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ORIGINAL ARTICLE

Symbiotic Goals and the Prevention of Blood-Borne Viruses Among Injection Drug Users

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A positive-deviance control–case life history study of injection drug users (IDUs) in New York City who had injected drugs for 8–15 years compared 21 IDUs who were antibody negative for both HIV and hepatitis C with 3 infected with both viruses and 11 infected with hepatitis C virus but not HIV. Eligible subjects were referred from other research studies and from community organizations that conduct testing for HIV and hepatitis C virus. Data were collected during 2005–2008 and were analyzed using life history and grounded theory approaches. They support grounded hypotheses that IDUs who are able to attain symbiotic goals like avoiding withdrawal and maintaining social support are assisted thereby in remaining uninfected with HIV or hepatitis C. These hypotheses should be tested using cohort studies and prevention trials to see if helping IDUs attain symbiotic goals reduces infection risk. The study's limitations are noted.

Keywords HIV, hepatitis C, prevention, injection drug user, positive deviance, symbiotic goals, structural interventions

BACKGROUND

Most efforts to prevent HIV or hepatitis C transmission among injection drug users (IDUs) have either relied upon syringe exchange and/or increasing pharmacy access to syringes or else have used health education approaches such as those suggested by cognitive-behavioral or other theories that center around helping injectors meet one type of goal: to avoid HIV and/or hepatitis C transmission. Although these approaches—and particularly syringe exchange—have had considerable effectiveness in reducing HIV transmission rates in New York City (Des Jarlais, Perlis, Arasteh, Torian, Beatrice et al., 2005), they have reduced hepatitis incidence by much less—probably because of the greater infectivity of hepatitis C (Des Jarlais, Perlis, Arasteh, Torian, Hagan et al., 2005; Friedman, Mateu-Gelabert, Sandoval, Hagan, & Des Jarlais, 2008). In addition, despite these interventions, some behavioral risk for HIV transmission remains—much of it involving sexual transmission (Des Jarlais et al., 2004). These issues are discussed elsewhere in this issue.

Although most prevention research has focused on ways in which public health agencies or other providers can act so as to help prevent transmission, there is another important strand to prevention—that of "indigenous" approaches that have been developed by IDUs themselves (Courtwright, Joseph, & Des Jarlais, 1989; Des Jarlais, Joseph, & Courtwright, 1985). As we have recently summarized this literature (Friedman et al., 2007), IDUs in New York recognized that there was a new fatal disease among them by the late 1970s, well before science knew AIDS existed, and took steps to protect themselves well before public health agencies took action. As we discussed in that article, IDUs in Rotterdam, Buenos Aires, and Central Asia, as well as other locations, also acted to protect themselves.

Since these initial efforts at self-protection, of course, public health interventions and scientific research have become available for injectors to make use of in their efforts to protect themselves and others.

Importantly, IDUs have other goals as well as staying uninfected. These goals include, but are not limited to, making sure that they do not go into drug withdrawal and maintaining social ties with people who can provide them with money, drugs, or other resources (Connors, 1994; Courtwright et al., 1989; Mateu-Gelabert et al., 2005).

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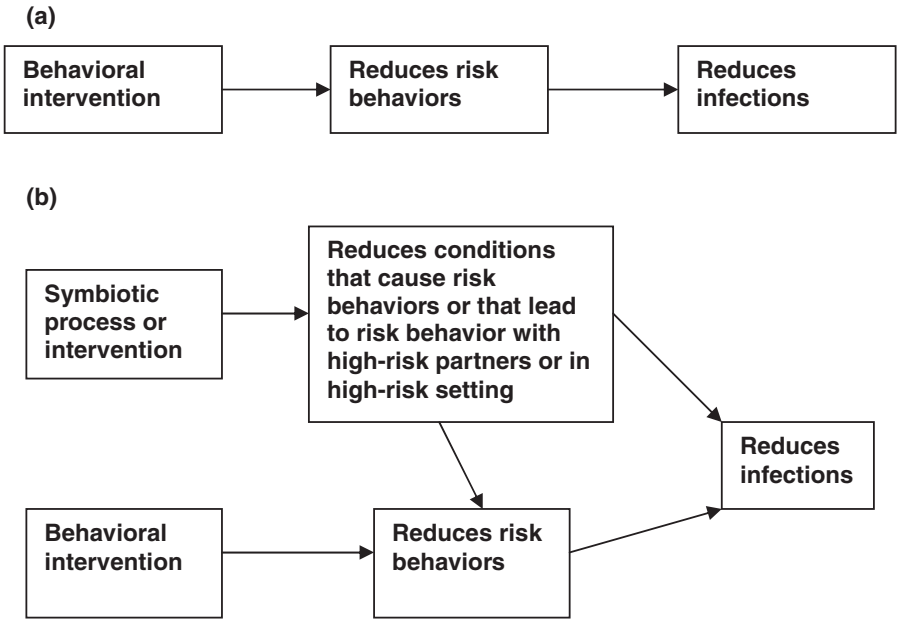

FIGURE 1. (a) The standard model of behavioral risk reduction; (b) the symbiotic model of risk reduction.

The literature on HIV prevention—whether that investigating public health interventions or that studying indigenous risk reduction—has mainly seen these as barriers to or facilitators for behavioral risk reduction motivated by the desire to avoid infection. Bourgois (1998), for example, graphically portrays instances in which social relations of distrust among drug users combine with the difficulties in obtaining drugs to stave off withdrawal to create situations in which drug paraphernalia are shared.

Here, we describe another theoretical approach to understanding how IDUs remain uninfected—an approach that might also be extended to other populations in which many members have several goals. We investigate whether some of these other goals are "symbiotic" in the sense that attaining these goals that are not directly focused upon disease prevention may nonetheless help reduce transmission risk.

Figure 1 provides a general overview of the kind of process we mean and where it might fit into avoiding infection. This article, then, considers evidence that such processes might be important in understanding how some IDUs avoid infection with HIV and hepatitis C. Engaging with such symbiotic processes might thus be appropriate pathways for public health prevention campaigns.

METHODS

The Staying Safe project utilizes a new "positive-deviance control–case life history" design elsewhere described (Friedman et al., 2008). This project is designed to develop grounded hypotheses about why some long-term injectors remain uninfected with either HIV or hepatitis C whereas most do not. (The concept of "positive deviance" is not new. See Sternin & Choo, 2000; Wray, 1972; Zeitlin, Ghassemi, & Mansour, 1990.)

The research was conducted in New York City. As is clear from Table 1, even by the time IDUs have been injecting for 15 years, a considerable proportion (about 30%) remain seronegative for both HIV and hepatitis C.

We compared qualitative data on the life histories and strategies that 35 New York City IDUs (who had injected drugs for 8–15 years) use to remain safe from various harms. Subjects were referred to us by other research projects that had already tested them for antibodies to each virus and had also notified them of test results. To do this, 21 IDUs who were antibody negative for both HIV and hepatitis C were compared with 3 infected with both viruses and 11 infected with hepatitis C virus (HCV) but not HIV. Interviews were conducted by three experienced qualitative interviewers/ethnographers. The interview began by eliciting a timeline of subjects' lives and then an in-depth narrative exploration of their biographies with some emphasis on their drug use and sexual histories. Subjects were then questioned about how they have maintained access to physical resources and to social support; how they have dealt with the problems of addiction and with requests for assistance from other drug users; how they have maintained income and otherwise how they have related to drug dealers; their tactics and strategies to get drugs, to avoid infection, and to meet other goals; and how their behaviors and strategies have or have not become socially embedded practices. The timeline took, on average, 55 minutes; the subsequent detailed interview averaged approximately 80 more minutes. In cases where we conducted a second interview to elicit more information or to clarify ambiguities in the first interview, these took about 80 more minutes. Participants were reimbursed $40 for their time and trouble for the first interview and $30 for any subsequent interviews. All procedures were approved by the National Development and Research Institute's Institutional Review Board.

TABLE 1. HIV and HCV seroprevalence rates by years of injection for IDUs entering the Beth Israel (New York) detoxification program during 1998–2002[a]

		HIV seroprevalence (%)			HCV seroprevalence (%)			HIV and HCV negative (%)		
Years of injection	*N* for HCV seroprevalence estimate[a]	Total	Male	Female	Total	Male	Female	Total	Male	Female
0–5	117	4	3	5	35	35	33	61	61	63
6–10	74	10	8	18	59	60	58	30	32	26
11–15	66	20	15	34	66	66	67	28	30	22
16–20	53	26	26	30	75	69	100	16	20	0
21+	140	30	30	23	81	80	87	12	12	12

[a]Only a subset was tested for HCV, so the HCV estimates for men and for women have substantial error variance.

Interviews were recorded and transcribed and then coded with ATLAS.ti software, using grounded theory and life-history analysis approaches. This article presents and exemplifies a selected subset of emergent categories that resulted from this analysis. We emphasize four major themes that characterized the activities of some subjects who remained antibody negative to both HIV and HCV. What is reported here are grounded hypotheses about how long-term double-negatives may have avoided becoming infected with either virus during many years of injecting drugs.

Since there is probably an unavoidable stochastic component in remaining HCV negative because some level of potential exposure is all but unavoidable (given the prevalence and infectiousness of HCV and of sometimes-unanticipated opportunities to share drugs), several subjects who were positive for hepatitis C antibody but negative for HIV resemble the double-negatives behaviorally and in their life histories. In three cases where we could determine a brief period during which hepatitis C seroconversion took place, we could identify the probable processes through which they occurred. All three of these events were consistent with the hypotheses developed in this article. (Further description of these cases, however, will require a separate article.)

RESULTS

Tables 2a and 2b provide a listing of our subjects by study ID number, code name we assigned them, HIV and HCV serostatuses, sex, race, ethnicity, and years of injection as well as some summary statistics by serostatuses. Of these 35 subjects, 21 were negative on the antibody tests for both viruses; 11 were HIV negative and hepatitis C positive; and 3 were double-positives. Twenty-eight were men, and seven were women. Almost half (16) were Latino/a; 17 were White; and 2 were Black—which may reflect the relatively low numbers of Blacks who have initiated injection in New York since the early 1990s.

Our ethnographic analyses of these data suggest that, in addition to those behaviors which are usually considered to be HIV/hepatitis C risk reduction—both by researchers and by IDUs themselves—such as obtaining

TABLE 2a. Listing of participants and some of their characteristics

Subjects' ID number	Status *Double-negatives*	Sex	Race/ ethnicity	Years of injection
001	NN	Male	Latino	8
002	NN	Female	White	13
004	NN	Male	Latino	10
006	NN	Male	Latino	14
007	NN	Male	Latino	9
008	NN	Male	Latino	10
009	NN	Male	Latino	10
011	NN	Male	White	
012	NN	Male	Latino	11
013	NN	Male	White	13
014	NN	Female	White	15
015	NN	Male	Latino	15
016	NN	Female	White	8
017	NN	Male	Latino	8
018	NN	Female	Black	10
020	NN	Male	White	9
022	NN	Male	White	13
028	NN	Male	White	10
030	NN	Male	Black	14
033	NN	Male	White	
035	NN	Male	White	
	HIV negative, HCV positive			
019	NP	Male	Latino	8
023	NP	Male	Latino	13
024	NP	Male	White	9
025	NP	Male	Latino	13
026	NP	Male	Latino	11
027	NP	Female	White	11
029	NP	Male	Latino	9
031	NP	Fem	White	
032	NP	Male	White	
034	NP	Male	White	8
036	NP	Male	White	15
	Double-positives			
005	PP	Male	Latino	13
010	PP	Male	Latino	15
021	PP	Female	White	10

TABLE 2b. Summary statistics by status

Antibody statuses	Sex	Race/ethnicity	Mean years injecting
Double-negative	4 female, 17 male	9 Latino, 10 White, 2 Black	11.1
HIV negative, HCV positive	2 female, 9 male	5 Latino, 6 White	10.8
Double-positive	1 female, 2 male	2 Latino, 1 White	12.7

knowledge, avoiding injecting with unsafe syringes or other equipment, and antibody testing aimed at avoiding infection, the IDUs who remain doubly uninfected often combined *intentions* to meet, and some *effectiveness* at meeting, one or more of the following somewhat interconnected other goals: minimizing or avoiding periods during which they experienced drug withdrawal; on occasions when they were unable to take the opiates they needed to prevent withdrawal, finding ways to minimize its impact on them; maintaining social support and resource support from some nonuser relatives, friends, and/or neighbors; and socially embedding ways to avoid risk behaviors and threats to social support in the norms and practices of their injection and support networks. Expectations associated with drug withdrawal have been linked to engaging in high-risk drug-use-related behaviors that can transmit HIV and HCV (Des Jarlais, Friedman, & Strug, 1986; Mateu-Gelabert, Sandoval, Meylakhs, Wendel, & Friedman, 2010; Razani, Mohraz, Kheirandish, Malekinejad, & Malekafzali, 2007). Social support helps injectors maintain lower-risk behaviors and can also provide them with locations in which to inject away from temptations to share drug solutions or equipment (Latkin, Forman, Knowlton, & Sherman, 2003; Mino, Deren, & Yeon-Kang, 2006). Peer norms around drug and sexual behaviors have been shown to affect injectors' behaviors (Friedman, Curtis, Neaigus, Jose, & Des Jarlais, 1999; Latkin et al., 2003); therefore, action to embed safety norms among one's peers can help an IDU avoid high-risk situations and behaviors.

Below, we present materials on how our subjects have implemented these sets of goals. In most cases, we simply list some of the specific techniques they used. The names used are project-assigned code names. All subjects named are double-negatives unless otherwise indicated.

Avoiding Periods in Which They Suffered Drug Withdrawal

Yugo (Subject 013 in Table 2a) has used pain pills (which he has been prescribed for chronic back pain due to his having been in an accident) to "keep himself straight" when he would otherwise experience withdrawal. He began with Percocet, went on to morphine, and since then has been on methadone for pain—which means he hardly ever has problems with withdrawal.

Green Eyes (009) goes into methadone programs when heroin is scarce or he lacks money. As he phrases his current practice, "So, I got so sick those two times. It [*sic*] unbelievable. Since then I always have methadone or a bag or two of heroin so I don't get sick . . . I just make sure that I don't [get] sick . . ."

Patches (020) uses fentanyl patches primarily to increase his high from heroin. However, he also uses it when he has trouble acquiring heroin as a way to avoid feeling dope sick.

Biker (015) has credit from a drug dealer so that he can get drugs even when lack of money would otherwise put him in threat of withdrawal.

Gangster (026), who unlike the subjects just discussed is positive for hepatitis C in spite of engaging in many of the behaviors discussed in this article (see below for the housing-related mishap that may well have resulted in his becoming infected), also uses methadone programs to bring down his tolerance when his need becomes too great to pay for:

> It's like a—not a game, but if you see that your tolerance is too high and you know that it's getting to a point where you can't maintain, you know, spending up to 200 dollars.. . . You need to go somewhere else and you go and you get a bottle of meth. It will hold you down for 2, 3 days. Because now my tolerance is high and I can't afford it, it ain't dinner. So what you do is you would go get a bottle of methadone; you would drink it, maintain, and then bring down, your tolerance.

Similarly, Gangster can always ask family members or very close friends for money when he is in withdrawal—and he makes sure he always pays them back.

By way of contrast to the above discussions on trying to avoid withdrawal and on coping with withdrawal (given below), Lucies (019), who is HCV positive and HIV negative, reports on how he deals with withdrawal:

> Respondent: I'd use anybody's syringe.
>
> Interviewer: You would use anybody's syringe?
>
> Respondent: Yeah. Most of the time, yeah. Like I say, I'd wake up sick. And that's why I'd go get the syringes too far or the day I don't see the guy walking with a bag, getting syringes and cookers and stuff like that. . . . And, and I don't have the energy to go, go get a syringe and then go to the spot and you know, it's, it's really bad. The [dope] sickness and all that stuff.

Sosa (005), a subject who is positive for both HIV and HCV, injects with others who also share syringes when faced with potential withdrawal:

> Interviewer: Was it okay with the other people that you were injecting with to share?
>
> Respondent: If you're injecting with a bunch of people, all they care about is when are they going to get the needle, so they could do the hit.
>
> Interviewer: And nobody knew nobody's health business.
>
> Respondent: When you want to get the next fix, you could care less about anybody's health issue, if you're shooting. That's my opinion. You just want your turn.

Finding Safe and Nonagonizing Ways to Manage Withdrawal When Heroin or Other Opiates Are Not Available

As a backup, some of the subjects have found ways to reduce the negative consequences of withdrawal on those occasions when they find themselves unable to avoid it. It is interesting that some of these examples are from long-term IDUs who are hepatitis C positive.

Biker (015), a double-negative, says that when he has to manage withdrawal, he uses his prescribed psychiatric pills as a backup.

Gangster (015; HCV+) handles withdrawal by toughing it out for half an hour or so while he gets access to syringes.

Researcher (024), who is one of the HCV-positive participants whose date of hepatitis C seroconversion we can place within a narrow time span, coped with withdrawal early in his drug use career by working out at a gym. When his drug use increased and he encountered more painful symptoms, he went into a methadone program (while continuing to use drugs) so that he could avoid withdrawal and not have to worry so much about money. (He was given the code name "Researcher" because he once was employed as a research technician for a gas company.)

Maintaining Social Support and Resource Support From Some Nonuser Relatives, Friends, and/or Neighbors

As has been extensively described in Stephens (1991), Friedman et al. (1999), and many others, many IDUs spend long periods as "street users" whose lives are heavily immersed in getting and using drugs. Many street users in New York and elsewhere live literally on the streets or in parks or rooftops. Others have lived in shacks that they have built in out-of-the-way locations. Still others live in single-room occupancy or other short-run, high-risk housing. Such housing has been linked to HIV-risk behaviors and to being infected with HIV (Corneil et al., 2006). On the other hand, many long-term IDUs avoid this by maintaining sufficient income and respectability to live in their own or others' homes. Even these IDUs, however, face the possibility of devolution into homelessness if they lose control of their drug use and its related economic necessities. The importance of housing was clearly visible in our study. One subject, Gangster, who had managed to stay safe for many years in his own housing may well have gotten infected with HCV in a halfway house (where he was forced to live after his release from prison), when a friend secretly used his injection equipment while he was out of his room. This bears witness that even a short-term housing crisis may disrupt safety routines and thus lead to infection.

A number of the double-negatives in the Staying Safe project used social and resource support from others to help them avoid the most high-risk and self-degrading aspects of the drug scene. For some, this support helped them retain employment and/or housing; for others, it helped them, even while living "in the street," to maintain some social respectability and some ability to avoid high-risk injection environments.

Although James Bond (007) had been homeless for 8 years, he maintained the social support he needed. For some years, he hid his drug use from his family and neighbors. Then and after, he maintained critical social support and the ability to spend an occasional night "crashing" with his family and friends, in part by being sure to treat them well. He maintained income from his "job" selling drugs even though his supplier knew he was doing drugs; he did this by scrupulously being sure to pay his supplier the full cost of the drugs he sold and buying his own drugs through his share of the sales.

Torch (006) lived in a housing project complex in which people were very supportive. One resident was a diabetic who sold sterile syringes; other diabetics he knew would make syringes available to him when he needed them. One of the women who lived in the projects (and who smoked crack herself) would let Torch take baths there and leave personal belongings there as well—in part because he would pay her a few dollars or a little bit of drugs.

Gangster (026; HCV positive) himself had access to credit from owners of local bodegas. He was able to get this credit both because he repaid the loans and because he was raised in the local public housing projects and both he and his family were respected.

Sosa (005) again provides material that helps us understand that the approaches described above by double-negatives (and Gangster) contrast considerably with how a double-positive has acted. Thus, although he initially had support from his nonuser sister, he violated and disrespected her space and ended up living on the street:

> Interviewer: And why did you end up in the street? Did the adoptive sister tell you to leave or—?
>
> Respondent: No, but I started doing things to her like—she got married and I sold all her—all the gifts they gave her for marriage. When she got married I stole everything.
>
> Interviewer: You stole all the stuff? You sold it?
>
> Respondent: Yeah. To get high. I also stole a master key to the Super and went into—broke into a couple apartments.
>
> Interviewer: Okay. And this was in the Bronx?
>
> Respondent: Yeah. And she started like complaining, you know; I felt like she didn't understand and I said the hell with it. And I went to live in the streets.

Socially Embedding Protective Norms and Practices Among Members of Their Injection and Support Networks

This is a fairly sophisticated approach to avoiding risk and was enacted by few of our subjects. It is also hard to elicit information about during an interview. Nonetheless, James Bond (007), the double-negative who has been homeless for 8 years, provides an example in which he "embedded" safety norms in his sole injection partner. What he did was simply to teach the woman he regularly

injected with to save a "wake-up bag." This meant that he would neither find that she used his wake-up bag nor come under pressure to split his with her—and thus meant that he had less probability of entering withdrawal. In addition, the two of them successfully coordinated a division of labor in order to make sure they would have access to clean syringes and drugs and thus avoid both infection and withdrawal.

Sosa (005), the double-positive, has a different approach to norms about risk. He basically goes along with high-risk norms and makes no attempt to change them (or to protect himself or others):

Respondent: People would come in just to shoot up in his house. He was hanging out with the guys from the shelter, during the daytime you have to leave the shelter, and they would come hang out at [friend name]'s house, and then go back when it's time for the shelter.

Interviewer: And the needles, where were they coming from?

Respondent: I don't know.

Interviewer: You don't know where the needles came from. So [friend] just took the needle, injected you, and you were happy.

Respondent: We used to share the needle around the kitchen, just share it. I'd use it, and they would rinse it out in the faucet, and [friend] would use it, and rinse it out in the faucet, and the other guy would use it—

Interviewer: So, the needles were just there for anybody to use.

Respondent: Mm-hmm. And the guys who would come in and shoot at [friend]'s house; they would give [friend] a bag just to shoot there, so [friend] didn't care—come in, shoot.

LIMITATIONS

Our data in this study are limited by the fact that it is based on a small nonprobabilistic sample. As discussed in Friedman et al. (2008), some of the subjects who were classified as hepatitis C negative on the basis of their antibody tests may nonetheless have been exposed to the virus and may have eliminated it without developing an antibody response. The data are also limited by the fact that subjects' reports of their past histories and actions may be inaccurate because of problems of recall or social desirability bias. We took precautions against this by eliciting reports in their detailed contexts and by asking about important issues at different parts of the interview, but some misreporting is likely to have occurred in spite of these precautions.

These limitations should be taken in the context of the overall study design and purpose. This design is aimed at developing hypotheses with grounding in the overall pattern of the data. They have considerable robustness in the face of sample nonrepresentativeness, moderate classification error, and moderate inaccuracy of self-report. In the strongest possible version of this claim, hypotheses may be true even if the data on which they are based are weak, and this will be shown by testing them through further research.

When we claim that these hypotheses are *grounded*, however, we go beyond what the previous argument covers. Although the strength of our claims are limited as described above, and the hypotheses indeed need to be tested, our confidence in our findings and hypotheses is strengthened by the fact that ethnography is a method that grounds its results by looking at subjects' accounts as wholes as well as at isolated portions of text and by searching both for regularities in different subjects' reports and at the range of phenomena in deciphering the overall meaning of the data.

CONCLUSIONS

The symbiotic goals discussed in this article seem to help some IDUs both (a) avoid high-risk behaviors and (b) avoid injecting with high-risk partners or in high-risk contexts. We would emphasize that even careful IDUs may well get infected with HCV and perhaps with HIV. Gangster illustrated this possibility. Nonetheless, the examples of behaviors by double-negatives contrast sufficiently with those of long-term IDUs who are positive only for hepatitis C and, particularly, with the behaviors of Sosa, the double-positive, to provide initial grounding for the hypothesis that attaining these symbiotic goals can help keep IDUs uninfected.

To the extent that the hypothesis is correct and thus that attaining these symbiotic goals actually reduces the risk for HIV and/or hepatitis C infection, training IDUs in these "staying safe" approaches may provide the basis for a new generation of prevention programs. Of course, the research reported here by no means proves that these symbiotic goals actually are protective—but they do provide grounded support for hypothesizing that they are.

We thus strongly urge that research be conducted to test these *hypotheses*—both by conducting cohort studies to see if IDUs who are more effective in attaining these symbiotic goals are less likely to become infected and by prevention trials of programs to teach IDUs how to "stay safe" by effectively pursuing these symbiotic goals as well as behavioral risk reduction. These prevention trials can answer questions such as the following:

- whether training in meeting symbiotic goals generates cognitive dissonance and/or goal confusion;
- whether successfully helping IDUs seek and attain these new goals increases or decreases their use of traditional techniques such as cessation of injection drug use; and
- whether such programs reduce HIV and hepatitis C transmission—it is important to keep in mind that the effectiveness of these programs might vary as between HIV prevention and hepatitis C prevention.

It is also essential that such programs also help injectors avoid other risks, such as overdose, that might ensue from such otherwise-protective practices as injecting alone (Darke & Hall, 2003; Hagan et al., 2007).

We suggest that both strands of this research be pursued simultaneously because the stakes are very high. As discussed in the Introduction, current hepatitis C prevention

approaches among IDUs are clearly of limited effectiveness, and new HIV infections continue to occur as well. Approaches to infection prevention that focus on helping IDUs reach symbiotic goals in their daily lives in the community as well as reducing their behavioral risk could open a fruitful new avenue of prevention—and one, furthermore, that can be done using the same organizational and counseling approaches that are now used for behavioral risk reduction.

The importance of this last point can easily be missed but becomes clear in the context of other critiques that have been made of current approaches to preventing HIV. We (Blankenship, Friedman, Dworkin, & Mantell, 2006; Friedman, Des Jarlais, & Ward, 1994; Friedman et al., 1999; Friedman, Kippax, Phaswana-Mafuya, Rossi, & Newman, 2006; Friedman, Rossi, & Phaswana-Mafuya, 2008) along with others (Bray, Blankenship, & Merson, 1999; Coates et al., 1996; Parker, 2001; Sweat & Denison, 1995) have called for supraindividual risk reduction approaches that use social network influence to encourage safer behavior; alter the structure, size, or turnover rates of sexual and injection networks; or try to change the policy or urban environments in ways that might reduce the spread of HIV. In spite of these suggestions and the considerable social epidemiologic research they and others have presented that shows that these variables, structures, and processes are related to infection and/or to behavioral risk, not much intervention along these lines has actually taken place. We suggest that this is in large part due to the fact that there are no social instruments that currently exist to carry out such interventions—perhaps particularly so in the United States. To the extent that structural interventions that affect community structure or the structures of sexual or injection networks do exist, they are primarily economically (as in much urban redevelopment) or politically motivated (as in ethnic cleansing) or involve law enforcement (as in arresting drug dealers), rather than oriented to public health. Thus, even though we have called for the use of structural interventions many times (Friedman et al., 1994, 1999, 2006, 2008), one advantage of the proposal to develop interventions around symbiotic goals is that structures already exist to provide individual treatment and training; indeed, whole professions exist to carry out mental health, medical, and similar interventions on people and even families. Thus, programs focusing on symbiotic goals might be able to make use of these structures and personnel.

Another characteristic of symbiotic interventions is that they focus on IDUs as people with subjective agency—i.e., as people with some freedom to affect their own fates. In Friedman et al. (2008) we said that staying "uninfected is not simply a question of social structure or social position. It involves agency by drug injectors, including sustained hard work and adaptation to changing circumstances." We have found that a number of the double-negatives were able to seek, and attain, many symbiotic goals and to avoid frequent syringe sharing in spite of external circumstances (years of homelessness, periods of depression, social network pressures to take risks, addiction) that some might see as all but erasing the possibilities for successful risk reduction (Bourgois, 1998). We are currently analyzing the data to try to understand whether and how subjects' creative responses to situations are a factor in avoiding infection, and if so, what individual characteristics and social processes affect such creativity.

On a theoretical level, our findings suggest that *behavioral HIV prevention* has been approached too narrowly (at least for IDUs). That is, behavioral risk prevention has emphasized finding ways to modify intentions, support, and/or skills that bear directly upon risk behaviors such as using condoms, avoiding syringe sharing, or limiting the number of sexual and/or injection partners. This, however, may be only one pathway to preventing infection. We here provide grounded hypotheses that suggest that behavioral interventions focusing on symbiotic pathways might also help prevent infection.

As is discussed elsewhere in this issue, the establishment of large-scale syringe exchange in New York City led to greatly reduced HIV transmission by making it easier for IDUs to avoid sharing syringes. In the Staying Safe project, we studied people who began to inject drugs after the syringe exchanges began—i.e., at a time when sterile syringes could be obtained relatively easily. Further research might usefully study if seeking the symbiotic goals discussed in this article is more or less protective in situations of syringe scarcity. For the HIV and hepatitis C epidemics among people who have injected drugs in New York during the period when syringe exchange has been large-scale, we hypothesize that seeking symbiotic goals has been one of the processes that have contributed to the reduction of HIV transmission.

There is no reason, furthermore, to suggest that symbiotic goal attainment limits infection only among IDUs. This has been recognized in microfinance interventions for sex workers, which are based on finding other ways to help sex workers obtain income. We suggest, therefore, that research be conducted to discover how some members of other high-risk populations besides IDUs have managed to stay safe. (Some of the logic and methodology of the "Staying Safe" approach to conducting such research is described in Friedman et al., 2008.) To the extent to which such symbiotic goals are found to exist among other populations, we suggest that appropriate research and interventions be carried out among them to help extend current prevention approaches. We further suggest that, to the extent that the symbiotic goal approach proves useful, it might suggest important revisions of public health prevention theory and methodology.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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GLOSSARY

HCV: Hepatitis C virus.
HIV: Human immunodeficiency virus.
IDU: Person who injects drugs.
Positive deviance: Behaviors or strategies, uncommon but successful, that lead to finding better solutions to a given health-related problem without special resources or knowledge.
Structural interventions: Public health interventions that promote health by altering the structural context within which health is produced and reproduced.

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