

Boundary-crossing and drug use among young adults in a low-income, minority, urban neighborhood

Peter L. Flom

Samuel R. Friedman

Alan Neaigus

Milagros Sandoval

National Development and Research Institutes, Inc., New York, USA

This paper examines the relationship between boundary-crossing sexual partnerships (i.e., those between partners who are 5 or more years older, of a different race or ethnicity, or live in a different neighborhood or borough) and use of crack or injected drugs among young adults in Bushwick, Brooklyn. Women who smoked crack or injected drugs were more likely to have a sexual partner who was older, of a different race/ethnicity, or from a different borough than were women who did not use these drugs; men who used these drugs were more likely to have older sex partners than men who did not. Young people who use these drugs are known to be at higher risk of having HIV and a number of other sexually-transmittable infections such as hepatitis B, genital herpes, and syphilis. The results of this paper imply this risk may be even higher for people who cross these boundaries. In addition, if these young people become infected, they may be particularly likely to serve as a gateway for spreading infection to other social groups.

INTRODUCTION

One important issue in population epidemiology is whether sexually transmitted diseases (STDs) such as HIV and Herpes Simplex type 2 (HSV2) cross social boundaries such as age, race, and geography. This is clearly shaped by sexual networks, since young crack smokers and drug injectors are much more likely to be infected with HIV and other STDs than the general population is. (Buchacz *et al.*, 2000; DiCarlo, Armentor, and Martin, 1995; Edlin *et al.*, 1994; Ellen, Langer, Zimmerman, Cabral, and Fichtner, 1996; Fleming *et al.*, 1997; Friedman *et al.*, 1999; Garfein, Vlahov, Galai, Doherty, and Nelson, 1996; Gunn, Montes, Toomey *et al.*, 1995; Mertz, Weiss, Webb *et al.*,

1998; Rolfs, Goldberg, and Sharrar, 1990; Schwarcz, Bolan, Fullilove *et al.*, 1992; Zenilman, Hook, Smith, Rompalo, and Celentano, 1994). We explored whether crack smokers and drug injectors have sexual networks that are particularly prone to cross social and geographical boundaries.

This type of boundary crossing is important for several reasons. First, as noted above, it has clear implications for the spread of HIV and sexually transmitted infections generally. Drug injectors and, to a lesser extent, crack smokers, may be a core group (Thomas and Tucker, 1996) and core groups have been shown to be important for the establishment and persistence of numerous infections, including HIV (Anderson and May, 1992; Boily, Lowndes, and Alary, 2002; Hethcote and York, 1984). Second, some of these relationships (especially those where the man is older than the woman (Alan Guttmacher Institute, 1994; Males, 1995, cited in Zierler and Krieger, 1997) or where the man is white and the woman is not) may be likely to have particularly unequal power relationships, and power in relationships is related to HIV-risk behaviors (Amaro, 1995; Bowleg, Belgrave, and Reisen, 2000).

Third, HIV may be concentrated in certain neighborhoods within cities. In San Francisco in 1998, 70% of all people diagnosed with AIDS lived in six of the city's 26 ZIP codes.¹ The incidence of new-borns diagnosed with AIDS in New York City by ZIP code ranged from 0 to 4.1%.² This concentration may make certain neighborhoods more likely to contain core groups, and makes inter-neighborhood boundary crossing important.

Research on injection networks of IDUs in Bushwick found that 1) having a partner of a different race/ethnicity helped predict the higher HIV-seroprevalence among Puerto Rican IDUs than among others (Jose, 1996) and having a partner who was 5 or more years older than the subject predicted HIV serostatus among injectors in general and among young and female injectors in particular (Friedman, Curtis, Neaigus, Jose, and Des Jarlais, 1999). Kottiri (2002) and his colleagues found that, in Bushwick, "racially/ethnically discordant risk partnerships involving black IDUs may function as bridges of transmission [of HIV] between groups" (p. 95). Similar patterns may be found among the sexual-risk networks of a more general population, and one purpose of this paper is to explore these networks. In summary, there is substantial theoretical and empirical evidence to indicate that HIV-risk between couples of different ages, different races/ethnicities, and different neighborhood is important to study, and this paper is one part of such study.

Methods

The data for this paper come from a survey of 18-24 year old youth in Bushwick, a low-income minority neighborhood in Brooklyn, New York with a population of approximately 100,000. Drug use and drug selling are widespread in Bushwick (Curtis, Friedman, Neaigus, Goldstein, and Ildefonso, 1995; Friedman, Flom, Jose *et al.*, in press; Maher, 1997; New York State Office of Alcoholism and Substance Abuse Services, 1992) as are some STIs, including herpes simplex virus (type 2) and chlamydia among 18 – 21 year olds (Friedman *et al.*, 1997).

We included two sub-samples: A probability sample of household youth, and a targeted sample of youth who use cocaine, heroin, crack or injected drugs. We did this in order to have a sufficient number of users of these drugs for analysis (i.e. to have reasonable statistical power). While there are important advantages to using a probability sample, there are also important advantages to using a

¹ Available online at http://www.nccsf.org/6%20Community_Assessment/Report_San_Francisco/Aids-sf.pdf

² Available online at <http://www.health.state.ny.us/nysdoh/aids/98/aidsny3.pdf>

targeted sample to study rare, sensitive, or illegal behaviors. In our household sample, only 1.1% of the subjects had smoked crack in the past year, and less than 0.6% had injected drugs. In our combined sample, there were 28 people (5.3%) who had injected drugs; to obtain this number from a household sample would have required a sample of approximately 5,000 people, which would have been prohibitively expensive in terms of both time and money. This combined sample is not representative of any general population, but it is the only type of sample which would allow these relationships to be understood. Additionally, users of the most stigmatized drugs may be under-represented in the household sample (Friedman *et al.*,1997).

Subjects were interviewed with informed consent, and were offered a range of tests for STDs and HIV. Subjects were assured of the confidentiality of their responses and of the results of all tests (except insofar as public health regulations require reporting of active STDs). Subjects were paid \$20 for completing the interview, and an additional \$10 for giving blood and urine specimens.

Household sample

Probability sampling of household youth was accomplished through a multistage sampling design. The first stage was the random selection of face-blocks. A face-block is both sides of one street between adjacent city streets. As of the start of the project (April, 1996), there were 577 face-blocks in Bushwick. Face-blocks, rather than city blocks, were chosen in order to use social interaction effects to help the recruitment process by quickly establishing the field staff as trustworthy people; and prior ethnographic research showed that social interaction in Bushwick takes place more often among neighbors on face-blocks (i.e. along and across a street) than with persons around the corner or across a back yard (Friedman *et al.*,1997). Face-blocks were screened sequentially, after being ordered randomly. One face-block could not be sampled because of intense hostility to our interviewers.

Young adults (18-24 years old) living in the household for at least 14 consecutive days prior to the screening were eligible for this study. Attempts were made to screen each dwelling unit. Screening was mainly conducted door-to-door; if the initial attempt failed to confirm the presence or absence of age-eligible residents, repeated attempts were made to screen each dwelling unit, and a variety of methods were used to determine the presence or absence of eligible persons in each dwelling unit. If more than one eligible person lived in a particular unit, one was randomly chosen. Extensive attempts were made to encourage selected individuals to take part in the study. The 43 selected face-blocks contained 2675 dwelling units, 90% of which (2404) were screened. Of the screened dwelling units, 21% (499) had an eligible resident. Of the 499 eligibles, 73% (364) were interviewed; one subject completed only part of the interview, and is not included in the results.

Targeted sample

The targeted sample of young adults who used heroin, cocaine, crack, or injected drugs in the last 6 months were recruited by a combination of ethnographically-based targeted sampling in drug use venues and chain-referral by household and targeted-sample participants. Age and residence eligibility were determined through at least one form of identification (such as driver's license, school ID, etc.).

All subjects, whether recruited as part of the targeted or the household sample, were asked to recruit other 18-24 year old Bushwick residents whom they had listed in their 12-month networks (defined below) as users of cocaine, heroin, crack, or any injected drugs. For each such eligible participant they brought in they received a \$5 finder's fee. Some respondents also functioned as auxiliary

recruiters and brought in age-eligible Bushwick residents who used heroin, cocaine, crack or injected drugs and who were not originally listed in their 12-month network. The use of chain-referral may bias the sample in that more extroverted or popular people, or those with high degree centrality, may be more likely to be nominated (Rothman and Greenland, 1998). However, it is not possible to obtain a truly random sample of the population of drug users and others have used similar strategies to study hidden populations (Braunstein, 1993; Watters and Biernacki, 1989).

Data Collection

Data were collected by face-to-face structured interview; the first interview was conducted in July, 1997, and the last in June, 2000. The interviews lasted between 1.5 and 2.5 hours, and were conducted either in our Bushwick storefront or in the respondent's homes (if privacy could be assured). The main part of the questionnaire was administered by trained interviewers, who were fully bilingual in Spanish and English. Most interviewers had extensive ties to the community.

The questionnaire focuses on issues of drug use and its relationship to behaviors and to network characteristics that may put youth at risk for HIV or STDs. Relevant parts of the questionnaire include questions on use of marijuana, cocaine, crack, heroin, and injected drugs in the past 12 months, as well as on sexual behaviors and networks. In addition, urinalysis for drug metabolites was performed prior to the interview; this may have had a "pipeline" effect in increasing the accuracy of self-report of drug use (Hamid, Deren, Beardsley, and Tortu, 1999); that is, the knowledge that they were going to be tested may have decreased the likelihood of false negative self-report.

Each subject was asked to name up to 3 people with whom they had had sex in the last year. They were then asked to supply a variety of information about each of these (and other) network links; relevant here are questions about their age, race, and location of residence. We compared data from the "behavioral section" of the questionnaire in which we asked them how many people they had had sex with in the past 12 months with data collected in the network section. If the two values were logically incompatible (e.g. they said they had had sex with only two people in the last year, but named three partners), we labeled them 'discordant'. Among those who did not use crack or inject drugs, there was very low discordance (15/459; 3.3%). Among the users of crack and injection drugs, discordance was somewhat higher (9/69; 13%). These nine people did not fall into any particular pattern; six named more people in the behavioral section, and three named more in the network section.

Dependent variables

The dependent variable was boundary-crossing, which we operationalized in five ways:

- 1) Having any sex partner five or more years younger than the subject;
- 2) having any partner five or more years older than the subject;
- 3) having one of a different race or ethnic group (where the categories were defined as Latino, non-Latino Black, non-Latino White, and other);
- 4) having any partner from a different neighborhood (i.e. outside of Bushwick)³; and
- 5) having any partner from outside of Brooklyn. While it would have been useful to be able to analyze the amount of boundary-crossing of each type (e.g., the number of partners who were

³ This was operationalized by asking the subject what neighborhood the partner lived in. No list of neighborhoods was read.

five or more years older, rather than simply whether there were any), our data do not permit this, as detailed information was collected only on those partners named in the network. Although many participants named all their partners, this was not true for those who had more than three partners, nor for everyone with less than three, since not all participants who had three partners named all of them in the network section.

Independent variables

The main independent variable was whether a participant had injected drugs or smoked crack in the last year.

Analysis

Because the sex networks of men and women tend to be quite different, we present the data analyzed separately for men and women. This does not allow us to determine the statistical significance of differences between men and women, but it does focus attention on gender-specific network patterns, which is important because both disease transmission probabilities and power relations may vary by gender. In order to determine the significance of differences, we also ran the analyses using sex and the interaction between sex and use of crack or drug injection. We indicate significant differences in the tables.

Analyses are presented below three ways: First, without any controls; second, with controls for number of sexual partners named in the network section; and third, controlling for both number of partners named and for age and racial/ethnic group of the subject (Latino/a vs. not). This is done because the analyses serve different purposes. The analysis without control for number of partners is more important for describing the potential spread of STDs. This is so because the spread of STDs does not depend on the reasons why boundary crossing takes place, but simply on its extent. The two models with statistical controls are more important for determining whether anything about the crack smokers and drug injectors other than their larger average number of partners might increase their likelihood of having boundary-crossing partnerships. The model controlling only for number of partners shows which types of boundary crossing are more or less likely among crack smokers and IDUs than among others, per relationship (rather than overall). The model with additional controls shows whether it is the race or age of the subject which is accounting for these differences.

Results

Of the 528 subjects, 363 (69%) came from the household sample; 289 (55%) were male; 78% were Latino, and 16% were African-American; 78% had never been married, 7% were legally married, and 11% were informally married or living together. Most (58%) had neither graduated from high school nor received a GED; of those who had neither, 27% were currently in school or a training program; of those who had either graduated high school or gotten a GED, 36% were in school or a training program. Just under a third (31%) were currently employed. Median household income in the past year was \$16,700. One-quarter of the subjects (141, or 27%) had been incarcerated, 16% (82) in the last 12 months. People in the targeted sample were more likely than those in the household sample to be male (78% vs. 44%, $p < .001$), and Latino (95% vs. 78%, $p < .01$), and less likely to have graduated from high school or gotten a GED (32% vs. 47%, $p < .001$), or to be employed (20% vs. 36%, $p < .001$). There were no significant differences between the two samples on marital status or household income.

Just over a third (187, or 35%) of the subjects had not used any illicit drug in the last 12 months; 136 (26%) had used only marijuana, 91 (17%) had used noninjected cocaine other than crack (and neither injected any drug nor used heroin), 46 (9%) had used noninjected heroin (and not injected any drug or smoked crack), 40 (8%) had smoked crack but not injected any drug, and 27 (5.4%) had used injected drugs.

There was substantial boundary crossing (see Table 1), although few subjects had younger partners (19 men and 3 women); no further analysis of the younger partner data was conducted because the small numbers did not permit analysis. More than a third of women (92 of 239, or 39%) and more than a quarter of men (81 of 289, 28%), had at least one partner who was five or more years older than they were. About a quarter of both men and women had at least one partner of a different racial/ethnic group, and about half had at least one partner from outside Bushwick.

Table 1. Levels of boundary crossing (entire sample)

Type of boundary crossed	Females (N = 239)	Males (N = 289)
Had at least one sexual partner five or more years younger	3 (1.2%)	19 (6.6%)
Had at least one sexual partner five or more years older	92 (39%)	81 (28%)
Had at least one sexual partner of different racial/ethnic group	61 (26%)	67 (23%)
Had at least one sexual partner from outside Bushwick	110 (54%)	154 (58%)
Had at least one sexual partner from outside Brooklyn	27 (14%)	56 (21%)

Male and female crack smokers and drug injectors were substantially and significantly more likely than nonusers of these drugs to have older partners, and women who smoked crack or injected drugs were more likely to have partners of a different racial/ethnic group, and to have partners from outside Brooklyn than women who did not (see Table 2).

Table 2. Relationship between being a crack smoker or drug injector and boundary crossing

Type of boundary crossed	Females (N = 239)		Males (N = 289)	
	OR	95% CI	OR	95% CI
Partner five or more years older	7.78	3.03-19.98	2.73	1.38-5.41
Partner of different racial/ ethnic group	2.41	4.58-26.85	1.31 ^b	0.61-2.78
Partner from outside Bushwick	2.05	0.88-4.75	1.39	0.68-2.87
Partner from outside Brooklyn	3.41	1.32-8.86	1.10 ^a	0.47-2.57

^a Main effect of sex significant

^b Interaction between sex and use of crack or IDU significant

Most of these effects remained significant after controlling for number of partners identified, but the female crack smokers and drug injectors were no longer significantly more likely to have had a partner outside Brooklyn (see Table 3); when, in addition, age and racial/ethnic group were controlled for (see Table 4), the only significant effect was that females who smoked crack or injected drugs were more likely to have a partner of a different racial/ethnic group. In addition, there was

some evidence that both males and females who smoked crack or injected drugs were more likely to have a partner five or more years older than they were; although this was not statistically significant, the effect sizes were fairly large, and, for females, larger than when age and race/ethnicity were not controlled. The general pattern of results was similar when members of the targeted sample who did not smoke crack or inject drugs were deleted.

Table 3. Relationship between being a crack smoker or drug injector and boundary crossing, adjusted for number of partners

Type of boundary crossed	Females (N = 239)		Males (N = 289)	
	AOR	95% CI	AOR	95% CI
Partner five or more years older	2.22	1.09-4.59	3.12 ^a	1.09-8.92
Partner of different racial/ethnic group	5.09	1.90-13.62	0.83 ^b	0.36-1.89
Partner from outside Bushwick	0.61	0.21-1.80	0.88	0.44-1.94
Partner from outside Brooklyn	0.34	0.07-1.69	0.46	0.17-1.28

^a Main effect of sex significant

^b Interaction between sex and use of crack or IDU significant

Table 4. Relationship between being a crack smoker or drug injector and boundary crossing, adjusted for number of partners, and for subject's race and age.

Type of boundary crossed	Females (N = 239)		Males (N = 289)	
	AOR	95% CI	AOR	95% CI
Partner five or more years older	2.78	0.94-8.23	2.03 ^a	0.98-4.22
Partner of different racial/ethnic group	4.77	1.71-13.31	0.82 ^b	0.35-1.94
Partner from outside Bushwick	0.5	0.16-1.54	0.9	0.40-2.02
Partner from outside Brooklyn	0.5	0.17-1.55	0.51	0.18-1.45

^a Main effect of sex significant

^b Interaction between sex and use of crack or IDU significant

Conclusions

Female crack smokers and drug injectors are substantially more likely than female nonusers to have one of their listed sexual network members be older, of a different race/ethnicity, and from another borough. All of these may be consequences of the social life patterns of users of these high-risk drugs, but the age and race/ethnicity results may be mediated by number of partners. However, the overall message is that smoking crack and injecting drugs are related to both a greater number and a more diverse set of sexual partners. Among males, there is a similar relationship for age boundary-crossing, but the other relationships are not statistically significant, and are not large.

It should be noted that the differences in boundary-crossing between subjects who smoke crack or inject drugs and those who do not are not due to commercial sex work. While crack smokers and

drug injectors were more likely to engage in commercial sex work, the results in this study come from people named as partners. We asked the subjects what relationship the partner was to them, and none were commercial partners.

It should also be noted that none of these results imply any particular causal pathway; in an observational study such as this, alternative causal pathways are impossible to rule out. In particular, we cannot infer that something about the drug use behavior itself causes greater boundary crossing; one alternative is that some other characteristic is causing both greater boundary crossing and use of crack or injected drugs.

It is possible that some of these boundary-crossing behaviors, while increasing the possibility of spread of HIV or other STIs from group to group, may be perceived (rightly or wrongly) by the subjects as decreasing their own risk. For instance, if a subject believes that people in Bushwick are more likely to be HIV-positive than people in other neighborhoods, than having partners from another neighborhood might be perceived as safer.

These findings are important for modeling the spread of infectious diseases. Earlier research has shown that crack smokers and drug injectors tend to have more partners than people who do not use these drugs (Flom *et al.*, 2001). It is also important to consider who these partners are. Even among the partners they were allowed to describe, there is a tendency for young female crack smokers and drug injectors to have more partners outside their own age group, outside their race/ethnicity, and from different geographic locations; and for young male crack smokers and drug injectors to have older partners. Given that crack smokers and drug injectors tend to have a great many more sexual partners (in our data, males who either smoked crack or injected drugs had an average of 17 partners, and female crack smokers or drug injectors an average of 44) than non-users of these drugs (in our data, male non-crack smokers or drug injectors had an average of 2.8 partners, and females an average of 1.3), the effects of this boundary-crossing will be magnified. That crack smokers and drug injectors have a greater number of partners implies that they may be at risk for becoming infected with viral STDs such as HIV or HSV-2 from older partners. If they become infected, they may be gateways for the transmission of STDs into their local community and/or race or ethnic group and outside it. It also suggests that, if crack smokers and drug injectors in a locality become a core group for a disease (due to their internal patterns of sexual and perhaps injecting relationships and behaviors; and to their potentially-restricted access to medical care), they might transmit these infections across social boundaries.

These results suggest that harm reduction, drug treatment, and STD services should be made easily available to crack smokers and drug injecting youth in order to protect them and also to slow the diffusion of diseases through communities.

REFERENCES

- Alan Guttmacher Institute. 1994. *Sex and America's teenagers*. New York: Alan Guttmacher Institute.
- Amaro, H. 1995. Love, sex and power: Considering women's realities in HIV prevention. *American Psychologist*, 50: 437-447.
- Anderson, R.M. and R.M. May. 1992. *Infectious Diseases of Humans*. New York: Oxford University Press.
- Boily, M.-C., C. Lowndes, and M. Alary. 2002. The impact of HIV epidemic phases on the effectiveness of core group interventions. *Sexually Transmitted Infections*, 78: 78-90.
- Bowleg, L., F.Z. Belgrave, and C.A. Reisen. 2000. Gender roles, power strategies, and precautionary sexual self-efficacy: Implications for Black and Latina women's HIV/AIDS protective behaviors. *Sex Roles*, 42: 613-636.
- Braunstein, M.S. 1993. Sampling a hidden population: Noninstitutionalized drug users. *AIDS Education and Prevention*, 5: 131-139.
- Buchacz, K., W. McFarland, M. Hernandez, J.D. Klausner, K. Page-Shafer, N. Padian, F. Molitor, J.D. Ruis, G. Bolan, S. Morrow, and M.H. Katz. 2000. Prevalence and correlates of herpes simplex virus type 2 infection in a population-based survey of young women in low-income neighborhoods of northern California. *Sexually Transmitted Diseases*, 27: 393-400.
- Curtis, R., S.R. Friedman, A. Neaigus, M. Goldstein, and G. Ildefonso. 1995. Street-level drug market structure and HIV risk. *Social Networks*, 17: 219-228.
- DiCarlo, R.P., B.S. Armentor, and D.H. Martin. 1995. Chancroid epidemiology in New Orleans men. *Journal of Infectious Diseases*, 172: 446-452.
- Edlin, B.R., K.L. Irwin, S. Faruque, C.B. McCoy, C. Word, Y. Serrano, J.A. Inciardi, B.P. Bowser, R.F. Schilling, S.D. Holmberg, and The Multicenter Crack Cocaine and HIV Infection Study Team. 1994. Intersecting epidemics - Crack cocaine use and HIV infection among inner-city youth. *The New England Journal of Medicine*, 331: 1422-1427.
- Ellen, J.M., L.M. Langer, R.S. Zimmerman, R.J. Cabral, and R. Fichtner. 1996. The link between the use of crack cocaine and the sexually transmitted diseases of a clinic population: A comparison of adolescents with adults. *Sexually Transmitted Diseases*, 23: 511-516.
- Fleming, D.T., G.M. McQuillan, R.E. Johnson, A.J. Nahmias, S.O. Aral, F.K. Lee, and M.E. St.Louis. 1997. Herpes simplex virus type 2 in the United States, 1976 to 1994. *New England Journal of Medicine*, 337: 1105-1111.
- Flom, P.L., S.R. Friedman, S.R. Kottiri, A. Neaigus, R. Curtis, D.C. Des Jarlais, M. Sandoval, and J.M. Zenilman. 2001. Stigmatized drug use, sexual partner concurrency, and other sexual risk network and behavioral characteristics of 18-24 Year old youth in a high-risk neighborhood. *Sexually Transmitted Diseases*, 28: 598-607.
- Friedman, S., R. Curtis, A. Neaigus, B. Jose, and D.C. Des Jarlais. 1999. *Social networks, drug injectors' lives and HIV/AIDS*. New York: Plenum.
- Friedman, S.R., R. Curtis, B. Jose, A. Neaigus, J. Zenilman, J. Culpepper-Morgan, L. Borg, M.J. Kreek, D. Paone, and D.C. Des Jarlais. 1997. Sex, drugs, and infections among youth: Parenterally- and sexually-transmitted diseases in a high-risk neighborhood. *Sexually Transmitted Diseases*, 247: 322-326.

- Friedman, S.R., P.L. Flom, B. Jose, *et al.* (In press.) Youth in a sea of troubles. In P. Venturelli, and E. Dunlap (Eds.), *Inside America's Drug Use*. Needham Heights, MA: Allyn and Bacon.
- Friedman, S.R., P.L. Flom, B. Jose, A. Neaigus, M. Sandoval, R. Curtis, J.M. Zenilman, J. Yuenger, K. Schmidt, and D.C. Des Jarlais. 1999. Drug use and STIs among youth in a high risk neighborhood. Paper presented at the International Society for Sexually Transmitted Disease Research, Denver, CO.
- Garfein, R.S., D. Vlahov, N. Galai, M.C. Doherty, and K.E. Nelson. 1996. Viral infections in short-term injection drug users: The prevalence of the hepatitis C, hepatitis B, human immunodeficiency, and human T- lymphotropic viruses. *American Journal of Public Health*, 86(5): 655-661.
- Gunn, R.A., J.M. Montes, K.E. Toomey, *et al.* 1995. Syphilis in San Diego County 1983-1992: crack cocaine, prostitution, and the limitations of partner notification. *Sexually Transmitted Diseases*, 22: 60-66.
- Hamid, R., S. Deren, M. Beardsley, and S. Tortu. 1999. Agreement between urinalysis and self-reported drug use. *Substance Use and Misuse*, 34: 1585-1592.
- Hethcote, H., and J. York. 1984. *Gonorrhea transmission dynamics and control*. Berlin: Springer Verlag.
- Jose, B. 1996. *Racial/Ethnic differences in the prevalence of HIV-1 infection among injecting drug users: social and behavioral risk factors*. Unpublished doctoral dissertation, Fordham University, Dept. of Sociology.
- Kottiri, B.J., S.R. Friedman, A. Neaigus, R. Curtis, and D.C. Des Jarlais. 2002. Risk networks and racial/ethnic differences in the prevalence of HIV infection among injection drug users. *Journal of Acquired Immune Deficiency Syndromes*, 30: 95-104.
- Maher, L. 1997. *Sexed Work: Gender, race and resistance in a Brooklyn drug market*. Oxford: Oxford University Press.
- Males, M.A. 1995. Adult involvement in teenage childbearing and STD. *Lancet*, 340: 64-65.
- Mertz, K.J., J.B. Weiss, R.M. Webb, *et al.* 1998. An investigation of genital ulcers in Jackson, Mississippi, with use of a multiplex polymerase chain reaction assay: high prevalence of chancroid and human immunodeficiency virus infection. *Journal of Infectious Diseases*, 178: 1060-1066.
- New York State Office of Alcoholism and Substance Abuse Services. 1992. *An Assessment of Drug Abuse: The northern half of Brooklyn*. New York: New York State Office of Alcoholism and Substance Abuse Services.
- Rolfs, R.T., M. Goldberg, and R.G. Sharrar. 1990. Risk factors for syphilis: Cocaine use and prostitution. *American Journal of Public Health*, 80: 853-857.
- Rothman, K.J., and S. Greenland. 1998. *Modern Epidemiology*. Philadelphia: Lippincott, Williams and Wilkins.
- Schwarcz, S.K., G.A., Bolan, M. Fullilove *et al.* 1992. Crack cocaine and the exchange of sex for money or drugs: Risk factors for gonorrhea among black adolescents in San Francisco. *Sexually Transmitted Diseases*, 19: 7-13.
- Thomas, J.C., and M.J. Tucker. 1996. The development and use of the concept of sexually transmitted disease core. *Journal of Infectious Diseases*, 174: 134-143.
- Watters, J.K., and P. Biernacki. 1989. Targeted sampling. *Social Problems*, 36: 416-430.

Zenilman, J.M., E.W. Hook 3rd, M. Shepherd, P. Smith, A.M. Rompalo, and D.D. Celentano. 1994. Alcohol and other substance use in STD clinic patients: relationships with STDs and prevalent HIV infection. *Sexually Transmitted Diseases*, 21: 220-225.

Zierler, S., and N. Krieger. 1997. Reframing women's risk: Social inequalities and HIV infection *Annual Review of Public Health*, 18: 401-436.