to drug use risk (Latkin et al., 1998). This may have been a result of the counteracting effect of syringe sharing occurring within sexual partner dyads, which is more prevalent among female than male injecting drug users.

**Density**

Overall network density is measured by comparing the total number of actual connections between network members with the number of connections that are theoretically possible: the number of actual ties divided by the number of all possible ties (Knoke & Kuklinski, 1982). Networks that have high density may be protective insofar as there is a low probability that infection will be introduced into such self-referential
networks. However, high network density (i.e., a high level of interconnectedness between network members), has been found to be prospectively related to drug risk practices among both men and women who inject drugs (Latkin et al., 1996; Latkin et al., 1998). Therefore, once infection is introduced into a dense network, transmission is likely to be quick and efficient.

Members of dense networks with peer norms that advocate risk taking may be particularly reluctant to adopt risk reduction practices. Furthermore, high density within networks may also imply multiplexity; that is, a large overlap between risk and social network members.

**Multiplexity**

Studies suggest that the overlap between risk and social networks may be higher among women who use drugs than among men who use drugs (Latkin et al., 1998). This type of overlap is known as multiplexity and is associated with strong ties. For example, a woman who has a primary sex partner with whom she injects drugs has a multiplex relationship (i.e., she has a defined risk relationship, shared injection practices, as well as a defined social relationship, primary sex partner, which may also be associated with risk). Moreover, in terms of overall network composition, the concordance of drug use between women and their network members other than sex partners (i.e., family and friends), has also been found to be quite high (Fullilove & Fullilove, 1989; Pivnik et al., 1994; Price et al., 1995). It is unclear if this high drug use concordance between women and their social network members is because women’s networks are smaller, or because women mix less often, by choice or by opportunity, with non-drug users once drug use is initiated and established. Furthermore, to the extent that drug use scenes are male-dominated, the participation by women in large, casual drug injecting relationships may be restricted.

The behavior of women with high proportions of multiplex ties is more likely to be influenced by network members with whom they have multiplex ties than that of women with lower proportions of multiplex ties. Multiplex relations may reduce women’s ability to adopt and maintain HIV drug use or sex risk reduction practices, if these multiplex relations are with high risk network members. However, in terms of prevention, increases in the proportion of women’s network members with specific protective characteristics could also lead to the development of a “critical mass”, which could influence the adoption of protective characteristics (Valente, 1995).

**Network member turnover**

Network membership change, or “turnover”, may involve primary relationships (e.g., old primary sex partnerships may dissolve and new ones may begin or network members may move away), or more anonymous relationships (e.g., multi-user injection settings or high-volume sex work). Frequent turnover increases the risk of encountering an infectious individual. One longitudinal study of behavior and network characteristics among injecting drug users found that standard network measures (e.g., density and size) were stable over time, but movement into and out of networks (i.e., network member turnover), was significantly associated with risky injection over time (Hoffmann, Su & Pach, 1997). Networks in which there is a high rate of membership turnover may be particularly susceptible to the epidemic spread of HIV. A high-risk example of this phenomenon is a shooting gallery in which random mixing is facilitated.

**Concurrency**

Concurrency refers to the simultaneous relationships with two or more partners who are at high risk of being infected (e.g., an infected sex partner and a friend with whom one shares syringes) (Morris & Kretzschmar, 1997). Women who use drugs and who are not infected can more than double their risk of infection if they have two risk partners at one time, because concurrent risk partners may also be linked to other risk partners. Uninfected women may also become infected by one of their concurrent risk partners and efficiently transmit infectious pathogens to other uninfected concurrent risk partners, while infected women risk both transmitting one set of pathogens to their concurrent risk partners and acquiring another set from them.

**Central location**

Women who use drugs may be central in their personal risk networks because of network characteristics (e.g., networks of high density or multiplexity in which drug use occurs). Alternatively, women may be imbedded in a “core” or central location of a larger socioeconomic or global network where HIV is present (Friedman et al., 1997; Neaigus et al., 1995). For example, women’s drug use may place them in a central risk position due to certain drug acquisition strategies (e.g., sex work). Women who engage in sex work may have high in-degree centrality (e.g., customers go to them). If infected, these women may also have high out-degree centrality (i.e., they transmit the virus to their customers) (Scott, 1991). Since women in sex work can be high-volume receivers and transmitters, they may function as a “bridge”, transmitting viruses from “higher risk” populations (i.e., infected customers) to “lower risk” populations (i.e., uninfected customers) (Morris, Podhisita, Wawer & Handcock, 1996).

**Social support**

Network social support can take a number of forms, such as material support or emotional support, and is a
feature of social relationships (Barrera, 1980; House, Landis & Umberson, 1988; Lin, Dean & Ensle, 1986; Sandler & Barrera, 1984). Support may be reciprocated or it may not (i.e., it may be symmetrical or asymmetrical) (Gottlieb, 1981; Riley & Eckenrode, 1986; Rook, 1987). Support may also mask and be commingled with coercion, so that support may include aspects of dependence. Therefore, the influence associated with social support may stem from consensus, as well as from coercion, depending on the type and source of social support and the characteristics of the relationship in which it occurs. Women are more likely than men to have social network relationships involving support, perhaps because, for historical and structural reasons, they are more likely to be dependent (Belle, 1982; Lin et al., 1986). All of these aspects of social support may influence decisions to participate in HIV risk practices, to participate in risk practices with individuals at a known higher risk of being HIV infected, or to participate in both fewer high risk practices and partnerships (Neaigus et al., 1994).

Despite the fact that social support has been linked to positive well being in the general population (House et al., 1988; Lin et al., 1986), among drug users, social support has been found to be associated with engaging in HIV risk practices, as well as with HIV risk reduction (El-Bassel & Schilling; 1994; Goehl, Nunes, Quitkin & Hilton, 1993; Latkin et al., 1995; Neaigus et al., 1995; Tucker, 1979, 1982). One reason for these seemingly contradictory findings may be that the meanings of both support and risk are subject to situational interpretation. For example, in the case where syringe sharing occurs in the context of a sexual relationship, the act of sharing may communicate meanings other than risk such as “trust” and “reciprocity” (Barnard, 1993; Zule, 1992). In networks where drug use is prominent, reciprocity of support and resources is a key feature (Zule, 1992). Women members of these networks may be at a disadvantage in that they are sometimes unable to reciprocate “in kind”, as may be the case with drug acquisition (Powis, Griffiths, Gossop & Strang, 1996). Prior research does not provide a detailed understanding of the alternative reciprocal exchanges that may occur in lieu of a symmetric exchange (e.g., providing sex for housing or food), whether these forms of exchange are voluntary or coerced, and the meaning of such exchanges for women. Despite the rationality implied in reciprocity among drug users, men and women may be reluctant to attach reciprocal value on the mediums of exchange available to women who use drugs.

Social isolation

A final network associated risk factor concerns social isolation. Social isolation is a feature of social networks that has not been widely considered with respect to HIV risk, with the exception of the concept of social isolates who do not participate in risk behaviors with others and therefore are not at risk of disease acquisition or transmission (e.g., Rothenberg et al., 1998). This conceptual approach makes the tacit assumption that social isolation is voluntary and that it indicates autonomy and independence; however, involuntary isolation may contribute to HIV risk, particularly for women.

Involuntary social isolation prohibits women from experiencing the benefits of companionship, such as enhanced self-esteem (Rook, 1987). Women who lack companions may feel particularly deprived and lonely, and consequently participate in sex and drug use behaviors through which they hope to escape their loneliness (Miller, 1999b). One study which examined reasons for drug use initiation found that women, but not men, heroin users reported initiating drug use to escape involuntary social isolation (Binion, 1982). However, there is evidence that membership in drug using networks is not a successful strategy to escape social isolation in the long term (Tucker, 1979, 1982), and isolation may ultimately be intensified as a result of membership in drug using networks, particularly for women, who face more social repercussions for maintaining “deviant” lifestyles than men (Rosenbaum, 1981). Moreover, involuntary social isolation has recently been found to be related to HIV risk among women injecting drug users and sex workers (Miller & Paone, 1998; Pyett & Warr, 1997).

Involuntary isolation may also restrict access to resources, such as drug markets, as well as increase the risk of exposure to violence associated with many facets of drug use for women. Efforts to purchase drugs alone and engaging in sex work independently increase women’s risk of being physically or sexually assaulted, as well as increase the risk of arrest. Long sentences associated with arrests for drug market activities, including sex work, combined with harsh prison conditions, make violence within this setting a long-term threat, particularly for women who are socially isolated and who do not establish some form of protective relationship. Even the establishment of protection in these situations may be associated with risk; for example, if sex is the method of payment for protection, it is unlikely that women will be able to implement risk reduction of their own volition.

Numerous studies report that network level risk factors, both compositional and structural, have the power to influence risk behavior at the individual level. A network approach in assessing disease transmission dynamics takes into account the fact that, unlike many viruses that are transmitted through casual contact, HIV, HCV and infectious HBV are transmitted through risk behaviors that involve close personal and physical contact between infectious and susceptible individuals (Neaigus, 1998). Interventions at this level have the
potential to reach many of those at risk, not only those who come into direct contact with the intervention efforts, but also through indirect intervention contact when participants share information and risk reduction materials with their personal network members. Therefore, a greater understanding of how networks influence women’s HIV risk behavior would assist in the development of network interventions targeted at women.

**Structural risk factors**

Several researchers have suggested that social and economic structural factors linked to the circumstances under which HIV risk occurs play a primary role in women’s increased vulnerability to HIV (Aggleton et al., 1994; Amaro, 1995; Gollub, 1999; Mann, 1991; Heise & Elias, 1995; Zierler & Krieger, 1997). A structural factor that may influence women’s HIV risk is access to material and institutional resources that provide for the well being of women and their families, including food, clothing, housing, medical care and necessary social services, which, for women who use drugs, may be particularly linked to children, unemployment and disability. However, detailed information concerning the relationship between access to resources, as well as the sources of and control over these resources, and HIV infection constitute a missing link in understanding why HIV and other transmissible pathogens are spreading so quickly among women who use drugs in the US.

Although women who use drugs continue to have access to a greater level of institutional support than men who use drugs, this is largely due to low-income women having to bear the cost, burden, and responsibility of child care (Kane, 1991; Liebow, 1967; Rosenbaum, 1981). Despite the large financial and social burdens of low-income women, they have few opportunities to increase their access to legal sources of income and many have to resort to obtaining income illegally, many by engaging in sex work (Kane, 1991). Sex work is a risk factor for infection with HIV and a number of other sexually transmitted infections (Ward, Day & Weber, 1999). Sex work is also an important source of income for a significant minority of women who use drugs, and may initially be viewed by women as a temporary situation to solve an otherwise insurmountable crisis, such as avoiding eviction (Silbert, Pines & Lynch, 1982; Wallace, Fullilove & Fisher, 1996; Weeks, Grier, Romero-Daza, Puglisi-Vazquez & Singer, 1998). Women who engage in sex work often do so to provide monetary income to support their children and their sex partners (Bourgois & Dunlap, 1993; Silbert et al., 1982).

For women who use drugs, sex work is also a major source of income for purchasing drugs. Given the material reality for engaging in sex work, ethnographers report that many women who trade sex approach HIV risk realistically and try to reduce work related harm through consistent condom use with their customers; however, the ability to consistently require condom use with commercial contacts has been found to vary greatly by the level of economic resources available to individual women and by the extent of their drug use (Weeks et al., 1998). Women who use drugs may be at high risk from sex work because they may be more likely than other women to engage in unprotected sex with customers; to engage in sex risk practices, such as anal sex; and may have more customers, thereby increasing their risk of exposure. However, much research suggests that the greatest HIV risk faced by sex workers, as well as by other women who use drugs, is through relationships with their primary sex partners; that is, within dyadic relationships (e.g. Ward et al., 1999). For women who use drugs, these partners are often men who inject drugs.

While researchers suspect that resource disadvantage is a source of risk for women in terms of disease transmission (Aggleton et al., 1994; Gollub, 1999; Heise & Elias, 1995), what little information there is concerning the direct and indirect impact of social and economic factors on HIV risk is currently theoretical or speculative (e.g. Wise, Chavkin & Romero, 1999). However, some hypotheses may be advanced. For example, the opportunity structure afforded women who use drugs in terms of finding stable relationships with non-drug using sex partners may be influenced by identifiable structural features, such as changes in welfare policies. The impact of these identifiable structural features could affect network level variables (e.g., turnover in sex partnerships), which could then influence the pool of sex partners available to women who use drugs, leading to a situation where the dynamics of risk within sex partnerships where drug use may be prominent play out at the individual level. There is some evidence to support this series of interrelationships.

Unstable relationships may be influenced by men’s or women’s movements into and out of networks because of direct or indirect social and economic factors (e.g., imprisonment, death from violence or AIDS, or a lack of a stable resource base). (Liebow, 1967; Hoffmann et al., 1997; Wallace, 1990; Wallace et al., 1996). Women who use drugs may be unable to attract male sex partners who do not use drugs, because of community norms wherein women who use drugs are held in low regard, even by men who use drugs (Rosenbaum, 1981; Barnard, 1993; Bourgois & Dunlap, 1993). Children may also act as structural barriers for women who use drugs and who would like to implement risk reduction. Women with children may hide their drug use to escape the social approbation placed upon them as mothers who use drugs (Rosenbaum, 1981; Barnard, 1993). The risk of losing their children may force women to rely on
sex partners or other network members to supply them with drugs and paraphernalia, may oblige them in an asymmetrical fashion to their network members, and potentially removes their control over the means of risk reduction (Barnard, 1993; Powis et al., 1996).

Given the dramatic changes in public assistance programs that have occurred in the US through welfare legislation enacted in 1996 (the Personal Responsibility Work Opportunity and Reconciliation Act), it is likely that the dynamics surrounding access to resources have changed greatly and that informal resource support plays an increasingly important role. However, women who use drugs may quickly use up resources supplied by non-institutional sources, such as family and close network members. These network members also tend to have increasingly limited resources and, further, may deem relations with women who use drugs as problematic. Non-drug using network members may eventually be forced to sever ties with women who use drugs because of economic and/or emotional reasons (Belle, 1982; Rook, 1984). This reality may further increase the risk of infection experienced by low income women who use drugs.

**Future directions in prevention for women who use drugs**

This review of known and suspected HIV risk factors for women who use drugs suggests that transmission dynamics are influenced by actions and situations occurring at multiple levels. However, most HIV risk reduction interventions have been conducted at the level of the individual (Drucker, Lurie, Wodak & Alcabes, 1998; Ickovics & Yoshikawa, 1998). Moreover, women who use drugs face significant barriers in accessing drug treatment programs (Chavkin, 1990), arguably the single most efficient and widely available means of HIV/AIDS prevention currently in existence (Drucker et al., 1998; Metzger et al., 1993; Serpelloni et al., 1994).

Some recent HIV preventive efforts have adopted a network approach and show promise as intervention tools to reduce both sex and drug use risk for women who use drugs. For example, secondary syringe distribution (i.e., satellite syringe exchange), in which one person exchanges numerous syringes on behalf of a network of injecting drug users, has become a topic of research interest (e.g., Valente, Foreman, Junge & Vlahov, 1998). This network-based drug use risk reduction approach, which was initiated by the drug users themselves, may be particularly promising in efforts to assure that women gain some control over their means of drug use risk reduction.

At another level of intervention, that of dyadic relationships, a project consisting of sex risk reduction counseling sessions with HIV serodiscordant couples experienced no seroconversions among project participants (Padian et al., 1993). These data suggest that it is possible to implement successful preventive interventions for women at levels other than the individual. In fact, Neaigus (1998) has recently provided practical suggestions as to how interventionists may develop and evaluate network interventions at multiple levels, as well as analyzing the benefits and limitations of this approach at each social level of intervention.

**Conclusion**

From the studies discussed above, it is clear that risk for infection with HIV, as well as with HBV and HCV, for US women who use drugs occurs at multiple levels that include biological, behavioral, dyadic relationship, network, and structural. In particular, research on risk factors for HIV among women who use drugs has increasingly found that the character and dynamics of relationships with sex partners is an important determinant of risk, both for engaging in risk behaviors and for doing so with high-risk partners. However, the influence of higher-order causal level factors, particularly the influence of network and social and economic structural factors, are the least well documented among women who use drugs, but are posited by several researchers to be a principal underlying cause of the current differential HIV incidence rates between men and women who use drugs (Aggleton et al., 1994; Amaro, 1995; Gollub, 1999; Heise & Elias, 1995; Mann, 1991; Zierler & Krieger, 1997).

Future research should focus on higher-order causal levels, in order to better understand disease transmission dynamics; to better evaluate the limitations, as well as the opportunities, of current intervention efforts; to develop interventions that improve and supplement current HIV prevention efforts among women who use drugs; and to inform public policy debate. However, research can only document how the highest causal levels function and interact; ultimately, the control of the highest-order causal levels is in the realm of politics and public policy.

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