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Infection disclosure in the injecting dyads of Hungarian and Lithuanian injecting drug users who self-reported being infected with hepatitis C virus or human immunodeficiency virus

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Abstract

The aim of this study was to assess the prevalence and correlates of disclosure to network members of being hepatitis C virus (HCV)- or human immunodeficiency virus (HIV)-infected among injecting dyads of infected injection drug users (IDUs) in Budapest, Hungary and Vilnius, Lithuania,. Multivariate generalized estimating equations (GEE) were used to assess associations. Very strong infection disclosure norms exist in Hungary, and HCV disclosure was associated with using drugs and having sex within the dyad. Non-ethnic Russian IDUs in Lithuania were more likely to disclose HCV infection to non-Roma, emotionally close and HCV-infected network members, and to those with whom they shared cookers, filters, drug solutions or rinse water or got used syringes from, and if they had fewer non-IDU or IDU network members. Ethnic Russian Lithuanian IDUs were more likely to disclose HCV if they had higher disclosure attitude and knowledge scores, 'trusted' network members, and had lower non-injecting network density and higher injecting network density. HIV-infected Lithuanian IDUs were more likely to disclose to 'trusted' network members. Disclosure norms matched disclosure behaviour in Hungary, while disclosure in Lithuania to 'trusted' network members suggests possible stigmatization. Ongoing free and confidential HCV/HIV testing services for IDUs are needed to emphasize and strengthen disclosure norms, and to decrease stigma.

Introduction

The extent of serostatus disclosure may vary depending on the type of infection (hepatitis C virus (HCV) vs human immunodeficiency virus (HIV)), and on the relationship (e.g. emotional closeness, trust) between the infected person and the network member [1,2]. In addition, those who are infected are more likely to disclose their infection status to others who are also infected, or seek out risk relationships with other infected people [3]. While

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disclosure among injecting drug users (IDUs) of HCV- and/or HIV-infected serostatus may not necessarily lead to engaging in lower-risk behaviours with other presumptively uninfected IDUs [4–6], it is an important step towards risk reduction [7].

The relationship between 2 people, also called a dyad, is the environment where HCV and HIV disclosure and risk behaviours often occur [2,8]. Within dyads, IDUs may practice selective risk taking by assessing the risk status of their network members. Based on this, they engage in risk behaviours with or disclose their infection to only some but not other network members [9,10]. In addition, IDUs may engage in different risk and/or disclosure behaviours with people whom they do not know well (weak social network ties) compared to their close friends (strong social network ties) [2,10,11].

Dyadic partnership characteristics and infection disclosure dynamics within dyadic partnerships may be specific to different cultures [1,12]. They may also vary based on the type and prevalence pattern of infections in the population. Hungary (population 10 million) and Lithuania (population 3 million) shook off decades of Soviet control in the early 1990s, and joined the European Union in 2004 [13,14]. Despite this similarity, the 2 countries are very different in both their ethnic composition and epidemiological patterns. The only major ethnic minority group in Hungary is the Roma (making up about 10% of the population). However, the ethnic makeup of Lithuania is very diverse, with Poles and Russians making up as much as half the population in certain urban areas [13,14]. The prevalence of HCV among IDUs in Hungary has been reported to be under 40% and no HIV has been detected among them [6,15]. In Lithuania, on the other hand, almost 90% of IDUs are infected with HCV and about 4% with HIV [15]. Understanding the dynamics of HCV and HIV disclosure in injecting dyads may help in the development of appropriate prevention approaches to decrease transmission among both higher- and lower- prevalence populations of IDUs.

The aim of these analyses was to assess the prevalence and correlates of HCV and HIV disclosure to network members among self-reported infected injecting dyads of IDUs in Budapest, Hungary and in Vilnius, Lithuania. We hypothesized that different levels of disclosure are rooted in the 2 cultural contexts (Hungary vs Lithuania). In addition, we hypothesized that within Lithuania, different levels of disclosure exist for HCV and HIV. We further hypothesized that different individual-level, dyad-level, and social network-level characteristics are associated with infection disclosure in the partnerships of IDU populations with different HIV and HCV prevalence patterns. Specifically, we anticipated high disclosure among seropositives who endorse HCV and HIV disclosure norms, with emotionally close partners, and in dense social networks.

Methods

Setting and participants

Injecting drug users were recruited in Budapest, Hungary (n = 215) between October 2005 and December 2006, and in Vilnius, Lithuania (n = 300) between March 2008 and May 2009. Initial participants were recruited using street outreach in Buda-pest and from the needle exchange program of the Lithuanian AIDS Centre in Vilnius. In addition, participants at both locations were asked to bring in other IDUs potentially eligible for study participation (snowball sampling). In Hungary, 29% of participants were street-recruited and 71% of participants were brought in by other participants. In Lithuania, 6% of participants were recruited from the needle exchange and 94% were brought in by other participants. Study eligibility criteria for both studies were self-report of drug injecting in the past 30 days and being aged ≥18 y.

Data on recruitment success were not collected or were not possible for those who were invited to participate by participants already enrolled in the study. Thus, differences between participants and non-participants could not be assessed. Self-report of drug injecting was confirmed at both locations by inspecting injecting marks. In Hungary participants were paid HUF 2000 (about €8) for participation and in Lithuania participants were given food coupons worth LTL 20 (about €8). Hungarian participants were paid HUF 500 (about €2) for bringing in other IDUs who were screened eligible for study participation. Food coupons worth LTL 10 (about €4) were given to Lithuanian participants for referrals. Eligible participants provided informed consent, were administered an approximately 2-h long structured face-to-face survey, and received counselling about preventing infectious diseases related to drug injecting.

The wording of the questions assessed in this analysis was identical at both study sites, except where specified otherwise. The questionnaires were written in English, translated into Hungarian and Lithuanian, back-translated, and modified, if necessary. Interviewers in Lithuania were fluent in Lithuanian, Russian and Polish, and were able to translate and conduct the interview in Russian for those 2 participants who spoke only Russian. All ethnic Polish participants spoke Lithuanian. No interview was refused, cancelled or terminated either in Hungary or in Lithuania due to lack of language skills.

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 related to the Hungary study. The institutional review boards at the Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA and the Lithuanian AIDS Centre approved all human subjects procedures related to the Lithuania study.

Measures and variables

Individual-level characteristics were gender, age, ethnicity (Roma and, in Lithuania only, Russian and Polish), at least high school education, and y since first injecting. In addition, self-report of being infected with HCV and HIV, and y since first diagnosed with HCV and HIV infections were also assessed. A combined HCV disclosure attitude variable was created based on agreement with both of the following statements: “those who are HCV-infected should tell their injecting partners” and “those who are HCV-infected should tell their sex partners”. A combined HIV disclosure attitude variable was created based on the same questions asked for HIV. A composite HCV/HIV knowledge score was calculated based on the number of correct answers to 8 questions. These 8 questions comprised 4 questions for HIV and 4 for HCV: whether HCV and, respectively HIV, are transmitted (1) sexually, (2) with used syringes, (3) with other used injecting equipment, and (4) whether there is a vaccine. Almost all IDUs in Lithuania were opiate (heroin or liquid opiate) injectors (96%), and most IDUs in Hungary were primarily heroin injectors (68%). Thus, we assessed the severity of heroin dependence (based on 5 questions) [16].

Nominated egocentric network data, which were used to create the dyad-level and social network-level variables, were collected by asking participants to name those people from whom they received information or emotional support, with whom they had sex, or with whom they had injected within the past 30 days. Participants were allowed to report information on up to 12 network members. Then the following information was collected about these nominated network members.

Dyad-level variables were as follows: An injecting dyad was defined as a dyad where the IDU participant reported that the network member was another IDU. Disclosure of HCV and HIV infections, the dependent variables in this analysis, assessed whether the participant

ever told the network member that he or she was infected with HCV or HIV. In addition, we assessed the gender, age, and ethnicity of the network member, if the participant knew whether or not the network member was infected with HCV or HIV, emotional closeness, and relationship duration (in months). Behavioural characteristics within the dyad referred to the past 30 days. They included daily contact; using drugs together; the number of times they injected drugs together; any distributive and receptive sharing of needles; any sharing of cookers, filters, drug solutions or rinse water; and the number times they had sex together.

Social network-level variables assessed the size (number of network members) and density (interaction between network members) of the non-injecting and injecting networks. Participants were also asked to report which of the nominated network members interacted with which other nominated network members. Based on this information, binary network density variables were created to assess any interaction between network members. A density of 0 vs density >0 means 2 or more of the non-injecting or injecting network members interacted with each other, as reported by the participant responder. In other words, if the participant reported that any of the non-injecting or injecting network members interacted with any of the other network members, assessed by asking the participants to report which of the nominated network members keep in touch with which other nominated network members, then that was a density greater than 0.

Statistical analysis

First we performed preliminary analyses to establish which ethnic groups to compare. For this reason, to explore ethnic differences in Lithuania, we assessed whether there were statistically significant differences in the dependent and independent variables among Russian IDUs vs non-Russian IDUs, and Polish IDUs vs non-Polish IDUs. Due to the small number of Roma IDUs in Lithuania, no such assessment was performed for this ethnic group. There were no significant differences among Russian vs non-Russian and Polish vs non-Polish regarding any of the individual-level variables. However, Polish IDUs were more likely and Russian IDUs were less likely than non-minority Lithuanians to have daily contact with their network members. In addition, Russian IDUs knew their network members for a shorter time, had denser injecting networks, and had a higher number of IDU network members than non-Russian IDUs. In addition, preliminary analyses showed considerable differences between Russian vs non-Russian IDUs concerning HCV disclosure, but no such differences were found between Polish and non-Polish IDUs. Thus, the HCV disclosure analysis among Lithuanian IDUs was stratified by Russian vs non-Russian ethnicity. The HCV disclosure analysis among Hungarian IDUs and the HIV disclosure analysis among Lithuanian IDUs were not stratified by ethnicity because of the small sample size. There were no HIV-infected IDUs in Hungary. Thus, altogether 4 sets of analyses were performed: disclosure of HCV-infected status among (1) IDUs in Hungary, (2) non-Russian and (3) Russian IDUs in Lithuania, and (4) disclosure of HIV infection among IDUs in Lithuania.

Univariate contingency tables to describe distribution and univariate generalized estimating equations (GEE) with corresponding *p*-values to assess association were conducted. GEE was used to account for sampling dependence and the correlation among nominated network members resulting from the clustering of network members within individual participants [17]. Variables with univariate significance of $p < 0.20$ were chosen for multivariate GEE analyses. Multivariate GEE models with backwards elimination were used to assess significant associations with the dependent variables. Adjusted odds ratios (aOR) and 95% confidence intervals (95% CI) are reported.

Results

Participant characteristics

Participant characteristics are shown in Table I. Hungarian IDUs were significantly more likely than Lithuanian IDUs to be Roma, younger and homeless, and to have at least high school education, inject mostly amphetamines, and inject for a shorter time. Hungarian IDUs were, however, less likely than Lithuanian IDUs to have ever been in treatment, live with their parents, inject daily, and self-report being infected with HCV and with HIV. Hungarian IDUs had significantly different patterns than Lithuanian IDUs of obtaining sterile syringes. The vast majority (90%) of IDUs in Budapest obtained all their syringes from legal sources (pharmacy or needle exchange), compared to 38% in Vilnius.

Of the IDUs in Budapest, 33 (15%) reported being infected with HCV and none with HIV. All of the 33 who self-reported being HCV-infected reported at least 1 injecting dyad, and they reported altogether 94 injecting dyads (Table II). Of the IDUs in Vilnius, 240 (80%) reported being infected with HCV (116 or 75% of the non-Russian and 127 or 85% of the Russian IDUs; $p < 0.05$). Altogether 27 (9%) self-reported being infected with HIV (7% of the non-Russian and 11% of the Russian IDUs; not significant). Of those who self-reported being infected with HCV, 239 (99%) reported at least 1 injecting dyad, and they reported altogether 1134 injecting dyads. Overall, 518 were dyads of non-Russian IDUs and 616 were dyads of Russian IDUs. All of the 27 who self-reported being HIV-infected reported at least 1 injecting dyad, and they reported altogether 138 injecting dyads. Disclosure of HCV-positive status occurred in 83% of Hungarian and 80% of both non-Russian and Russian dyads, and HIV-positive status was disclosed in 33% of Lithuanian dyads.

Correlates of infection disclosure

Univariate associations are presented in Tables II and III. It is noteworthy that among the Hungarian IDUs who reported injecting dyads, everybody agreed that both HIV and HCV infection should be disclosed to both injecting and sex partners. It is also notable that disclosure occurred in all dyads where the participant gave their used syringes to the network member.

In multivariate models among the Hungarian IDUs, no individual or social network-level variables and only 2 dyad-level variables were associated with HCV disclosure (Table IV). These dyad-level variables were: using drugs together and a higher number of sexual acts with the network member in the past 30 days.

Among the non-Russian Lithuanian IDUs, the individual-level variable that was associated with HCV disclosure in multivariate analysis was a higher number of y since first injecting. Significant dyad-level variables were non-Roma ethnicity; emotional closeness; knowing that the network member was infected with HCV; sharing cookers, filters, drug solutions or rinse water; and receptive syringe sharing. Finally, significant social network-level characteristics were smaller networks of both non-injectors and injectors.

Among the Russian Lithuanian IDUs, individual variables that were associated with HCV disclosure in multivariate analysis were self-reported HIV infection, positive HCV disclosure attitude, and a higher HIV and HCV knowledge. Dyad-level multivariate associations were emotional closeness, a longer duration of the relationship, knowing that the network member was infected with HCV, and a higher number of injecting episodes together in the past 30 days. Social network-level associations were a lower density of the non-injecting network and a higher density of the injecting network.

Multivariate individual-level associations with HIV infection disclosure among Lithuanian IDUs were a lower heroin dependence score and negative HCV infection disclosure attitudes. Dyad-level associations were older age of the network member, being emotionally close, and a higher number of sexual acts with the network member in the past 30 days.

Discussion

The major findings of our study are as follows: We found that the majority of HCV-infected IDUs disclosed their infection, while only a minority of HIV-infected IDUs did. In addition, we found different individual, dyad and social network characteristics to be associated with disclosure of HCV and HIV infections among the injecting dyads of low-HCV prevalence Hungarian IDUs and high-HCV prevalence Lithuanian IDUs. Contrary to many previous studies that found no indication of risk reduction among HCV-infected IDUs [4–6], there is an element of secondary HCV risk reduction in both populations. (By secondary prevention we mean infected persons deliberately engaging in behaviours to prevent infecting uninfected injecting or sexual partners.) An example is the disclosure among Hungarian IDUs to all distributive syringe sharing partnerships. Another example is the association of HCV disclosure among non-Russian IDUs in Lithuania with receptive syringe sharing, suggesting ordered sharing. In addition, disclosure norms matched HCV disclosure behaviour in Hungary and among Russian IDUs in Lithuania. However, disclosure to ‘trusted’ network members and in lower density and smaller networks in Lithuania among non-Russian, and, to some extent, Russian IDUs suggests possible stigmatization. Each of the main findings is expanded upon in the paragraphs below.

While there are probably HIV-infected IDUs in Hungary, there were none in our sample. Thus, when we talk about HIV disclosure in this study, we refer to Lithuanian IDUs. HIV-infected IDUs who know that they are infected may increasingly engage in secondary preventive behaviours such as less distributive syringe sharing or ordered sharing [18–20]. However, evidence of risk reduction has been found in some but not in other populations of HCV-infected IDUs [5,6,21,22]. This difference in behaviours related to different infections may be because IDUs, aware of the differences in both infectiousness and severity of these infections, may regard HIV as a major threat to their health and HCV as much less of a health concern [23]. The inverse association in this analysis between HIV disclosure behaviour and HCV disclosure norms may be an indication of this distinction between the attitudes towards HIV and HCV infections.

A main finding of this study is the implication of secondary risk reduction. We saw this among Hungarian and Lithuanian populations of self-reported HCV-infected IDUs and (albeit non-significantly) among self-reported HIV-infected IDUs in Lithuania. In Hungary, all IDUs who engaged in distributive syringe sharing disclosed their infection to the network members to whom they gave their used syringes. We previously found that always cleaning 1-piece syringes can reduce the odds of HCV infection to close to nil in this low-HCV prevalence population where syringe sharing is not common and where mostly 1-piece syringes are used [6]. However, this cross-sectional association needs to be confirmed in longitudinal studies. The provision of sterile syringes is essential to prevent drug injecting-related infectious diseases. However, in low-HCV populations where syringe sharing is rare, HCV infection disclosure combined with thorough cleaning of used (1-piece) syringes may play a key role in reducing infection risk in those rare situations where there are not enough sterile syringes. This finding underlines the need to provide free and confidential testing and counselling. Such services increase the proportion of IDUs with up-to-date knowledge about both their infection status and proper syringe cleaning practices, and reinforce already existing disclosure norms [24].

The association among Lithuanian self-reported HCV-infected IDUs of disclosure with receptive syringe sharing suggests ordered sharing. In other words, those IDUs who believe they are still uninfected with HCV inject before those who are infected with HCV [19]. While there was no statistically significant association between secondary prevention practices in the context of HIV in Lithuania, a much smaller percentage of HIV- than HCV-infected Lithuanian IDUs gave away their used syringes. In a post-hoc analysis of this sample, this difference was highly significant. In addition, disclosure of HIV infection occurred in all but 1 such HIV discordant dyad. In contrast to other studies that found no indication of secondary prevention among HCV-infected IDUs [5,6], the indication of secondary HCV prevention in this dyad analysis study among Hungarian and Lithuanian IDUs may have the following explanations. First, secondary preventive behaviours may be culture- and/or population-specific. In addition, secondary prevention practices related to HIV infection may be more widespread, both among strong and weak ties. However, only certain secondary prevention behaviours may be practiced and mostly with strong ties in the context of HCV infection.

This study confirms our prior ethnographic findings that in Hungary strong HCV infection disclosure norms exist among IDUs [24], and it also shows that these disclosure norms may be reflected in disclosure behaviour. HCV infection among IDUs in Hungary may be perceived as a health issue rather than stigma. We suspect this because HCV disclosure norms so closely match disclosure behaviour and because all those Hungarian IDUs who had 2 or more non-IDU network members who knew each other disclosed their infection. Non-Russian IDUs in Lithuania, however, were more likely to disclose HCV infections to non-Roma, emotionally close and HCV-infected network members, and to those with whom they also engaged in several risk behaviours. Moreover, the more non-IDU or IDU network members they had, the less likely they were to disclose to their IDU network members. In addition, HIV infection in Lithuania was more likely to be disclosed only to ‘trusted’ (older, emotionally close, sex partner) network members [2]. These findings suggest that HCV infection may be stigmatized among non-Russian and HIV among all Lithuanian IDUs. Russian Lithuanian IDUs, on the other hand, seem to be in-between Hungarian IDUs and non-Russian Lithuanian IDUs with regard to their perception of HCV infection (public health approach vs stigma). While some associations point to stigma (e.g. the inverse association with non-injecting network members keeping in touch with each other), others point to a more public health-oriented attitude (association of disclosure with attitude, disclosure to injecting partners, higher density of nominated ever-injector network). This intermediary status of Russian Lithuanian IDUs suggests that while the infections may not be stigmatized among Russian ethnicity IDUs, they may be by the larger Lithuanian society.

Education and knowledge was linked to disclosure. All Hungarian IDUs with a high-school education disclosed their HCV infection to their network members, and among Russian Lithuanian IDUs, higher HIV and HCV knowledge score was associated with HCV disclosure. Higher levels of education and knowledge have been found to be associated with lower levels of stigma [25,26]. Educating IDUs about health and infection prevention by providing free and confidential testing and counselling may be an important tool to increase disclosure and decrease internalized stigma, especially among non-Russian ethnicity Lithuanian IDUs. Furthermore, dyad interventions including partner voluntary testing and counselling may also help to promote and reinforce disclosure norms within both dyads and social networks. Research is needed to investigate the role of stigma in Lithuania, both among IDUs and among the larger society, and also in other populations with high prevalence of HCV and/or HIV infections.

Limitations of this analysis include that while IDUs in Lithuania were initially recruited from the needle exchange, IDUs in Hungary were initially recruited from the street.

However, most participants were recruited through other participants at both locations, which probably reduced the potential initial recruitment bias. Moreover, most IDUs in Buda-pest attended syringe exchanges, so IDUs in the sample from Budapest may also have been relatively representative of IDUs who attended syringe exchanges. Some of the differences found in this study may be a result of differences in the recruitment process. Another limitation is that data collection in Vilnius started 2 y after data collection ended in Hungary. While the IDU population and their behaviours may have changed during this time in Hungary, we believe this to be very unlikely. There was no change in the availability, quality or access to prevention programs targeting IDUs in Hungary, and the drug profile of these participants was very similar to those in our earlier studies [27]. This suggests minimal changes in secular trends. This analysis assessed the relationship of self-reported infection status to disclosure, and not of laboratory-confirmed infection. However, we chose to use self-reported infection because we were interested in how perception was related to behaviour and not how behaviour was related to infection. Unfortunately neither study assessed HCV/HIV stigma specifically, so we are unable to further explore the stigmatization of HCV and/or HIV infection among these 2 populations of IDUs. In addition, many other characteristics of dyadic relationships may influence infection disclosure (including, for example, fear of partner rejection), and we assessed only selected aspects. Social desirability, which was not assessed in this study, may have resulted in some unmeasured bias. Another limitation of the study is the small sample size for the HCV-infected Hungarian IDUs and HIV-infected Lithuanian IDUs. This prevented us from exploring the potential role of ethnicity in Hungary and among HIV-infected IDUs in Lithuania. As there were no HIV-infected IDUs in Hungary, we were unable to assess HIV disclosure. Dependence scores were only calculated for heroin/opiate injectors, which accounts for most, but not all, participants. In addition, the 2 populations are not random samples of the IDU populations in these 2 countries. This, combined with the sampling differences in the 2 studies, means that the representativeness of and generalization from these findings may be limited.

Our analysis highlights the importance of dyad analysis in understanding the disclosure of HCV and HIV infections in IDU populations with different HIV and HCV prevalence patterns. Our findings underline the need for ongoing free and confidential HCV and HIV testing and counselling services for IDUs. Such counselling should place a special emphasis on strengthening disclosure norms and practices through dyad and network interventions, and increasing knowledge about and decreasing stigma towards drug-related infectious diseases. In Lithuania, the role of ethnicity should also be addressed and explored, as well as stigma among the non-IDU population towards HCV/HIV and/or injecting drug use. Issues related to infection status disclosure (such as what should be disclosed, how it should be disclosed, when it should be disclosed) should be incorporated into existing prevention programs in a culturally appropriate way to empower at-risk populations to minimize infection risk. Promotion of disclosure to everyone in an IDU's injecting network (regardless of whether they engage in risk behaviour with those people) may not be feasible, especially if there are negative consequences for the infected IDU who makes the disclosure. However, disclosure to other IDUs who are in strong network ties (e.g. injecting partners) and thereby are at a potential risk of engaging in unsafe injecting behaviour with the participant may have much more of a public health benefit. Persons in high-risk groups should be taught to disclose in appropriate contexts, but the appropriate context depends on the target population and to the risk behaviour in question. Consequently, IDUs should be trained in skills necessary to both disclose and assess the importance of disclosing in specific situations. Ideally, disclosure of positives would help to promote and reinforce norms of not sharing injection equipment.

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Table I

Participant characteristics.

Characteristic	Hungary, *n* (%)	Lithuania, *n* (%)
Total	215 (100)	300 (100)
Female	49 (22.8)	71 (23.7)
Age y, mean (SD)	27.9 (6.5)	29.8 (7.6) [a]
Ethnicity		
Roma	44 (20.5)	6 (2.0) [a]
Russian	N/A	150 (50.0)
Polish	N/A	50 (16.7)
Homeless	28 (13.0)	21 (7.0) [a]
At least high school education	52 (24.2)	38 (12.7) [a]
Marital status single	166 (77.2)	210 (70.0)
Lives with parents	65 (30.2)	170 (56.7) [a]
Y since first injecting, mean (SD)	7.4 (5.3)	10.1 (6.7) [a]
Daily injector	91 (42.3)	273 (91.0) [a]
Injects mostly heroin	147 (68.4)	198 (66.0)
Injects mostly amphetamine	61 (28.4)	18 (6.0) [a]
Ever in treatment	81 (37.7)	129 (43.0) [a]
Syringe exchange attendance		
No syringe exchange attendance	106 (49.3)	5 (1.7)
Some syringes obtained from the syringe exchange	53 (24.7)	262 (87.3)
All syringes obtained from the syringe exchange	56 (26.0)	33 (11.0) [a]
Self-reported being HCV-infected	33 (15.4)	240 (80.0) [a]
Y since diagnosed with HCV, mean (SD)	5.1 (3.6)	4.0 (3.0)
Self-reported being HIV-infected	0 (0)	27 (9.0) [a]
Y since diagnosed with HIV, mean (SD)	N/A	5.8 (2.4)

SD, standard deviation; N/A, not applicable; HCV, hepatitis C virus; HIV, human immunodeficiency virus.

[a] $p < 0.05$.

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Table II

Univariate individual attribute correlates of disclosure of being HCV- and HIV-infected.

	Hungary HCV disclosure Dyad *n* = 94		Lithuania – non-Russian HCV disclosure Dyad *n* = 518		Lithuania – Russian HCV disclosure Dyad *n* = 616		Lithuania HIV disclosure Dyad *n* = 138	
Characteristic	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**
Total	16 (17.0)	78 (83.0)	104 (20.1)	414 (79.9)	124 (20.1)	492 (79.9)	92 (66.7)	46 (33.3)
Individual characteristics								
Female gender								
No	15 (22.1)	53 (77.9)	82 (19.0)	349 (81.0)	83 (17.5)	390 (82.5)	63 (60.6)	41 (39.4)
Yes	1 (3.8)	25 (96.2)	22 (25.3)	65 (74.7)	41 (28.7)	102 (71.3)	29 (85.3)	5 (14.7)
Age y, mean (SD)	30.4 (3.9)	29.9 (4.7)	30.0 (7.7)	32.1 (7.2)	27.6 (6.2)	30.0 (7.0)	32.3 (6.1)	32.4 (5.3)
Roma ethnicity								
No	12 (15.4)	66 (84.6)	102 (20.6)	394 (79.4)	124 (20.4)	484 (79.6)	87 (67.4)	42 (32.6)
Yes	4 (25.0)	12 (75.0)	2 (9.1)	20 (90.9)	0 (0)	8 (100)	5 (55.6)	4 (44.4)
Russian ethnicity	N/A		N/A		N/A			
No							47 (88.7)	6 (11.3)
Yes							45 (52.9)	40 (47.1) [a]
Polish ethnicity	N/A							
No			79 (19.1)	335 (80.9)	107 (21.6)	389 (78.4)	76 (65.5)	40 (34.5)
Yes			25 (24.0)	79 (76.0)	17 (14.2)	103 (85.8)	16 (72.7)	6 (27.3)
At least high school education								
No	16 (20.5)	62 (79.5)	79 (17.8)	366 (82.2)	114 (20.3)	447 (79.7)	89 (69.5)	39 (30.5)
Yes	0 (0)	16 (100)	25 (34.2)	48 (65.8)	10 (18.2)	45 (81.8)	3 (30.0)	7 (70.0) [a]
Y since first injecting, mean (SD)	12.6 (5.3)	10.5 (4.9)	7.4 (7.6)	12.5 (6.5) [a]	9.0 (6.4)	10.5 (5.7)	14.4 (6.2)	14.2 (7.4)
Heroin dependence score, mean (SD)	7.3 (2.9)	7.1 (4.4)	6.6 (5.5)	10.9 (4.0) [a]	7.5 (4.8)	10.1 (4.0) [a]	12.1 (2.5)	9.5 (3.5)
Y since diagnosed with HCV, mean (SD)	5.7 (2.9)	4.8 (3.5)	3.4 (2.8)	4.2 (2.9)	3.8 (2.8)	4.6 (2.8)	6.3 (2.6)	5.7 (3.7)
Self-reported HIV infection							N/A	
No	0	0	100 (21.5)	365 (78.5)	120 (22.4)	415 (77.6)		
Yes	0	0	4 (7.5)	49 (92.5)	4 (4.9)	77 (95.1) [a]		

	Hungary HCV disclosure Dyad *n* = 94		Lithuania – non-Russian HCV disclosure Dyad *n* = 518		Lithuania – Russian HCV disclosure Dyad *n* = 616		Lithuania HIV disclosure Dyad *n* = 138	
Characteristic	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**
Y since diagnosed with HIV, mean (SD)	N/A		5.6 (0.2)	5.8 (1.4)	6.8 (2.1)	5.3 (3.0)	5.4 (2.5)	5.5 (2.6)
Attitude – HIV has to be disclosed to all injecting and sex partners								
No	0	0	9 (15.3)	50 (84.7)	19 (21.6)	69 (78.4)	50 (63.3)	29 (36.7)
Yes	16 (17.0)	78 (83.0)	95 (20.7)	364 (79.9)	105 (19.9)	423 (80.1)	72 (71.2)	17 (28.8)
Attitude – HCV has to be disclosed to all injecting and sex partners								
No	0	0	12 (23.5)	39 (76.5)	43 (38.0)	70 (62.0)	6 (23.1)	20 (76.9)
Yes	16 (17.0)	78 (83.0)	92 (19.7)	375 (80.3)	81 (16.1)	422 (83.9) [a]	86 (76.8)	26 (23.2) [a]
HIV and HCV knowledge score, mean (SD)	3.9 (1.2)	4.0 (1.0)	4.7 (0.6)	4.8 (0.5)	4.7 (0.7)	4.8 (0.5)	4.5 (0.8)	4.9 (0.3)

SD, standard deviation; N/A, not applicable; HCV, hepatitis C virus; HIV, human immunodeficiency virus. Percentages are row percentages.

[a] $p < 0.05$.

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Table III

Univariate dyad and social network correlates of disclosure of being HCV- and HIV-infected.

	Hungary HCV disclosure Dyad *n* = 94		Lithuania – non-Russian HCV disclosure Dyad *n* = 518		Lithuania – Russian HCV disclosure Dyad *n* = 616		Lithuania HIV disclosure Dyad *n* = 138	
Characteristic	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**
Total	16 (17.0)	78 (83.0)	104 (20.1)	414 (79.9)	124 (20.1)	492 (79.9)	92 (66.7)	46 (33.3)
Dyad characteristics								
Age of network member y, mean (SD)	29.8 (5.7)	28.7 (5.1)	30.0 (6.8)	31.2 (6.9)	29.8 (7.2)	29.9 (6.5)	32.4 (6.5)	32.8 (6.0) [a]
Female								
No	13 (17.8)	60 (82.2)	70 (18.4)	310 (81.6)	96 (19.9)	386 (80.1)	70 (64.2)	39 (35.8)
Yes	3 (14.3)	18 (85.7)	34 (24.6)	104 (75.4)	28 (20.9)	106 (79.1)	22 (75.9)	7 (24.1)
Roma ethnicity								
No	12 (15.2)	67 (84.8)	98 (19.4)	408 (80.6)	122 (20.2)	483 (79.8)	92 (67.6)	44 (32.4)
Yes	4 (26.7)	11 (73.3)	6 (50.0)	6 (50.0) [a]	2 (18.2)	9 (81.8)	0 (0)	2 (100)
Russian ethnicity	N/A							
No			48 (19.7)	196 (80.3)	58 (25.1)	173 (74.9)	34 (64.2)	19 (35.8)
Yes			56 (20.4)	218 (79.6)	66 (17.1)	319 (82.9) [a]	58 (68.2)	27 (31.8)
Polish ethnicity	N/A							
No			91 (20.4)	354 (79.6)	107 (20.4)	418 (79.6)	73 (66.4)	37 (33.6)
Yes			13 (17.8)	60 (82.2)	17 (18.7)	74 (81.3)	19 (67.9)	9 (32.1)
Network member is HCV-infected								
No	12 (20.3)	47 (79.7)	36 (66.7)	18 (33.3)	33 (54.1)	28 (45.9)	1 (100)	0 (0)
Yes	4 (11.4)	31 (88.6)	68 (14.7)	396 (85.3) [a]	91 (16.4)	464 (83.6) [a]	91 (66.4)	46 (33.6)
Network member is HIV-infected								
No	0	0	99 (20.5)	384 (79.5)	116 (19.9)	466 (80.1)	83 (72.8)	31 (27.2)
Yes	0	0	5 (14.3)	30 (85.7)	8 (23.5)	26 (76.5)	9 (37.5)	15 (62.5) [a]
Emotionally close								
No	11 (24.4)	34 (75.6)	87 (25.1)	259 (74.9)	107 (25.2)	318 (74.8)	75 (76.5)	23 (23.5)
Yes	5 (10.2)	44 (89.8)	17 (9.9)	155 (90.1) [a]	17 (8.9)	174 (91.1) [a]	17 (42.5)	23 (57.5) [a]

	Hungary HCV disclosure Dyad *n* = 94		Lithuania – non-Russian HCV disclosure Dyad *n* = 518		Lithuania – Russian HCV disclosure Dyad *n* = 616		Lithuania HIV disclosure Dyad *n* = 138	
Characteristic	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**
Length of time knowing each other in months, mean (SD)	90.9 (60.0)	82.3 (71.5)	22.1 (17.4)	38.9 (50.3) [a]	20.7 (17.0)	31.6 (39.1) [a]	29.2 (20.3)	37.5 (59.6)
Daily contact								
No	11 (22.0)	39 (78.0)	85 (24.4)	263 (75.6)	106 (23.4)	347 (76.6)	87 (73.1)	32 (26.9)
Yes	5 (11.4)	39 (88.6)	19 (11.2)	151 (88.8)	18 (11.0)	145 (89.0) [a]	5 (26.3)	14 (73.7) [a]
Used drugs together								
No	5 (41.7)	7 (58.3)	15 (39.5)	23 (60.5)	12 (37.5)	20 (62.5)	0 (0)	2 (100)
Yes	11 (13.4)	71 (86.6) [a]	89 (18.5)	391 (81.5)	112 (19.2)	472 (80.8)	92 (67.6)	44 (32.4)
Number of times injected drugs together in past 30 days, mean (SD)	9.9 (15.9)	13.3 (18.6)	9.6 (12.8)	14.1 (9.5)	9.4 (6.5)	13.9 (10.4) [a]	8.7 (4.8)	11.1 (5.7)
Sharing of cookers, filters, drug solutions or rinse water								
No	9 (20.1)	34 (79.1)	63 (38.4)	101 (61.6)	57 (33.5)	113 (66.5)	35 (59.3)	24 (40.7)
Yes	7 (13.7)	44 (86.3)	41 (11.6)	313 (88.4) [a]	67 (15.0)	379 (85.0) [a]	57 (72.2)	22 (27.8)
Distributive syringe sharing								
No	16 (19.8)	65 (80.2)	74 (28.4)	187 (71.6)	81 (25.4)	238 (74.6)	91 (68.9)	41 (31.1)
Yes	0 (0)	13 (100)	30 (11.7)	227 (88.3) [a]	43 (14.5)	254 (85.5) [a]	1 (16.7)	5 (83.3)
Receptive syringe sharing								
No	15 (18.3)	67 (81.7)	92 (31.7)	198 (68.3)	103 (27.6)	270 (72.4)	43 (60.6)	28 (39.4)
Yes	1 (8.3)	11 (91.7)	12 (5.3)	216 (94.7) [a]	21 (8.6)	222 (91.4) [a]	49 (73.1)	18 (26.9)
Number of times they had sex in the past 30 days, mean (SD)	0.13 (0.34)	0.97 (2.91) [a]	0.09 (0.40)	0.39 (1.86)	0.47 (1.71)	0.68 (2.61)	0.02 (0.21)	0.78 (2.67) [a]
Social network characteristics								
Size of nominated network of never-injectors, mean (SD)	0.94 (0.68)	0.69 (1.10)	0.57 (1.35)	0.20 (0.63) [a]	0.80 (1.41)	0.17 (0.62) [a]	0.34 (1.22)	0.28 (1.07)
Two or more never-injector network members keep in touch with each other (density)								
No	16 (18.0)	73 (82.0)	89 (18.2)	400 (81.8)	104 (17.7)	484 (82.3)	85 (65.4)	45 (34.6)
Yes	0 (0)	5 (100)	15 (51.7)	14 (48.3) [a]	20 (71.4)	8 (28.6) [a]	7 (87.5)	1 (12.5)

	Hungary HCV disclosure Dyad *n* = 94		Lithuania – non-Russian HCV disclosure Dyad *n* = 518		Lithuania – Russian HCV disclosure Dyad *n* = 616		Lithuania HIV disclosure Dyad *n* = 138	
Characteristic	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**	**Did not disclose**	**Disclosed**
Size of nominated network of ever-injectors, mean (SD)	4.9 (2.5)	4.1 (2.3)	5.6 (1.6)	5.1 (1.7)	5.5 (2.0)	5.4 (1.9)	6.0 (1.7)	5.3 (1.8)
2 or more ever-injector network members keep in touch with each other (density)								
No	4 (13.3)	26 (86.7)	8 (24.2)	25 (75.8)	7 (36.8)	12 (63.2)	4 (50.0)	4 (50.0)
Yes	12 (18.8)	52 (81.3)	96 (19.8)	389 (80.2)	117 (19.6)	480 (80.4)	88 (67.7)	42 (32.3)

SD, standard deviation; N/A, not applicable; HCV, hepatitis C virus; HIV, human immunodeficiency virus. Percentages are row percentages.

[a] $p < 0.05$.

Table IV

Multivariate correlates of disclosure of being HCV- and HIV-infected.

	Hungary HCV disclosure Dyad *n* = 94	Lithuania – non-Russian HCV disclosure Dyad *n* = 518	Lithuania – Russian HCV disclosure Dyad *n* = 616	Lithuania HIV disclosure Dyad *n* = 138
	aOR (95% CI)	**aOR (95% CI)**	**aOR (95% CI)**	**aOR (95% CI)**
Individual characteristics				
Y since first injecting	-	1.14 (1.02, 1.27)	-	-
Heroin dependence score	-	-	-	0.79 (0.63, 0.99)
Self-reported HIV infection	-	-	5.0 (1.1, 22.5)	N/A
Attitude – HCV has to be disclosed to all injecting and sex partners	-	-	3.4 (1.2, 9.6)	0.07 (0.01, 0.40)
HIV and HCV knowledge score	-	-	2.6 (1.3, 4.9)	
Dyad characteristics				
Age of network member	-	-	-	1.12 (1.03, 1.21)
Roma ethnicity	-	0.21 (0.05, 0.89)	-	-
Emotionally close	-	7.5 (2.2, 25.3)	5.1 (1.8, 14.6)	5.0 (1.2, 21.1)
Length of time knowing each other (months)	-		1.02 (1.00, 1.03)	-
Network member is HCV-infected	-	6.8 (1.7, 26.3)	12.0 (3.2, 45.9)	-
Used drugs together	6.9 (1.5, 32.6)	-	-	-
Number of times injected drugs together in past 30 days	-	-	1.09 (1.04, 1.14)	-
Sharing of cookers, filters, drug solutions or rinse water	-	2.1 (1.1, 4.2)	-	-
Receptive syringe sharing	-	3.1 (1.5, 6.1)	-	-
Number of times they had sex together in the past 30 days	1.2 (1.0, 1.3)	-	-	2.8 (1.4, 5.7)
Social network characteristics				
Size of nominated network of never-injectors	-	0.42 (0.26, 0.66)	-	-
2 or more never-injector network members keep in touch with each other (density)	-	-	0.07 (0.01, 0.41)	-
Size of nominated network of ever-injectors	-	0.62 (0.46, 0.85)	-	-
2 or more ever-injector network members keep in touch with each other (density)	-	-	6.4 (1.0, 40.8)	-

HCV, hepatitis C virus; HIV, human immunodeficiency virus; aOR, adjusted odds ratio; 95% CI, 95% confidence interval; N/A, not applicable.

Note: '-'means the variable was not included in the final model due to lack of significance.