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The Effect of Personal Network Exposure on Injecting Equipment Sharing among IDUs in Budapest, Hungary

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Abstract

Until the mid-1990s, the prevalence and incidence of HIV infection was uniformly low in countries across the Central and Eastern European region. In the past decade, however, this has changed dramatically, with a rapid increase in HIV infections in the region, especially in Eastern Europe where 41% of new HIV infection cases were among injecting drug users (IDUs) and as much as 66% of IDUs are infected with HIV in certain regions. While Russia, the largest country in Eastern Europe, has the fastest growing HIV rates in the world, the situation is different in Central Europe. For example, Hungary has low levels of HIV infection – estimated less than 1% of IDUs. Understanding the role of network factors in the spread and prevention of HIV could not only enable us to keep the HIV rates low among IDUs in countries like Hungary, but also provide a means for the effective prevention of other blood-borne and sexually transmitted infections (STIs) that share similar routes of transmission as HIV. Rogers' diffusion of innovations theory may help explain why HIV rates among IDUs are low in Hungary. Valente's related exposure or contagion model postulates that the more individuals within a social network adopt an innovation or a practice, the greater the probability of an individual is to adopt this innovation or practice. Personal network exposure (PNE), measured both within egocentric and sociocentric networks quantifies the extent to which a person is exposed to risk through their social network. The aim of this analysis was to assess the association of PNE and other correlates with injecting equipment sharing among IDUs in Budapest, Hungary.

INTRODUCTION

Until the mid-1990s, the prevalence and incidence of HIV infection was uniformly low in countries across the Central and Eastern European region. In the past decade, however, this has changed dramatically, with a rapid increase in HIV infections in the region, especially in Eastern Europe (Hamers and Downs 2003; Aceijas et al. 2004; European Centre for the Epidemiological Monitoring of AIDS 2005). In Eastern Europe, 41% of new HIV infection cases were among injecting drug users (IDUs). Estimates suggest that in certain regions, as much as 66% of IDUs are infected with HIV (Hamers and Downs 2003; Kelly and Amirkhanian 2003; Rhodes et al. 1999). The largest country in Eastern Europe, Russia, has

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the fastest growing HIV rates in the world (Kalichman et al. 2000). However, the situation is different in Central Europe. In 2004 fourteen Central European countries reported a total of 217 new HIV infections contracted through injecting drug use (European Centre for the Epidemiological Monitoring of AIDS 2005). It is estimated that in Central European countries excluding Poland and the former Yugoslavia, under 2% of IDUs are infected with HIV (Hamers and Downs 2003; Dehne et al. 1999; Robinson 2000; Kilibarda 1993). Hungary, like many Central European countries, has low levels of HIV infection. At the end of 2004, Hungary (population 10 million) had 1,175 diagnosed cases of HIV infection, and the estimated prevalence of HIV among IDUs was less than 1% (European Centre for the Epidemiological Monitoring of AIDS 2005).

In addition to being at risk of HIV infection, IDUs are also at risk of acquiring Hepatitis C (HCV) and Hepatitis B (HBV). In contrast to the very low prevalence of HIV among IDUs in Hungary, the prevalence of HCV among IDUs in Hungary was about 30% in the late 1990s (European Monitoring Centre for Drugs and Drug Addiction 2002; Ujhelyi et al. 1998; Zacher 2003; Topolánszky 2002), and, while HBV infection rates among IDUs in Hungary were 13% for women and 8% for men, only about 7% reported having been vaccinated against HBV (Topolánszky 2002). The presence of HCV and HBV epidemics among IDUs in Hungary is a concern not only in its own right, but also because it suggests that injecting and sex risk behaviors and risk networks among IDUs are very common (Hamers and Downs 2003; Stark et al. 1996; Mikl et al. 1998). This implies that many of the conditions for an expansive and rapid HIV epidemic are present in the Central European region among drug injectors.

Social network theory, an approach that recognizes that individuals are embedded in social and risk networks (Trotter II, Bowen, and Potter Jr 1995; Neaigus et al. 1994), may help explain the discrepancy of HIV rates between Central and Eastern Europe. According to this theory, the potential for epidemic spread of HIV infection within a specific risk-group depends on many supra-individual factors, including the probability of transmission, the average number of contacts (Anderson and May 1988), risk network composition and structures (which includes both the centrality of high-risk individuals and mixing patterns within a network (Friedman et al. 1997; Neaigus et al. 1994), and secondary prevention. Understanding the role of network factors in the spread and prevention of HIV could not only enable us to keep the HIV rates low among IDUs in Central European countries like Hungary, but also provide a means for the effective prevention of other blood-borne and sexually transmitted infections (STIs) that share similar routes of transmission as HIV, such as HBV and HCV, as well as other STIs.

A theory which may help explain why HIV rates among IDUs are low in Hungary is the diffusion of innovations theory (Rogers 2000). This theory describes how an innovation, an idea, practice, or object, is spread among members of a community (Rogers 2003). The exposure or contagion model (Valente 2005), which is related to the diffusion theory, postulates that the more individuals within a social network adopt an innovation or a practice, the greater the probability of an individual is to adopt this innovation or practice. Personal network exposure (PNE) quantifies the extent to which a person within a network is exposed to such an innovation, idea, practice or object (Valente 1995). PNE can be measured both within egocentric and sociocentric networks. Within egocentric networks, PNE is the proportion of adopters among network members and thus measures the direct influence of network members (Valente 2005). Within sociocentric networks, PNE measures both direct and indirect network influence and is calculated by weighting exposure by the inverse of the shortest paths (geodesic distances) between any two members of the sociocentric network (Valente 1995). To incorporate the influence of opinion leaders, PNE can be weighted by network measures (e.g. centrality) (Valente 2005).

PNE to risk or protective behaviors through direct and indirect ties to other IDUs who engage in these risk behaviors and who are members of the sociocentric network thus may influence an individual IDU's injecting behavior. We hypothesize that if PNE is positively associated with injecting equipment sharing, then, according to the contagion model, sharing may be a social epidemic – the more individuals are exposed to injecting equipment sharing, the more likely they are to share. The aim of this analysis was to assess the association of PNE and other correlates with injecting equipment sharing among IDUs in Budapest, Hungary.

METHODS

Between October 2005 and February 2006, 83 injecting drug users were recruited in Budapest, Hungary from non-treatment settings using a combination of street outreach and chain referral methods (Heckathorn 1997; Gyarmathy and Neaigus 2005; Gyarmathy et al. 2006) for a United States National Institute on Drug Abuse funded study on network risk for HIV, HBV and HCV among IDUs in Budapest (study ongoing). Participants were recruited from areas of the city where drug users often congregate, from the needle exchange, and through referral by other IDUs who were in the study. Candidate participants who self-reported injecting drugs in the past 30 days were eligible to participate. Eligibility of drug use was verified by urine tests (heroin, cocaine, amphetamine and methamphetamine) for those reporting drug use in the past 2-3 days. Injecting route of drug administration was verified by inspection of injecting marks for those who reported injecting in the past 30 days. Participants were paid HUF 2000 (about USD 10) for participation and HUF 500 (about USD 2.5) for bringing in their nominated network members or other IDUs who were eligible to participate in the study. The Institutional Review Boards at the National Development and Research Institutes, Inc. in New York, USA and the Hungarian Academy of Sciences in Budapest, Hungary approved all human subjects procedures.

After providing their informed consent, eligible participants were administered a structured survey interview that took about 2 hours to complete. Then participants received counseling about and were tested for HIV, HAV, HBV, HCV and syphilis infections.

Measures

The interview included questions about demographics, socio-economic status, drug use and injecting behaviors, sexual risk behaviors, self-reported HIV and HCV infections, knowledge about HIV and HCV transmission, heroin dependence and injecting equipment sharing. The dependent variables in the analysis were five types of injecting equipment sharing: sharing cookers, sharing filters, receptive syringe sharing, distributive syringe sharing and syringe-mediated drug sharing (backloading) in the past 30 days. Since having an IDU sex partner has been found to be associated with injecting equipment sharing (Evans et al. 2003; Lum, Sears, and Guydish 2005), and we had found strong infection disclosure norms among IDUs in Hungary (Gyarmathy et al. 2006), we created four-way interaction variables for self-report of HCV infection and having an IDU sex partner (1. no reported HCV infection and no IDU sex partner (reference category), 2. no reported HCV infection and IDU sex partner, 3. reported HCV infection and no IDU sex partner, 4. reported HCV infection and IDU sex partner).

Participants were asked using standard naming stimuli (Friedman et al. 1999) to provide us with the real or fictitious name of friends or family whom they would go to for advice, asked a favor from in the past 30 days, with whom they have had sex or used non-injected or injected drugs in the past 30 days. Then, for every nominated network member, more detailed data was collected (Friedman et al. 1999; Neaigus et al. 2006; Weeks et al. 2002) about the network member's demographics, drug use and injecting behaviors and sexual risk behaviors, and how close they are emotionally to the network member. We also assessed the relationships among nominated network members.

Ties among participants who were interviewed for the study were ascertained based on each participant’s nominations and on reports of relationships of other participants about their network members. We used four methods to verify links (Friedman et al. 1999): 1. “storefront link”, when participants brought their network members in and linkage data was recorded, 2. “field link”, when the participant identified the network member to the staff in the field, 3. “ethnographic link”, when staff observed links in the field, and 4. “data set link”, when identifying data was used to establish links. We used UCINET (Borgatti, Everett, and Freeman 2002) to create social network measures based on this relationship data. First, we symmetrized the data in order to incorporate into the assessment of network exposure “modeling” or indirect communication (Neaigus et al. 2006), i.e., ties between participants who share injecting equipment. Geodesic distances between each participant were then calculated, along with two measures of centrality. Closeness centrality (how may steps away an individual is from others within the entire sociocentric network that this individual is a member of) was calculated to indicate potential roles of opinion leadership, and degree centrality (the number of ties of each individual within their egocentric network) to indicate the size of their personal network. PNE measures for each of the injecting equipment sharing variables were calculated in SAS® by transposing individual equipment sharing data into an exposure matrix, weighting exposure by closeness centrality (Valente 2005), and multiplying weighted exposure by the inverse of the geodesic distances. PNE measures were then standardized to have a mean of 0 and a standard deviation of 1 for easier interpretation.

ANALYSIS

Univariate odds ratios and corresponding 90% confidence intervals were calculated to assess associations between candidate variables and each of the equipment sharing variables. Then, multivariate logistic regression models with stepwise selection (with model entry and retention significance of 0.10) identified significant ($p<0.10$) correlates of equipment sharing, with PNE forced in as the main exposure variable. In each of these models, equipment-specific PNE measures were used (e.g., for assessing correlates of sharing cookers, PNE to sharing cookers were used; for correlates of sharing filters, PNE to sharing filters was used, etc.)

RESULTS

Sample description

The mean age of the 83 participants was 28.5 years (median: 28; SD=5.8; range: 18-41), 21 (25%) were female, 9 (11%) were Roma (Gypsy) (Table 1). About a third (n=28; 34%) had a high-school degree and 9 (11%) reported that they were still in school. Most were single (n=63; 76%) and had worked at some point at a legal job (n=63; 76%). Altogether 47 (57%) reported having an average monthly income of HUF 100,000 (approximately USD 500), and 16 (19%) reported being homeless. Altogether 48 (58%) participants reported sharing cookers, 47 (57%) sharing filters, 15 (18%) distributive syringe sharing, 17 (21%) receptive syringe sharing, and 26 (31%) backloading in the past 30 days. Almost all agreed that syringes can transmit HIV (n=77; 94%) and HCV (n=78; 95%) infections (data not shown in table). About half agreed that cookers, cotton and dissolved drugs can transmit HIV (n=37; 45%) and HCV (n=44; 54%) (data not shown in table). Altogether 26 (31%) reported incorrect knowledge about HIV and 21 (25.3%) about HCV (data not shown in table). The mean degree centrality was 4.4 (SD=5.3). Non-standardized PNE values show that mean network exposure to cookers and filters is the highest, followed by backloading, receptive syringe sharing and distributive syringe sharing.

Univariate correlates of equipment sharing

Significant ($p<0.10$) correlates of equipment sharing are presented in Tables 2-6. We found that equipment-specific standardized PNE was positively associated with sharing filters and inversely associated with distributive syringe sharing, and we found no significant associations between PNE and sharing cookers, receptive syringe sharing and backloading. Degree centrality was positively associated with sharing filters and backloading. Heroin dependence showed a negative association with sharing cookers, and both incorrect knowledge of HIV transmission and incorrect knowledge of HCV transmission were positively associated with both sharing cookers and sharing filters. Having an IDU sex partner and self-report of being HCV negative was positively associated with sharing cookers, sharing filters and distributive syringe sharing, while having no IDU sex partner and self-report of being HCV infected was associated with distributive syringe sharing. Being emotionally close to an IDU was associated with all forms of equipment sharing, except with backloading. Of the demographic variables, female gender was associated with sharing cookers, receptive syringe sharing and backloading, while younger age was associated with sharing cookers, sharing filters and backloading.

Multivariate correlates of equipment sharing

PNE was significantly ($p<0.10$) and positively associated with sharing filters and backloading, and significantly and inversely associated with distributive syringe sharing (Table 7). Degree centrality showed a significant association with distributive syringe sharing, and incorrect knowledge about HIV transmission with sharing cookers and filters. Having no IDU sex partner and self-report of being HCV infected was associated with distributive syringe sharing, and being emotionally close to an IDU with sharing cookers and filters. Of the demographic variables, female gender showed an association with sharing cookers, distributive syringe sharing and receptive syringe sharing, while younger age with all forms of equipment sharing except for distributive syringe sharing.

DISCUSSION

Contrary to our hypothesis, we found that PNE was not positively associated with all forms of injecting equipment sharing, but only with sharing cookers and filter, and it was inversely associated with distributive syringe sharing. In addition, we found an interaction of having an IDU sex partner and self-report of being infected with HCV as they relate to receptive syringe sharing.

Levels of injecting equipment sharing among IDUs in this sample are similar to reports on injecting equipment sharing from studies conducted in the United States and in other Central European countries, and lower than among IDUs in Eastern Europe. Studies have found that about 20% of IDUs in the US, Estonia, Czech Republic and Poland shared syringes in the past month (Lundgren, Amodeo, and Chassler 2005; European Monitoring Centre for Drugs and Drug Addiction 2002). In contrast, around the same time, studies among IDUs in Saint Petersburg reported 41% sharing syringes, and in Moscow, between 40-75% (Somlai et al. 2002; Reilley et al. 2000; Gore-Felton et al. 2003). The relatively low rates of syringe sharing but high rates of other injecting equipment sharing may be one reason why levels of HIV are low but of the prevalence of HCV is relatively high among IDUs in Hungary.

The positive association between PNE and sharing filters may indicate that these two sharing behaviors may be linked to a social epidemic. In a previous study we found that filters are often reused by IDUs in Hungary as a backup drug supply (Gyarmathy et al. 2006). In addition, ethnographic observations of injecting events and discussions with participants in this study indicate that retaining and giving away filters may be an act of giving someone a favor so that, in need, this person can also be asked for a favor. In this context, favor usually refers to an alternative drug supply in the form of a second cooking of the filter. The inverse association between PNE and distributive syringe sharing suggests that rather than being a social epidemic, distributive syringe sharing may be situation-specific and reflect the demand and supply of syringes in particular injecting settings, e.g. if there are N new syringes and N+1 IDUs, and one IDU gives his or her used syringe to the IDU without a new syringe, there is no need for the other IDUs to give away theirs. Indeed, the association of degree centrality with distributive syringe sharing corroborates this, since it shows that the more IDUs there are in an IDU’s egocentric network, the more likely they are to share syringes. Furthermore, ethnographic findings from this study suggest that syringe sharing occurs either in sexual partnerships or if somebody “falls in”, i.e., shows up unexpectedly in a group about to inject drugs, and this unexpected person does not have their injecting equipment handy.

Lack of the association between PNE and injecting equipment sharing may suggest that sharing is not a function of exposure, but rather that all IDUs in a given population are influenced by common structural conditions, such as laws against the possession of syringes and other injecting equipment, that operate independently of exposure. Under this scenario, the model might represent a form of "structural equivalence" (Burt 1987) so that a given behavior occurs because of macro-conditions that affect all IDUs (even singletons) rather than being mediated through social networks. We believe that sharing cookers may be due to such structural conditions. IDUs in this study reported during ethnographic observations that packaging of drugs by dealers is such that the packaged quantity is too much for one person to use all at one time. Thus, several people buy one package. However, because they find it difficult and unfair to share it dry, they dissolve the drug in one cooker and share it wet instead. In addition, incorrect knowledge about HIV transmission seems to be another reason why IDUs in this study share filters and cookers, since many are not aware that infections can also be transmitted though injecting equipment other than syringes.

The association of receptive syringe sharing with self-report of HCV infection and not having an IDU sex partner raises concerns. IDUs in this sample believe that once they have HCV infection, "it's all the same" for them, not realizing that they are still at risk for HIV or potentially other blood borne infections. In addition, studies have shown that having an IDU sex partner is associated with sharing both syringes and other injecting equipment (Evans et al. 2003; Neaigus et al. 1995; Strathdee et al. 1997). While in a sexual partnership either partner may be equally likely to give or take used syringes regardless of HCV serostatus, reasoning that "they have unprotected sex anyway", they may not receive used syringes from a third person. However, an IDU who does not have an IDU sex partner may be more likely to receive a used syringe from another person than either one of a couple. Due to their "informed altruism" (Des Jarlais et al. 2004), HCV infected IDUs may put themselves at risk for HIV infection.

Limitations of the study include the small sample size and that we allowed a higher than customary Type I error when calculating confidence intervals. Hence, while on the one hand we may have missed associations due to the small sample size, we may also have identified associations that may not be strong enough for statistical significance in a larger sample. In addition, due to the recruitment methods, the sample may not be representative of all IDUs in Budapest, since we may not have had access to IDUs that are more socially integrated (Gyarmathy and Neaigus 2005) and thus more hidden. Missing links between participants is another limitation, which could lead to underestimating PNE. However, we recruited most nominated network members and we also used links reported by other participants in our analysis, which we believe minimized the underreporting of links.

Network interventions among IDUs in Hungary combined with the provision of legal, sterile syringes and other injecting equipment, and regular testing and counseling services can help to prevent the outbreak of HIV and to control the existing HCV epidemic due to parenteral routes of transmission (Latkin and Knowlton 2005; Gyarmathy et al. 2004; Gyarmathy and Neaigus 2005). Interventions need to focus on disseminating proper knowledge about HIV and Hepatitis infections, especially concerning the sharing of injecting equipment other than syringes. While the currently existing disclosure norms should be encouraged (Gyarmathy et al. 2006), those with HCV infection need to be counseled about the fact that they are still uninfected with HIV and thus are at risk for HIV infection if they take used syringes from other injectors. In addition to focusing on correcting misconceptions about the risks of sharing both syringes and other injecting equipment, infection prevention efforts among IDUs in Hungary need to focus on increasing the distribution, practice and legalization of carrying sterile syringes in order to minimize the situation-specific factors that may lead to syringe and other injecting equipment sharing. Moreover, as much as possible, IDUs should be provided access to appropriate drug treatment so that they can be helped to stop the practice of drug injecting.

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Table 1.

Description of the sample – injecting drug users in Hungary, 2005-2006

	N (%)		N (%)
Total	83 (100.0)	Shared cookers in the past 30 days	48 (57.8)
Age - mean (SD)	28.5 (5.8)	Shared filters in past 30 days	47 (56.6)
Gender		Distributive syringe sharing in past 30 days	15 (18.1)
male	62 (74.7)	Receptive syringe sharing in past 30 days	17 (20.5)
female	21 (25.3)	Backloading in past 30 days	26 (31.3)
Ethnicity		Degree centrality - mean (SD)	4.4 (5.3)
non-Roma	74 (89.2)		
Roma	9 (10.8)	PNE for sharing cookers (non-standardized) - mean (SD)	136 (78.6)
High school degree	28 (33.7)		
Currently in school	9 (10.8)	PNE for sharing filters (non-standardized) - mean (SD)	147 (85.5)
Marital status single	63 (75.9)	PNE for receptive syringe sharing (non-standardized) - mean (SD)	50.8 (29.4)
Ever had a legal job	63 (75.9)		
Homeless	16 (19.3)	PNE for distributive syringe sharing (non-standardized) - mean (SD)	36.0 (21.2)
Average monthly income above HUF 100 000 (USD 500)	47 (56.6)	PNE for backloading (non-standardized) - mean (SD)	84.8 (49.8)

Table 2.

Univariate correlates of sharing cookers in the past 30 days – injecting drug users in Hungary, 2005-2006

Characteristic	did not share	shared	OR (90% CI)	sig. p-value
	N (%)	N (%)		
Total	35 (42.2)	48 (57.8)	(reference)	
Personal network exposure - mean (SD)	−.02 (0.95)	0.02 (1.04)	1.0 (0.7, 1.5)	0.863
Degree centrality - mean (SD)	4.0 (5.7)	4.7 (5.0)	1.0 (1.0, 1.1)	0.5766
Heroin dependence - high				
no	13 (32.5)	27 (67.5)	(reference)	*0.0876
yes	22 (51.2)	21 (48.8)	0.5 (0.2, 1.0)	
Incorrect knowledge about HIV transmission				
no	30 (52.6)	27 (47.4)	(reference)	*0.0063
yes	5 (19.2)	21 (80.8)	4.7 (1.8, 12)	
Incorrect knowledge about HCV transmission				
no	31 (50.0)	31 (50.0)	(reference)	*0.0179
yes	4 (19.0)	17 (81.0)	4.2 (1.6, 12)	
no HCV and no IDU sex partner	25 (52.1)	23 (47.9)	(reference)	*0.0406
no HCV and IDU sex partner	2 (16.7)	10 (83.3)	5.4 (1.4, 21)	0.3866
HCV and no IDU sex partner	5 (38.5)	8 (61.5)	1.7 (0.6, 5.0)	0.2135
HCV and IDU sex partner	3 (30.0)	7 (70.0)	2.5 (0.7, 8.6)	
Emotionally close to an IDU				
no	26 (56.5)	20 (43.5)	(reference)	*0.0040
yes	9 (24.3)	28 (75.7)	4.0 (1.8, 9.0)	
Gender				
male	30 (48.4)	32 (51.6)	(reference)	*0.0547
female	5 (23.8)	16 (76.2)	3.0 (1.2, 7.7)	
Age - mean (SD)	30.2 (5.3)	27.3 (5.8)	0.9 (0.9, 1.0)	*0.0265
Ethnicity				
non-Roma	31 (41.9)	43 (58.1)	(reference)	0.8836
Roma x	4 (44.4)	5 (55.6)	0.9 (0.3, 2.9)	

*p<0.10

Table 3.

Univariate correlates of sharing filters in the past 30 days – injecting drug users in Hungary, 2005-2006

Characteristic	did not share	shared	OR (90% CI)	sig. p-value
	N (%)	N (%)		
Total	35 (42.2)	48 (57.8)	(reference)	
Personal network exposure - mean (SD)	−.02 (0.95)	0.02 (1.04)	1.0 (0.7, 1.5)	0.863
Degree centrality - mean (SD)	4.0 (5.7)	4.7 (5.0)	1.0 (1.0, 1.1)	0.5766
Heroin dependence - high				
no	13 (32.5)	27 (67.5)	(reference)	*0.0876
yes	22 (51.2)	21 (48.8)	0.5 (0.2, 1.0)	
Incorrect knowledge about HIV transmission				
no	30 (52.6)	27 (47.4)	(reference)	*0.0063
yes	5 (19.2)	21 (80.8)	4.7 (1.8, 12)	
Incorrect knowledge about HCV transmission				
no	31 (50.0)	31 (50.0)	(reference)	*0.0179
yes	4 (19.0)	17 (81.0)	4.2 (1.6, 12)	
no HCV and no IDU sex partner	25 (52.1)	23 (47.9)	(reference)	*0.0406
no HCV and IDU sex partner	2 (16.7)	10 (83.3)	5.4 (1.4, 21)	0.3866
HCV and no IDU sex partner	5 (38.5)	8 (61.5)	1.7 (0.6, 5.0)	0.2135
HCV and IDU sex partner	3 (30.0)	7 (70.0)	2.5 (0.7, 8.6)	
Emotionally close to an IDU				
no	26 (56.5)	20 (43.5)	(reference)	*0.0040
yes	9 (24.3)	28 (75.7)	4.0 (1.8, 9.0)	
Gender				
male	30 (48.4)	32 (51.6)	(reference)	*0.0547
female	5 (23.8)	16 (76.2)	3.0 (1.2, 7.7)	
Age - mean (SD)	30.2 (5.3)	27.3 (5.8)	0.9 (0.9, 1.0)	*0.0265
Ethnicity				
non-Roma	31 (41.9)	43 (58.1)	(reference)	0.8836
Roma x	4 (44.4)	5 (55.6)	0.9 (0.3, 2.9)	

*p<0.10

Table 4.

Univariate correlates of distributive syringe sharing in the past 30 days – injecting drug users in Hungary, 2005-2006

Characteristic	**did not share**	**shared**	**OR (90% CI)**	**sig. p-value**
	N (%)	**N (%)**		
Total	68 (81.9)	15 (18.1)	(reference)	
Personal network exposure - mean (SD)	0.10 (0.98)	−.46 (1.01)	0.6 (0.4, 0.9)	*0.0548
Degree centrality - mean (SD)	4.4 (5.3)	4.7 (5.8)	1.0 (0.9, 1.1)	0.8353
Heroin dependence - high				
no	32 (80.0)	8 (20.0)	(reference)	0.6603
yes	36 (83.7)	7 (16.3)	0.8 (0.3, 2.0)	
Incorrect knowledge about HIV transmission				
no	47 (82.5)	10 (17.5)	(reference)	0.8531
yes	21 (80.8)	5 (19.2)	1.1 (0.4, 3.0)	
Incorrect knowledge about HCV transmission				
no	52 (83.9)	10 (16.1)	(reference)	0.4320
yes	16 (76.2)	5 (23.8)	1.6 (0.6, 4.5)	
no HCV and no IDU sex partner	42 (87.5)	6 (12.5)	(reference)	
no HCV and IDU sex partner	7 (58.3)	5 (41.7)	5.0 (1.5, 16)	*0.0275
HCV and no IDU sex partner	10 (76.9)	3 (23.1)	2.1 (0.6, 7.7)	0.3475
HCV and IDU sex partner	9 (90.0)	1 (10.0)	0.8 (0.1, 5.1)	0.8257
Emotionally close to an IDU				
no	41 (89.1)	5 (10.9)	(reference)	*0.0646
yes	27 (73.0)	10 (27.0)	3.0 (1.1, 8.2)	
Gender				
male	53 (85.5)	9 (14.5)	(reference)	0.1552
female	15 (71.4)	6 (28.6)	2.4 (0.9, 6.3)	
Age - mean (SD)	28.7 (5.8)	27.7 (5.9)	1.0 (0.9, 1.1)	0.5376
Ethnicity				
non-Roma	60 (81.1)	14 (18.9)	(reference)	0.5709
Roma x	8 (88.9)	1 (11.1)	0.5 (0.1, 3.3)	

*p<0.10

Table 5.

Univariate correlates of receptive syringe sharing in the past 30 days – injecting drug users in Hungary, 2005-2006

Characteristic	did not share	shared	OR (90% CI)	sig. p-value
	N (%)	N (%)		
Total	66 (79.5)	17 (20.5)	(reference)	
Personal network exposure - mean (SD)	−.00 (1.02)	0.01 (0.93)	1.0 (0.6, 1.6)	0.9577
Degree centrality - mean (SD)	4.3 (5.5)	4.9 (4.7)	1.0 (0.9, 1.1)	0.6431
Heroin dependence - high				
no	32 (80.0)	8 (20.0)	(reference)	0.9164
yes	34 (79.1)	9 (20.9)	1.1 (0.4, 2.6)	
Incorrect knowledge about HIV transmission				
no	49 (84.2)	9 (15.8)	(reference)	0.1226
yes	16 (76.2)	5 (23.8)	1.3 (0.5, 3.5)	
no HCV and no IDU sex partner	41 (85.4)	7 (14.6)	(reference)	
no HCV and IDU sex partner	10 (83.3)	2 (16.7)	1.2 (0.3, 4.9)	0.8567
HCV and no IDU sex partner	7 (53.8)	6 (46.2)	5.0 (1.6, 15	*0.0195
HCV and IDU sex partner	8 (80.0)	2 (20.0)	1.5 (0.3, 6.3)	0.6683
Emotionally close to an IDU				
no	40 (87.0)	6 (13.0)	(reference)	*0.0672
yes	26 (70.3)	11 (29.7)	2.8 (1.1, 7.2)	
Gender				
male	54 (87.1)	8 (12.9)	(reference)	*0.0053
female	12 (57.1)	9 (42.9)	5.1 (1.9, 13)	
Age - mean (SD)	29.0 (5.5)	26.5 (6.4)	0.9 (0.8, 1.0)	0.1185
Ethnicity				
non-Roma	57 (77.0)	17 (23.0)	(reference)	0.9687
Roma x	9 (100)	0 (0.0)	zero cell	

*p<0.10

Table 6.

Univariate correlates of syringe mediated drug sharing (backloading) in the past 30 days – injecting drug users in Hungary, 2005-2006

Characteristic	**did not share**	**shared**	**OR (90% CI)**	**sig. p-value**
	N (%)	**N (%)**		
Total	57 (68.7)	26 (31.3)	(reference)	
Personal network exposure - mean (SD)	−.09 (1.00)	0.20 (1.00)	1.3 (0.9, 2.0)	0.2308
Degree centrality - mean (SD)	3.7 (5.3)	6.0 (5.1)	1.1 (1.0, 1.2)	*0.0831
Heroin dependence - high				
no	26 (65.0)	14 (35.0)	(reference)	0.4870
yes	31 (72.1)	12 (27.9)	0.7 (0.3, 1.6)	
Incorrect knowledge about HIV transmission				
no	42 (73.7)	15 (26.3)	(reference)	0.1485
yes	15 (57.7)	11 (42.3)	2.1 (0.9, 4.7)	
Incorrect knowledge about HCV transmission				
no	45 (72.6)	17 (27.4)	(reference)	0.1913
yes	12 (57.1)	9 (42.9)	2.0 (0.8, 4.7)	
no HCV and no IDU sex partner	35 (72.9)	13 (27.1)	(reference)	
no HCV and IDU sex partner	6 (50.0)	6 (50.0)	2.7 (0.9, 8.0)	0.1349
HCV and no IDU sex partner	8 (61.5)	5 (38.5)	1.7 (0.6, 5.0)	0.4277
HCV and IDU sex partner	8 (80.0)	2 (20.0)	0.7 (0.2, 2.7)	0.6432
Emotionally close to an IDU				
no	33 (71.7)	13 (28.3)	(reference)	0.5028
yes	24 (64.9)	13 (35.1)	1.4 (0.6, 3.0)	
Gender				
male	46 (74.2)	16 (25.8)	(reference)	*0.0670
female	11 (52.4)	10 (47.6)	2.6 (1.1, 6.2)	
Age - mean (SD)	30.0 (5.6)	25.1 (4.7)	0.8 (0.8, 0.9)	*0.0008
Ethnicity				
non-Roma	52 (70.3)	22 (29.7)	(reference)	0.374
Roma x	5 (55.6)	4 (44.4)	1.9 (0.6, 6.2)	

*p<0.10

Table 7.

Multivariate correlates of sharing cookers, sharing filters, distributive and receptive syringe sharing

	Sharing cookers	Sharing filters	Distributive syringe sharing	Receptive syringe sharing	Backloading
	aOR (90%CI)	**aOR (90%CI)**	**aOR (90%CI)**	**aOR (90%CI)**	**aOR (90%CI)**
Personal network exposure	1.0 (0.65, 1.5)	1.8 (1.1, 2.8)[b]	0.2 (0.09, 0.47)[b]	0.78 (0.45, 1.4)	1.6 (1.0, 2.5) [a]
Degree centrality	N/S	N/S	1.3 (1.1, 1.5)[b]	N/S	N/S
Incorrect knowledge about HIV transmission	3.7 (1.3, 10.5)[b]	4.3 (1.5, 12.8)[b]	N/S	N/S	N/S
Self-reported HCV infection and no IDU sex partner	N/S	N/S	N/S	13.6 (3.2, 58.2)[b]	N/S
Emotionally close to an IDU	2.7 (1.1, 6.6)[a]	4.0 (1.6, 10.1)[b]	N/S	N/S	N/S
Female gender	3.2 (1.1, 9.8)[a]	N/S	4.1 (1.3, 13.1)[b]	7.2 (2.3, 22.5)[b]	N/S
Age	0.91 (0.84, 0.98)[b]	0.90 (0.84, 0.98)[b]	N/S	0.88 (0.80, 0.97)[b]	0.82 (0.74, 0.90)[b]

Note:

[a]p<0.10

[b]p<0.05