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Social Network Correlates of HCV and HIV Transmission Risk Behaviors among Injecting Drug Users

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Abstract

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MS, University of Puerto Rico, 2006

BS MT, University of Puerto Rico, 2001

Dissertation Submitted in Partial Fulfillment of

the Requirements for the Degree of

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Abstract

Drug injection is an increasingly important risk factor in the transmission of blood-borne pathogens, including the hepatitis C virus (HCV) and human immunodeficiency virus (HIV). The purpose of the study was to examine the influence of social network factors on HCV and HIV. The study was grounded in social network theory and sought to determine whether social network characteristics affect high-risk sexual and drug injection behavior as well as self-reported HIV and HCV status. The study design was a quantitative cross-sectional survey. 181 participants in a needle exchange program completed a survey in Spanish assessing individual drug and sex risk practices as well as gathering information to describe the characteristics of participants' personal networks from an egocentric perspective. General estimating equation techniques were used to analyze the data. Results showed that only social network size was related to risky sexual behavior. Injecting risk behaviors were only impacted by personal network exposures, measured by the average number of years network members had injected. HIV self-reported serum status was correlated with trust, closeness, and number of family members named among the closest 5 network members. Last, HCV self-reported serum status was only related to the years that network members had been injecting drugs. This study has implications for positive social change in that public health practitioners may gain a better understanding of the social network characteristics associated with high-risk behaviors of those infected with HCV and HIV in order to develop health promotion programs to lower infections and mortality.

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Dedication

With great humility, I dedicate this work to the three most influential men in my life: Rev. Wilson De Jesús, Rev. Rafael "Rafy" Medina, and Dr. Rene Dávila-Torres, PhD, DBA. To them who taught me sacrifice, courage, and love for those around me that now are called community; their teachings were no less than public health.

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Chapter 1: Introduction to the Study

Background of the Study

Drug injection is an increasingly important risk factor in the transmission of blood-borne pathogens. Blood-borne pathogens are a wide spectrum of biological agents that are transmitted after blood exposure. Exposures can happen through sticks with a needle or other sharp instrument contaminated with infected blood. Other exposures involve contact of the eye, nose, mouth, or skin with infected blood (Center for Diseases Control and Prevention [CDC], 2010a). Among the most relevant blood-borne pathogens are the hepatitis C virus (HCV) and human immunodeficiency virus (HIV; CDC, 2010a).

By 2008, HCV was the most common chronic blood-borne infection in the United States. It was estimated that almost 3.2 million persons were chronically infected with HCV, and approximately 8,000 to 10,000 die each year (CDC, 2009a). Drug injection results in a common and effective HCV transmission path. In general, those with large or repeated percutaneous exposures with infected blood have higher risk of HCV; thus, injecting drug users (IDU), recipients of blood or its derivatives before 1987, persons with HIV infections, and chronic hemodialysis patients are at higher risk (CDC, 2009a). Nevertheless, other routes of exposures for HCV have been suggested (such as sexual transmission) but are inconclusive (CDC, 2008).

HIV is estimated to have affected more than 1.2 million people in the United States during 2011, and 658,507persons have died since the epidemic started (CDC, 2015). As in the case of HCV infection, drug injection is an effective and common route of exposure to the pathogen. However, different from the case of HCV, there is

conclusive evidence that HIV is sexually transmitted and thus potentially affects a larger portion of the general population (CDC, 2007c).

Thus, HIV and HCV are two of the main concerns in blood-borne virus transmission among the IDU population; this transmission represents an important challenge to public health agencies worldwide (Dumchev et al., 2009; Mathers et al., 2008; Strathdee & Stockman, 2010; Sweeting et al., 2009). Strathdee and Stockman (2010) reported that in 2007, drug injection was the third most relevant risk factor in the spread of HIV among the general population. The authors also reported that since HCV shares transmission patterns with HIV among IDU, it is not unusual to find cases of comorbid HCV and HIV infection. However, HCV is less likely to be tested in the population than HIV (CDC, 2009b).

There is evidence linking substance use and blood-borne virus risks with behaviors of members of individuals' social networks (Buchanan & Latkin, 2009). In order to better understand the transmission of both blood-borne viruses (HIV and HCV), analysis of social network variables is a logical approach. Wylie, Shah, and Jolly (2006) defined *social network analysis* (SNA) as "a technique which measures and analyzes the interactions that occur between people" (p. 2). SNA has the advantage that the theoretical model and the method for analysis are the same, thus making it easier to understand the phenomena under study. This is due to the matching of the theoretical framework to specific analysis designs (Lozares, 1996).

Valente (2010) described five social network data collection techniques to help analyze a social network. The first of the five collection techniques is *survey,* which includes analysis of social networks using standard questions. *Egocentric* data analysis,

the focus of the present study, is used to inquire about the social roles of people named (i.e., *altars*) by a participant and how altars in networks influence behaviors. This approach uses name generators and questions on the interaction between altars. The *sequenced* data technique uses random walk to generate index cases; the participant names altars, and a random subset of those altars is interviewed. Sequenced collection of data involves the use of snowball sampling for finding altars named by the participant. The fourth network analysis is *census;* in this approach, all members of a community are interviewed and asked one or more social network questions. Last, the *two-mode* or *joint* technique uses nominations of events attended or organization membership for collecting the data and mapping associations among them. Each of these can be used for SNA, and they have varying levels of capacity to analyze structural and relational measures.

Hepatitis C Epidemic

Hepatitis is the common name referring to inflammation of the liver that is caused primarily by a group of viral infections. The known hepatitis viruses are Hepatitis A (HAV), Hepatitis B (HBV), Hepatitis C (HCV), and Hepatitis D (HDV). The mode of transmission differs by virus type. In the case of HCV, scientists have only identified humans as known natural hosts (Shama, 2010). Therefore, the transmission of this RNA virus is completely dependent on human-to-human contact and interaction (World Health Organization [WHO], 2010). HCV is transmitted after contact with infected blood and/or blood products (CDC, 2010c). Intravenous therapies and drugs also play an important role in the transmission of the infection (Shana, 2010).

HCV is epigenetic and shows 11 different genotypes that have more than 100 different strains. Genotypes 1-3 are the most commonly found in the world; however,

geographical differences have been observed. For instance, types 1A and 1B are found worldwide and account for approximately 60% of the cases. South Asia is distinguished for reporting genotype 3; and genotype 4 has been associated with the Middle East, Egypt, and central Africa. Genotype 5 is almost exclusively found in South Africa, and genotypes 6 through11 are distributed in Asia (WHO, 2010).

The incubation period of HCV is approximately 6 to 8 weeks, although for the infected host the incubation period could pass unnoticed (Shana, 2010). This is why the disease is frequently underestimated worldwide and is not typically recognized until irreversible damage occurs. The WHO has reported that approximately 40% of persons exposed to HCV are able to fully recover. The other 60% become chronic carriers with a 20% liver cancer incidence. It is estimated that 3% of the entire world population has chronic HCV (WHO, 2010).

In Europe, more than 4 million persons suffer from HCV (WHO, 2010), and in the United States, estimates indicate that 21,870 new infections of HCV occurred in 2012 in the USA alone; this represents a 75% increase from 2010 to 2012 (CDC, 2015b). The CDC has reported that most HCV carriers are unaware of their status, and this may be one of the reasons that since 2007, more people have been dying from HCV than from HIV/AIDS. Currently, there are no vaccines for HCV prevention, and pharmacological therapy is not always successful (CDC, 2010). Nevertheless, the CDC (2015b) reported that some drugs result in 90% viral suppression; these are still in testing, and FDA approval for release is pending. Prevention strategies to avoid contagion with HCV include the following:

- Using sterile equipment during injection therapies, medical treatment, or drug administration;
- Avoiding using toothbrushes, razors, and other items that might be contaminated with blood;
- Never reusing or sharing needles, water, or drug preparation equipment; and
- Assuring sterile equipment during body piercing and tattooing (CDC, 2010, p. 1).

The WHO (2010) included the following as high-risk groups for HCV:

- Recipients of blood, blood products, and solid organs before 1992;
- Recipients of coagulation factors before 1987;
- Hemophiliac patients and hemodialysis center employees;
- IDU;
- Health care professionals exposed to unsterile medical or dental equipment;
- Those employees working with blood, blood products, or organs;
- Those administrating acupuncture and/or tattooing and their clients;
- Health care workers; and
- Newborns (due to perinatal transmission; WHO, 2010, pp. 1-2).

HIV Epidemic

HIV/AIDS is the most significant infectious disease contributing to mortality rates worldwide (WHO, 2010b). Estimates show that in 2008, 2 million deaths in the world were attributed to HIV/AIDS. At the end of 2008, 33.4 million people worldwide were

living with HIV, and HIV incidence accounted for approximately 2.7 million new infections that same year (WHO, 2010b).

As in most diseases, HIV/AIDS is more common among those with low socioeconomic-status (SES). Vulnerable populations include the homeless, sex workers, injecting drug users, men who have sex with men, transgender people, migrants, and prisoners. Geographical disparities have also been reported, with a disproportionate number of infections occurring in Sub-Saharan Africa (two thirds of the infected populations are concentrated in this area; Joint United Nations Programme on HIV/AIDS [UNAIDS], 2013). In the Caribbean, there were 240 million adults and children living with HIV by 2008. New cases were estimated at 20,000 with a prevalence of 1% (0.9–1.1%; WHO, 2009). However, UNAIDS (2013) reported that new cases fell by 30% (approximately 14,000 per year). The estimated prevalence in the United States was 1.1 million people in 2006 (WHO, 2009), and this number increased in 2012 to 1.2 million people (CDC, 2015c). Health disparities by race/ethnicity were observed, where Hispanics were almost 3 times more likely to have HIV than Whites. Blacks were almost 8 times more likely to be HIV positive than Whites (CDC, 2008).

The virus works by invading the host cell and forcing it to synthesize its genes (gag, pol, env, and others) using the host mRNA (Requejo, 2006). HIV has shown great variation, which has made it difficult to develop effective public health measures to effectively eradicate the disease (Heeney, Dalgleish, & Weiss, 2006). There are two main strains of HIV: HIV-1 and HIV-2. HIV-1 has been more extensively reported and studied than HIV-2, which is restricted to some regions of Western and Central Africa (Heeney et al., 2006; Requejo, 2006). Lakhashe, Thakar, Godbole, Tripathy, and

Paranjape (2008) reported that HIV-1 is classified under 11 subtypes (A to K), and Requejo (2006) reported more than 15 circulating recombinant forms (CRFs) of the virus worldwide.

Although subtypes are not strictly confined to a geographical area, some subtypes have shown a geographical trend. For instance, subtype A has mostly been associated with Africa and the former Soviet Union; subtype B with North and South America, Australia, and Japan; subtype C with East Africa, South Asia, and South Africa; subtype D with East and Central Africa; and subtype E with Vietnam and Thailand (it is also highly related to IDU in the area). Other subtypes, such as F, have been identified in Eastern Europe (Lakhashe et al., 2008; Resquejo, 2006), while subtypes G, H, J, and K appear to be distributed throughout Africa (including Burkina Faso, Mali, Nigeria, Ivory, Coast, Gabon, and Democratic Republic of Congo; Lakhashe et al., 2008; Resquejo, 2006). Current research has suggested that these subtypes have spread to South Europe and Asia (Resquejo, 2006). Researchers have noted that the high diversity in HIV strains and their increasing resistance to drug therapies could have significant implications for appropriate clinical approaches to treating the HIV/AIDS epidemic (Heeney et al., 2006; Lakhashe et al., 2008; Resquejo, 2006).

The CDC (2007) has reported that risk for HIV is exacerbated by a number of injection drug use and sexual risk factors, including sharing injection equipment, having sex with multiple partners or with partners who have sex with multiple partners, and having sex with those with sexually transmitted diseases, among others (CDC, 2007, pp. 5-6). In addition to these risk factors, Ashwani, Singal, Bhupinderjit, and Anand (2009) included sharing toothbrushes/razors, tattooing, and snorting drugs as risk factors for U.S.

citizens. WHO (2009) specified additional populations having higher risk behaviors for HIV, which included men who have sex with men, sex workers, prisoners, mobile workers, low-SES individuals, and immigrants.

HCV and HIV Epidemic Interactions

Ashwani et al. (2009) noted that comorbidity of HCV and HIV in the United States and its territories is common. Both HIV and HCV share routes of infection transmission as well as other risk factors that facilitate coinfection (Ahswani et al., 2009; WHO, 2007). It was estimated that HCV in the United States occurred in approximately 25%-40% of those who reported HIV infection, suggesting that nearly 300,000 individuals had an HIV/HCV-positive diagnosis (Ahswani et al., 2009). Worldwide estimates suggest that 4 to 5 million patients are coinfected with HIV and HCV. The most vulnerable population seems to be IDU, in which coinfection may be occurring in 90% of all cases (WHO, 2007; Deng, Gui, Zhang, Gao, & Yang, 2009).

HIV has been shown to alter the natural history of HCV infection (Ashwani et al., 2009; Lo, Kostman, & Amorosa, 2008; WHO, 2007). The natural history of HCV infection typically begins with acute hepatitis, which is followed by chronic hepatitis, hepatic cirrhosis, hepatocellular carcinoma, decompensated liver disease, and death. However, HIV/HCV coinfected persons develop cirrhosis and end-stage liver disease at higher rates than those only infected with HCV (Deng et al., 2009; Lo Re et al.). In their meta-analysis (considering 29 studies), Deng et al. (2009) stated that people with HIV/HCV had an overall odds ratio of 3.40 to have liver cancer or death. Moreover, in the case of IDU with HIV, the WHO (2007) wrote that HCV infection in injecting drug users (IDU) is a major medical challenge due to concurrent substance abuse, comorbid

mental health conditions, poor socioeconomic status, and complex, expensive and often unavailable HCV treatment (WHO, 2007, p. 3). Thus, vulnerability in IDUs to develop more serious health conditions is higher as compared to the general population.

Social Network Characteristics

Few empirical studies have examined the impact of the social network characteristics on IDU in Hispanic populations (Pérez et al., 2004). Wylie, Shah, and Jolly (2006) defined *social network analysis* (SNA) as "a technique which measures and analyzes the interactions that occurs between people" (p. 2). Wasserman and Galaskiewicz (1994) also defined it as an index individual and the individuals with whom the index is connected by interactions or behaviors of interest (Wasserman & Galaskiewicz, 1994, p. 2). SNA involves complex mathematical approaches to understand the social conditions that facilitate the spread of disease. In social networks, the focus is on understanding the actors (nodes) and how their relations with others (edges) affect their health status. Conventional data analysis focuses on how the actor's (the individual respondent's) attributes (characteristics such as sex, marital status, income, and knowledge, among others) impact health status (Hanneman & Riddle, 2005). In social network analysis, the principal aim is to describe how actors are located or embedded in the overall network in relation to others. The researcher then seeks to understand how the whole pattern of individual choices gives rise to more holistic patterns (density of the network and ties among individuals). More clearly, this type of analysis explains how an individual's choices are affected by his or her social network and how the social network is affected by his or her decisions. One purpose of this study is to understand from an egocentric perspective (the perspective of those surveyed who

described their networks) how the network characteristics are correlated with behaviors and self-reported serum-status. The surveys included questions for participants to describe characteristics of their networks, and these characteristics are used as correlates to HIV, HCV, and risky sex behavior. Therefore, in the social network approach, the relationships among members of the network (edges) themselves are just as fundamental as the actors (nodes) to which they connect (Wiley, Shah, & Jolly, 2006).

The social network model is based on the assumption that communication within and between people and groups impacts the behaviors of individuals. SNA is also predicated on the assumption that communication and behaviors among individuals in the network can impact the individuals' behaviors in very complex ways. SNA was developed to show how relations among members of a social group who are connected influence attitudes, beliefs, and behaviors of individuals. Through SNA, a number of network measures have been derived that define and hence identify multiple characteristics of these relations.

Egocentric network analysis, the data collection and data analysis technique that was adopted in the present study, is used to measure characteristics of the actors' environment from their perspective. Egocentric network information has been shown to be a good predictor of behavior (Valente, 2010). Egocentric network data collection and analysis techniques assume that an individual's behavior is often a function of his or her perception of peers' behaviors. For example, the extent to which an individual has a connection to similar behaviors in the network impacts whether he or she adopts that same behavior (called *personal network exposure*). Egocentric network analysis can lead

a researcher to find the threshold where an actor can adopt or decline to adopt a particular behavior.

Egocentric analysis is also used to measure and understand the strength of relations within a network, using mathematical properties such as closeness; nature of acquaintance; how long the participant has known the network member; frequency of interactions; types of relationships (family, spouse, sex partners, and friends); socioeconomic characteristics (educational attainment, wealth, and others); demographic characteristics (age, marital status, and geographical area); content of communication (communications related to health, religion, or family, among others); and risk behaviors (sharing syringes, engaging in unprotected sex, and piercing practices; Valente, 2010). In summary, analysis of self-reported data by a respondent (*ego*) regarding the social characteristics of a number of people he or she has contact with (*altars*) and the type of contact is called *egocentric analysis* (Jolly, Muth, Wylie, & Potterat, 2001). Also, egocentric analysis involves the network in two respects: (a) its structure (the social characteristics of the altars, size, age, educational level, family, friend, etc.); and (b) its relational characteristics (personal network exposure, ties, etc.; Valente, 2010).

Limitations of egocentric analysis include potential inaccuracy of reports of alter opinions and behaviors. Although this could occur because of lack of interaction, weak connections, or high network turnover, it could also be for other reasons. For instance, the participants might purposefully provide erroneous information on altars' opinions and behaviors to validate their own behavior. Although this study did not use social network analysis techniques that required interviewing altars and understanding their connections among each other, the egocentric network analysis approach and the use of ego responses

to questions about altars have been shown to be useful for the purposes of program planning for Puerto Rican IDU living with HIV (Kottiri, Friedman, Neaigus, Curtis, & Des Jarlais, 2002).

Problem Statement

Substance abuse is an important challenge for public health systems due to the number of persons affected and the increased health risks (specifically for HCV/HIV) of this population (WHO, 2009). In 2006, the Hispanic/Latino population had HIV/AIDS as one the five leading causes of death for those aged 25-34 years (CDC, 2009d), and by 2013, HIV/AIDS was the eighth leading cause of death among Hispanics/Latinos aged 25-34 and the ninth leading cause of death for those between the ages of 35 and 54 (CDC, 2015d). However, the CDC observed heterogenic trends within the Hispanic/Latino population that have given rise to disparities even among subgroups of Hispanics/Latinos. For example, Hispanics/Latinos born in Puerto Rico are at higher risk for HIV infection than other Hispanic/Latino groups in the United States. HIV incidence in Puerto Rico (26.4 per 100,000) during 2009 was higher than for the United States (22.8 per 100,000) as a whole (CDC, 2011).

This evidence may suggest that risk factors for Puerto Ricans islanders are different from risk factors for other Hispanics/Latinos in the continental United States. WHO (2009) reported that transmission while injecting drugs plays a relatively modest role in the epidemic in all Caribbean areas except for Puerto Rico. The statistics show that in 2006, approximately 40% of HIV incidence among males and 27% of new infections among females are directly related to injection drug use (WHO, 2009).

Similar results have been reported for HCV infections among Puerto Rican islanders, who have a higher risk of infection (compared with all United States residents). Puerto Rico's HCV general population prevalence has been reported at 2.4% (National Health and Nutrition Examination Survey [NHANES], 2008); United States has a prevalence of 2.3% for same age category (20–59 years) (NHANES, 2008). However, the prevalence of HCV among IDU in Puerto Rico is approximately 80%, compared with 57.5% of IDU living in the continental United States (Pérez et al., 2004; Pérez et al., 2010a; Pérez et al., 2010b).

In addition, the CDC has reported that among Puerto Ricans, both casual and chronic substance users may be more likely to engage in risky sexual behaviors such as unprotected sex when they are under the influence of drugs or alcohol (CDC, 2009c). Therefore, given the disparities in HIV/HCV infection between IDU living in Puerto Rico and IDU living in the continental United States, the lack of research concerning this disparity, and the need to further understand the influence of social networks on HIV/HCV risk behaviors, there is a need to investigate the characteristics of the social networks of Puerto Rican injection drug users and their implications for blood-borne virus transmission.

Purpose of the Study

The purpose of this exploratory quantitative study was to describe how social network characteristics of Puerto Ricans participating in a needle exchange program relate to personal engagement in risk behaviors. Risk behaviors included substance use and sexual behaviors associated with transmission of HCV/HIV. The study included data collection on risky behavior of the particpants in relation to injecting drugs and sexual

contact and correlates of those practices. Then, participants were asked to name their network members and provide information about them; this allowed perceived characteristics to be associated with individual risk.

Nature of the Study

The nature of this study was exploratory. A quantitative, cross-sectional survey design was used to describe how the characteristics of Puerto Ricans' IDU social networks, as described by the nodes, are related to engagement in risk behaviors at a specific point in time. The Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO, in combination with the Social Network Instrument developed by Wyllie (2006), was used to measure network characteristics. A total of 181 local Puerto Rican IDU and participants from 9 needle exchange sites were recruited to participate. Research staff used a random number table to select a number (eight) from one to nine, and every eighth person waiting in line to exchange syringes was approached to determine study eligibility (consistent with inclusion study criteria).

Research Questions and Hypotheses

There were two research questions, as described below. Key research (alternative) hypotheses associated with each research question are reported. Detailed statistical tests are included as an appendix showing dependent, independent, and appropriate statistical tests as per hypothesis question.

*Research Question 1***:** What are the relationships among personal network measures and high-risk sexual and injection drug behavior?

$H_{o1\text{-}1}$: Social network characteristics (closeness [psychological closeness, frequency of contact, and trust]; geographic insularity; density; network size; relationship type; personal network exposure [network member frequency of injection, years network members had injected, pooling money with network members, and social network]) do not contribute unique explained variance in a measure of sexual risk behavior, as measured by the Sexual Risk Scale score from the BBV-TRAQ instrument, in a regression model.

$H_{a1\text{-}1}$: Social network characteristics (closeness [psychological closeness, frequency of contact, and trust]; geographic insularity; density; network size; relationship type; personal network exposure [network member frequency of injection, years network members had injected, pooling money with network members, and social network]) contribute unique explained variance in a measure of sexual risk behavior, as measured by the Sexual Risk Scale score from the BBV-TRAQ instrument, in a regression model.

$H_{o1\text{-}2}$: Social network characteristics (closeness [psychological closeness, frequency of contact, and trust]; geographic insularity; density; network size; relationship type; personal network exposure [network member frequency of injection, years network members had injected, pooling money with network members, and social network]) do not contribute unique explained variance in a measure of injecting risk behavior, as measured by the Injecting Risk Behaviors scale score from the BBV-TRAQ instrument, in a regression model.

$H_{a1\text{-}2}$: Social network characteristics (closeness [psychological closeness, frequency of contact, and trust]; geographic insularity; density; network size;

relationship type; personal network exposure [network member frequency of injection, years network members had injected, pooling money with network members, and social network]) contribute unique explained variance in a measure of injecting risk behavior, as measured by the Injecting Risk Behaviors Scale score from the BBV-TRAQ instrument, in a regression model.

Research Question 2: What are the relationships among social network characteristics and self-reported HIV and HCV status?

$H_{o2\text{-}1}$: Social network characteristics (closeness [psychological closeness, frequency of contact, and trust]; geographic insularity; density; network size; relationship type; personal network exposure [network member frequency of injection, years network members had injected, pooling money with network members, and social network]) do not correlate with self-reported HIV and HCV status in a regression model.

$H_{a2\text{-}1}$: Social network characteristics (closeness [psychological closeness, frequency of contact, and trust]; geographic insularity; density; network size; relationship type; personal network exposure [network member frequency of injection, years network members had injected, pooling money with network members, and social network]) do correlate with the self-reported HIV and HCV status in a regression model.

Theoretical Base

This study was based on egocentric network analyses, which are both a methodological approach and a theoretical paradigm. Valente (2010) described five techniques for network analysis, which include the classic SNA using closed systems,

and techniques such as egocentric network analysis, in which the individual provides information on members of his or her social network. This model has been used to describe, explore, and understand structural and relational aspects of health (Luke & Harris, 2007). In the present study, I sought to determine how structural and relational characteristics of the network, as reported by the participants, correlated with risk of blood-borne infections. Previous literature has supported the use of egocentric network analysis for these purposes (Luke & Harris, 2007; Prithwish, Cox, Boivin, Platt & Jolly, 2007; Wylie, Shah, & Jolly, 2006).

Definition of Terms

Closeness: Closeness describes the importance or prominence of a given altar in the ego's network. In the present study, closeness was assessed using three measures adapted from survey items: psychological closeness, frequency of contact, and degree of trust (Luke & Harrison, 2007; Wylie, Shah & Jolly, 2006).

Density: Density refers to the extent to which nodes are connected to each other within a participant network. High density indicates that all or many of the nodes know each other (Tobin & Latkin, 2009). It is measured by calculating the ratio of observed ties to possible ties (Luke & Harris, 2007). In this study, a matrix was provided to participants, and they were asked to indicate how members of the network were connected to each other.

Drug network members: Drug network members are people who injected drugs with the interviewee, at the same time and in the same location, at least once during the previous 6 months (Aitken, Higgs, & Bowden, 2008).

Geographic insularity: Geographic insularity describes the proximity of the participant and the network members based on geography (Tieu, 2015). For the present study, participant and network members were asked to identify their zip code and/or barrio. Data were coded such that the variable distinguished those participants who lived in the same zip code as all of their network members and those for whom at least one network member lived outside of the same zip code or barrio.

Injection: Injection is defined as a skin-piercing event performed with a syringe and needle with the purpose of introducing a curative substance or a vaccine into a patient by the intramuscular, intravenous, or subcutaneous route. This excludes all skin surgery, tattoos, and body piercings (Simonsen, Kane, Lloyd, Zaffran, & Kane, 1999).

Network exposure: Network exposure refers to the percentage of the members an individual's personal network sharing some characteristic (Valente, 2010). In the present study, network exposure was ascertained from questions concerning how often participants injected with their network members, years the network member had injected, frequency of pooling money with a network member, and social network exposure.

Risk networks: Risk networks are networks of people with whom the respondent has engaged in a potential risk event, such as injecting drugs or having sex, within a designated time period (Braine et al., 2008).

Secondary syringe exchange: Secondary syringe exchange is a type of exchange that involves secondarily obtaining large quantities of syringes from a sanctioned source and redistributing them to other IDU for sale, trade, or altruistic purposes, or as part of drug transactions (De et al., 2007).

Sexual network members: Sexual network members are those with whom the respondent had sex at least once during the previous 6 months, whether or not money was exchanged (Aitken, Higgs, & Bowden, 2008).

Syringe exchange programs: These are programs that allow sterile syringes to be obtained from sanctioned sources (De, Cox, Boivin, Platt, & Jolly, 2007).

Closeness: Closeness involves connections between participants and members of their network (Valente, 2010).

Unsafe injection: Unsafe injection occurs when the syringe, needle, or both have been reused without sterilization. This also includes the reuse of cotton, cookers, or any kind of paraphernalia used in injection practices (Simonsen et al., 1999).

Assumptions

The social network model is based on the assumption that the communication among, within, and between people and groups impacts the behaviors of individuals. SNA is also predicated on the assumption that communication and behaviors among individuals in the network can impact the individuals' behavior in a very complex way. Therefore, SNA is always a proxy of how relations among members of a social group who are connected influence attitudes, beliefs, and behaviors of individuals. Another critical assumption is that participants will report all relevant network members without leaving out key members. The Principal Investigator limited this to five members; there could be additional members who are important but are not counted. In addition, it is assumed that participants report characteristics for each of the network members that match the actual characteristics of the network members; in this type of egocentric network analysis, individuals report information on their network members rather than

network members themselves providing information. Additionally, SNA involves the assumption that causes of behavior are primarily social rather than personality based (Valente, 2010).

Limitations

This study had several limitations. First, actors who were not connected to others (isolates) were not included in the study. Participant networks could have been more homogenous than expected. This could have resulted in obtaining artificially stronger ties (e.g., higher values of connectedness and solidarity and lower conflictual networks) that would then result in overestimating the risk for transmission of HIV/HCV. Also, it was not possible to identify all key members (and their characteristics) in order to quantify how they affect the risk of HCV/HIV transmission. Therefore, there may have been personal characteristics of the people in the social network that could have influenced the transmission of HCV/HIV that were not reflected in this study. Finally, as it is assumed in SNA that causes of behavior are primarily social rather than personality based, the individual causes of behaviors tend to be downplayed or ignored in this kind of analysis (Valente, 2010).

Delimitations

The population included all participants of NEPs receiving the services of *Iniciativa Comunitaria e Investigación Inc*. (ICI Inc.). This program has approximately 24 centers around the island of Puerto Rico. This study was restricted to those who were injection drug users; sexual risk practices are also important as transmission paths for HIV/HCV but were considered only in the context of participants who were active IDU.

As the primary focus of the study was egocentric network analysis, individual approaches to understanding risk were in general not considered (although they are important).

Significance of the Study

Federal and local agencies have continued expanding their efforts to reduce the rates of HCV/HIV in the Hispanic/Latino community. The efforts include better access to culturally appropriate prevention care and treatment services and enhancing research, policy, and community involvement, among others (CDC, 2009c). This study will contribute (a) to expansion of the knowledge base on one of the most vulnerable Hispanic/Latino populations within the United States territories; (b) to the development of evidence for use by health agencies, community-based organizations, and stakeholders; (c) to the development of health education and prevention programs based on evidence; and (d) to increased knowledge of Hispanic/Latino IDU social networks and their relationship to HCV/HIV transmission, which has not been documented.

Summary and Transition

HIV and HCV are among the most important blood-borne viruses worldwide (WHO, 2010a, 2010b, 2007). Adverse health effects of these infections range from simple infections to death; thus, life expectancy decreases. Although these epidemics have a larger impact in developing countries and in countries in a transitional state, they present a clear public health challenge in the United States. Both pathogens contributed to increased health disparities in the nation. Disparities in these infections, especially among racial and ethnic minorities, have been observed by researchers (CDC, 2009c) Statistics show that Hispano/Latino populations have been disproportionally affected by the epidemic in the United States. Within Hispano/Latino populations, intervention

programs for Puerto Rican islanders need to be contextually and culturally relevant. Epidemics among Puerto Rican populations tend to be more related to injection drug practices than to risky sex behaviors (CDC, 2009c; Pérez, 2004, 2010a; WHO, 2009).

Chapter 2 includes a review of existing literature about how the characteristics of different IDU social network impact engagement in risk behaviors related to the transmission of HCV/HIV viruses. The chapter starts by providing a historical background of social network analysis in a public health context, followed by a description of the risk and protector factors documented for different social networks and how these are associated with the transmission of HCV/HIV viruses. Finally, the chapter includes a description of social network analysis theory that forms the theoretical framework for this study.

Chapter 2: Literature Review

Introduction

The purpose of the literature review is to give an overview of the research on the social networks of needle exchange program (NEP) participants and of those not participating in NEP in conjunction with their risk to blood-borne viral diseases. This study was based on egocentric network analysis, which is both a methodological tool and a theoretical paradigm. This model has been used to describe, explore, and understand structural and relational aspects of health (Luke & Harris, 2007). Luke and Harris (2007) showed that social network theory includes a multidisciplinary approach that includes mathematics, statistics, sociology, anthropology, psychology, biology, physics, and computer sciences. Social network theory has clear application to public health research and can be a versatile framework within which to understand the transmission of diseases and the influence of personal and social influences on health behaviors.

Literature Search Strategy

Multiple electronic databases of peer-reviewed journals (such as PubMed, A to Z Ebscot, MD Consult, and Ocenet) were used to access information for this project. Walden, University of Puerto Rico, University of South Florida, and Berkeley online libraries were accessed for retrieving articles. Only articles obtained on these databases and published from 1990 to 2010 were considered. Keywords for article searches included *social network, injecting drug use, needle exchange program, social network analysis, Hispanics, drugs, syringe, HIV, HCV, AIDS, hepatitis, blood-borne pathogens, addictions, epidemiology,* and *health programs*. In addition, health authorities' webpages, books, and other statistical reports were consulted.

IDU Subculture and Drug Use Patterns

Worldwide estimates suggest that there are approximately 16 million IDU (Mathers et al., 2008; Strathdee & Stockman, 2010). However, the heterogeneity of this group poses public health challenges to practitioners, as health problems tend to be unique within subgroups. For instance, IDU characteristics vary in such ways as (a) geographical area in which they live, (b) injecting practices, (c) risk behaviors, (d) social norms, (e) network composition, (f) network role (centrality, propinquity, overlapping, etc.), (g) how drugs are obtained and shared, (h) quantities of drugs used, (i) types of drug used, (j) injection settings, (k) injection frequency, (l) race/ethnicity, (m) age, (n) legal and social frameworks, (n) network turnover (the proportion of new IDUs in the personal network during the past month relative to the number of members in the past 6 months), (o) strength of ties to other network members, and (p) and sources of the virus. Thus, personal attributes as well as influences from individual networks can shape the risk of exposure to diseases such as HCV and HIV (Braine et al., 2008; Davey-Rothwell et al., 2010; Junge et al., 2000; Koester, Glanz, & Barón, 2005; Latkin et al., 1995; Latkin et al., 2009; Mathers et al., 2008; Rhodes & Treloar, 2008; Shaw et al., 2007; Strathdee & Stockman, 2010).

Cultural Practices in Drug Preparation

The recognition of a culture of drug use and the potential risks associated with transmission of blood-borne pathogens is essential to developing effective intervention strategies. Researchers have documented that differences in HIV/HCV risk profiles can be attributed to the places where IDU inject drugs, as these places have their own cultural norms of injecting drug use (Hillier, Dempsey & Harrison, 1999; Jean-Paul et al., 1996;

Koester, Glanz, & Barón, 2005; Miller-Day & Barnett, 2004; Nemoto et al., 1999). IDU behaviors and attitudes can be influenced by the collective norms of their network members, which can increase or diminish the risk of blood-borne virus infections (Miller-Day & Barnett, 2004). However, as drug use is a forbidden behavior, specific practices still remain unclear and in many places have been poorly documented (Andía et al., 2008; Filinson et al., 2005; Jean-Paul et al., 1996; Miller-Day & Barnett, 2004).

Koester, Glanz, and Barón (2005) described injecting practices of IDU in Denver, Colorado. They described the practices of a group of IDUs of several ethnic backgrounds (including Whites, Blacks, and Hispanics/Latinos, among others). Koester et al. wrote that their participants melted solid rocks of heroin pills (tar) of approximately 0.25 g each in a cooker. The melted pills were mixed with water and then drawn into a syringe, which was then divided among participants.

In a sample of drug users in the Netherlands, Jean-Paul et al. (1999) discovered a different process. Dutch IDU acquired heroin as a hydrophobic powder that did not need to be melted. Dutch users, however, needed to acidify the heroin in order to make it soluble in water (by the use of lemon juice). Thus, they used a cocker (spoon) with a couple drops of lemon juice, water, and the heroin, which they then heated until heating resulted in a uniform solution that was injected. The differences in heroin preparation could be attributable to the manufacturing source of heroin. Southwest Asian heroin, which is frequently used in Europe, has a hydrophobic nature (Jean-Paul et al. (1999).

Conversely, in the United States, most of the heroin originates in Southeast Asia, which has a hydrochloride form that is easily dissolved in hot water. Jean-Paul et al. (1999) also stated that high-purity heroin and cocaine should dissolve in water at room

temperature. The adulteration of the product makes necessary the use of heat or acidification to increase water solubility.

In Puerto Rico, heroin also comes as a water-soluble powder that does not require melting (Andía et al., 2008; Filinson et al., 2005). On the island, the drug is dissolved in a cooker by briefly moving the cooker in a circular way and heating the solution as necessary to accelerate dissolving. Thereafter, a small part of a cotton ball or cigarette filter is placed at the cooker with the intention of filtering prior to syringe loading. In most cases, the drug solution is divided among the participants by any of three methods: *backloading*, which involves adding contents to the back end of a syringe once the plunger is removed; *frontloading*, which involves removing the needle from the host syringe and inserting the needle from the second syringe into the host and drawing contents; and sharing directly from the cooker (Andía et al., 2008; Filinson et al., 2005).

The differences in the risks through drug preparation are notable (Jean-Paul et al., 1999). The researchers showed that, in the case of Dutch IDU, acidification of the solution could result in lower risks for disease transmission. Similarly, other authors have shown that the point to which IDU heat the solution, combined with the time heat is applied, could reduce the risks of HCV/HIV (Andía et al., 2008; Filinson et al., 2005). Theoretically, those who receive the drug in soluble form would then face an increased risk of blood-borne transmission, as the solution is only heated once (to make it a uniform solution); those who receive the drug as a rock must heat it for a prolonged period of time in order to melt it.

Cultural Differences in Drug-Sharing Practices

The drug-sharing culture among IDU is complicated, variable, and multifaceted. There are several ways in which IDU divide the drug solution; each has its own associated risks and varies by geographical area (Andía et al., 2008; Filinson et al., 2005). Backloading is one of the techniques used for sharing drugs and requires a skillful injector who is able to perform it without spilling the drug solution (Jean-Paul et al. , 1996). Backloading requires the sharing of the drug by delivering it using the back part of a full syringe that delivers it to the empty one (Jean-Paul et al., 1996). The injector needs to balance the full syringe at an angle sufficient to deliver the solution but not sufficient for the solution to be spilled. The technique is rarely used but has been documented for New York and other North American and European cities (Andía et al., 2008; Filinson et al., 2005, Jean-Paul et al., 1996). The main risks associated with backloading are related to contamination of clean syringes with used ones.

A variation of this technique has also been reported in the Netherlands by Jean-Paul et al. (1999), in which a syringe is used as storage and every injector draws doses from it. This modality requires a big syringe (> 2 ml), which may be the reason why this practice is rarely used. Jean-Paul et al. (1996) also noted that this modality could be used for frontloading.

Frontloading, rarely seen in the United States, involves the use of a syringe with a detachable needle. Frontloading happens when the needle is removed from the hub of a receive syringe and the needle is inserted through the hub at the front of the receptor syringe. This practice is commonly seen in European countries where syringes have detachable needles. In the United States and its territories (including Puerto Rico), the

most common syringes used are diabetic syringes, which are not detachable (Andía et al., 2008; Filinson et al., 2005). However, while uncommon, this practice has been documented among Puerto Rican islanders (Andía et al., 2008; Filinson et al., 2005). Gaughwin, Gowans, Ali, and Burrell (1991) established that the type of syringe is directly related to blood-borne diseases, as detachable syringes have 55 times more blood than diabetic syringes after usage. Thus, detachable syringes increase the risks for blood-borne diseases, as they have the capacity to deliver a higher viral load, which implies that frontloading (theoretically) has up to 55 times more of the virus being transmitted than what occurs during backloading. Thus, the risks of drug sharing associated with backloading and frontloading as well as the geographical location can increase or diminish the risk of HIV/HCV.

Finlinson et al. (2005) documented that on the island of Puerto Rico, almost 40% of IDU use backloading; the others tend to prepare the solution and discharge it in the cooker for division among IDU. Sharing the cooker can be considered an indirect needle-sharing practice that poses a different kind of risk for HCV/HIV. Frontloading and backloading tend to expose the user more directly to the virus, resulting in higher risks for these practices (and hence lower for cooker sharing). However, indirect needle sharing practices also can expose the user to the virus through contamination of the source and not the syringe (De et al., 2007a; Latkin, et al., 2009a; Paintsil et al., 2009). Additionally, other paraphernalia and equipment related to injecting behaviors are shared, including cotton, tourniquets, and water (De et al., 2007a; Latkin et al., 2009a; Paintsil et al., 2009).

Jean-Paul et al. (1996) noted that cooker sharing is most common among diabetic syringe users because backloading requires great skill and is also time consuming. This practice is done after drug preparation and involves several modalities. One of them is common in the Netherlands, where injectors make a simultaneous draw into syringes of the drugs. Other cooker-sharing practices are performed after injectors reach agreement on the proper division of the drug; each sharer draws the surplus in a specific order (Andía et al., 2008; Filinson et al., 2005). This modality is the one that predominates in Puerto Rico, and it has been noted that Puerto Rican islanders practice it more than Puerto Ricans in the continental United States (Andía et al., 2008).

IDU in South Florida and Brooklyn have reported a different cooker-sharing practice during which cocaine and heroin are prepared separately in different cookers and syringes. Thereafter, the IDU make the proper mixture by squirting the cocaine into the syringe containing the heroin, and half of the resulting mixture is then transferred from the second syringe into the first syringe (Chitwood, McCoy, & Comerford, 1990; Inciardi & Page, 1991).

Cookers pose a risk of infection with HCV/HIV, as sharing contaminates new or noninfected syringes in the process, and the cooker is a necessary step in the injection process. Likewise, the use of plungers (rubber tips) for mixing the drug with water also increases the risks for HCV/HIV (De et al., 2007a; Koester, Glanz, & Barón, 2005; Latkin et al., 2009). The cotton used for filtering the solution into the syringe and the water for disinfecting and dissolving the drug in shooting galleries are not always clean; thus, both factors constitute a focus of infection that increases blood-borne virus diseases (De et al., 2007, 2007b; Filinson et al., 2005; Gyarmathy & Neaigus, 2006).

Other Facts Related to Subculture

Braine et al. (2008) and Koester, Glanz, and Barón (2005) stated that drug acquisition in the United States is done by selected persons within IDU networks who are allowed to buy the heroin; these people receive part of the injection as a reward. However, in Puerto Rico, IDU typically obtain heroin from a drug dealer without an intermediary (i.e., selected person). Drug dealers accessible to IDU in Puerto Rico are known as *tiradore*s (Finlinson et al., 2005). *Tiradores* are usually established in permanent sites and serve as a connection between the IDU and the *bichote* (a high-volume drug dealer who does not work with IDU but rather directly with the *tiradores*). The *tiradores* are considered secondary distributors (who may or may not be users) in charge of the street markets that include, in some cases, the shooting gallery (a place where IDU inject). Puerto Rican islander IDU tend to be lower, as the risk of infection attributable to drug acquisition tends to be equally distributed in this population (Finlinson et al., 2005). This is the case for islanders where the drug is bought by the IDU and he or she uses it; however, in the continental United States, the drug is acquired by a third person from the dealer and is then given to the IDU, who is obligated to share it with the third person. This specific practice is not within the social norms of Puerto Rican islanders. Thus, in general, this drug sharing increases the risk of contagion with HCV/HIV among mainland IDU.

Among Puerto Rican islanders, risk of infection with HCV/HIV is linked to other socially approved norms related to needle sharing in all its modalities (backloading, frontloading, and paraphernalia sharing). This has been found to be a significant factor in the transmission of HCV/HIV, as islanders engage in riskier behaviors than do U.S.

continental Puerto Ricans who are injectors (Andía et al., 2008). Authors have documented that drug and needle sharing is more common among islanders who develop strong social bonds with other IDU. Hillier, Dempsey & Harrison (1999) and Miller-Day and Barnett (2004) also found that strong bonding leads to permissive attitudes towards risk behaviors among IDUs in the United States and Australia.

Filliston et al. (2005) also noted that when Puerto Rican islander IDU pooled money or drugs, the quantity of drug to be injected was determined by the proportion each participant had contributed. Also, when only one syringe was available, the proportion of money spent determined the order of injection (Finllinson et al., 2005). Similar findings were suggested by Jean-Paul et al. (1996) and Nemoto et al. (1999), who documented that the quantity of drugs and money each participant contributes is proportional to the quantity of the solution to be injected and the order of injection. The implications for blood-borne transmission are that the economic contribution can increase risk by the load of virus being injected. This would be determined not only by the quantity of drug, but also by the turn an IDU takes in the chain of injection.

Another factor in the Puerto Rican IDU culture that impacts transmission is frequency of injection. Several researchers have determined that NEP participants have a frequency of injection that ranges from 6 to 8 times per day (Dávila-Torres & Reyes-Ortiz, 2010; Finlinson et al., 2005). Frequency of injection is an important factor for exposure to HCV/HIV through indirect injection practices (cooker, cleaning, etc; Jean-Paul et al., 1996). Many authors have suggested that Puerto Rican IDU are less likely to know their HCV and HIV serum status, which impacts their risk of exposure to those

who share needles or equipment with them (Andía et al., 2008; Finlinson et al., 2005; Kang et al., 2005; Pérez et al., 2010b).

HCV and HIV Prevalence and Risk Factors Among IDUs

HCV

HCV and HIV are among the top 10 viral infections in the world that result in high morbidity and mortality rates (separately and as comorbid infections; WHO, 2007, 2010a, 2010b). HCV global estimates indicate an estimated 130 to 170 million cases (Alter, 2006, 2007; Pérez, 2004; WHO, 2010c). In Europe, more than 4 million persons suffer from this condition (WHO, 2010), and in the United States, estimates indicate that 3.2 million Americans live with chronic HCV (Armstrong, 2007). The CDC has reported that incidence rates are approximately 17,000/year (CDC, 2010c) in the United States.

These data may underestimate the total number of HCV infections, because they do not reflect more than half a million persons who are incarcerated and do not participate in the health studies conducted by different health agencies (Armstrong, 2007). Estimates of HCV infection in this population are higher than in the general population (moderate estimates suggest a 30% prevalence (Armstrong, 2007). Armstrong (2007) and Estrada (2005) documented health disparities that disproportionally affect minority populations. They noted that HCV prevalence is higher among Hispanics than non-Hispanic Whites, findings supported by other researchers (CDC, 2009c, Sprading et al., 2010; WHO, 2009,). In addition, the authors noted that Hispanic IDU have the highest infection risk ratios within the United States.

Puerto Rican islanders are not included in many research activities due to their political status. Only some of the data provided by the CDC and the WHO present Puerto

Rican islanders separately from mainland Puerto Ricans. For example, the National Health and Nutrition Examination Survey (NHANES) study provides self-reported estimates of HCV and HIV for the 50 states but excludes other American territories such as Puerto Rico (Armstrong, 2007; Pérez, 2010b). The study by Pérez et al. (2010b) is one of the few studies, and maybe the only study, to examine HCV prevalence (as confirmed by laboratory tests taken from 2005–2008) of Puerto Rican islanders. Pérez and colleagues reported an HCV weighted prevalence of 2.3–2.7% among Puerto Rican islanders, most of whom (80%) were unaware of their HCV serologic status. In the case of mainland Puerto Ricans, the prevalence is similar (2.3%) among those aged 20 to 59 years. However, among islanders reporting lifetime drug use, prevalence of HCV was approximately 80%. These data are significantly different from reports from NHANES 1999–2002 from which HCV seroprevalence of 57.5% was reported among Puerto Rican mainland lifetime drug users (CDC, 2007b).

Recently, Reyes-Ortiz et al. (2014) reported that for the Mayagüez (western) and Ponce (southern) regions of the island, the total number of cases registered in the Puerto Rico Department of Health was 4,434. HCV was most prevalent among males of these regions than from females and it was documented that only 25.8% of all cases had a PCR diagnostic test. The authors also reported significant differences for age of diagnosis between males and females where women are diagnosed younger than males ($p < 0.000$). Differences between regions were observed being Mayagüez the health region with higher prevalence in comparison with Ponce region (p=0.01).

However, the data given by Reyes-Ortiz et al. (2014) for HCV although is the first data published by the Puerto Rico's Health Department does not cover the metropolitan

area of Puerto Rico. This is important as this region is more likely to have a higher prevalence of the disease in comparison to the rest of the island as per Pérez et al. (2010b). Neither the report discriminates for lifetime drug use cases, which for the purpose of this study are relevant. The study however, counts all the reported cases of people living within those health regions and takes in consideration the incarcerated people who reported their permanent address to be within those municipalities. Last this study data could not be compared with other populations in USA or Latin America.

Several studies conducted during the first decade have compared Puerto Rican IDU living in mainland and those living on the island. The results of subject profiles regarding risk factors and health behaviors indicate significant differences between the two groups. For instance, Puerto Rican islanders start using heroin younger than that Puerto Rican IDU living in mainland (33.2 vs. 38.4 years of age, respectively). Islanders are also less educated (high school level or less), have less family support (talking, housing, etc.), and use less cocaine in their drug solution than Puerto Ricans in the mainland (islanders indicate a preference for pure heroin). Puerto Rican islanders also report increased rates of injection and drug solution being injected (5.4 times per day compared with 2.8 times per day among mainland IDU; Amill et al., 2004; Colón et al., 2001).

Amill et al. (2004) and Colón et al. (2001) have also reported that islanders have more exposure to drug environments, more access to drugs, and do more pooling for buying drugs than mainland Puerto Ricans. Puerto Ricans living on the mainland are more aware of their HCV/HIV status and report more participation in methadone programs. Therefore, the research suggests that the social environment and HCV risk for

islanders is unique from those in the mainland U.S. IDU (Puerto Rican or other groups). In fact risks of infection among Puerto Ricans for HCV are still increasing at alarming rates in comparison to other ethnic backgrounds as African American IDU and White, non-Hispanics IDU, which had rather decreased or remained steady, (Cooper et al., 2008; Pérez, 2010b). Thus, HCV prevalence among Hispanic IDU population is a significant health problem to be addressed. However, among the Hispanic populations within all the U.S. territories, Puerto Ricans islanders seem to be the most vulnerable population to infection.

HIV

HIV/AIDS is currently the most prevalent infectious disease worldwide, and its contribution to mortality rates exceeds that of any other communicable disease (WHO, 2010b). HIV cases worldwide increased from 7.6 million in 1990 to 33.4 million in 2008. Incidence rates accounted for approximately 2.7 million new infections for 2008 (WHO, 2010b). The WHO reported that approximately 25 million persons have died from AIDS since the beginning of the pandemic (WHO, 2010d). The report shows that 2 million of deaths due to HIV occurred in 2008 (WHO, 2010b). The CDC (2010d) has estimated that for 2008, in the USA the prevalence of HIV/AIDS was estimated in 862,434 persons. The agency reported health disparities by race and observed that Hispanics were almost three times more likely to have HIV than whites, and blacks were almost eight times more likely to have HIV (CDC, 2008).

In the Caribbean, 240,000 of adults and children were living with HIV in 2008; new cases were estimated at 20,000 (with a range of 16,000–24,000; WHO, 2009). Most of the inhabitants of the Caribbean islands are Hispanics, and Puerto Rico is a USA

territory within the Caribbean. Transmission of HIV in the island is more similar to the trends in the rest of the Caribbean than in the USA (CDC, 2009). In general, within the Caribbean region, injecting drug use plays a relatively modest role in the epidemic. However, when examine by countries, the role of injecting drug use represents the most common transmission route for Puerto Rico accounting for 40%–51% of HIV incidence among males in 2006 and 27% of new infections among females (Amill et al., 1999; CDC, 2009c). This compares to 25% of the cases of HIV in the USA due to injection drug use. Similar statistics are found in Brazil (20%) and Canada (22%; Amill et al., 1999). Others have reported that injecting drug use accounts for approximately 10% of HIV infections globally, although rates could be as high as 49.7% in countries other than Africa (Strathdee & Stockman, 2010).

Pérez et al. (2010b) found that in Puerto Rico, the prevalence of HIV is 1.1% (95% CI: 0.5%–2.3%). This could be representing 25,000 persons (95% CI: 12,000–51,000) of which 9,100 are estimated to be unaware of their HIV status (Pérez et al., 2010b). Unfortunately, Pérez, et al. do not report specific data for IDU; however, they report higher risk for those aged 40–49 years, MSM, individuals with a history of STIs, those who received a blood transfusion before 1992, and those with a record of imprisonment. The estimates made by Pérez et al. are higher than the data reported for the US adult population (1.1 % in Puerto Rico vs. 0.5% in the USA). Also, lack of awareness of HIV status is significantly higher among Puerto Rican islanders than in the general population in the U.S. (36.4% in Puerto Rico vs. 21% in the U.S.). The authors explained that these differences are due mainly by the increased frequency of injection and injecting behaviors observed in the Puerto Rican Islander IDU. Also, Pérez et al.

noted that this population of IDU are hard to reach and are underserved with respect to health services. They suggest that it is necessary to assess characteristics of social, sexual, and drug using networks using network analysis.

In addition, documented risk factors for HCV/HIV in the Puerto Rican islanders IDU population suggest being similar to other Hispanic or ethnic groups (Baumbach, 2008; Pérez et al., 2004; Pérez, 2010b). These risks include (a) injecting with used injection equipment; (b) having sex for money or drugs; (c) having sex with an HIV infected person; (d) having more than one sex partner; (e) having a sex partner who has had other sex partners; (f) sharing injection drug needles and syringes or injection equipment; (g) having risky sex behaviors (for instance sex without a condom); (h) ever having had a sexually transmitted disease, like chlamydia or gonorrhea; (i) having received a blood transfusion or a blood clotting factor between 1978 and 1985; (j) ever having had sex with someone who has done any of those things; (k) using toothbrushes, razors and other items that might be contaminated with blood; (l) using non-sterile equipment during body piercing and tattooing; and (m) being a newborn of an infected mother (due to vertical transmission) (CDC, 2007; CDC, 2010; WHO, 2010a).

Needle Exchange Programs and HCV/HIV

The purpose of needle exchange programs (NEP, also known as syringe exchange programs [SEP]) is to allow an opportunity for IDU to exchange used syringes for new ones. SEP aim to reduce and control the transmission of blood borne pathogens and other adverse effects related to drug injection (Batos & Strathdee, 2000; Delgado, 2004; Downing et al., 2005; Hagan et al., 1999; Pollack, 2001; Stancliff et al., 2003; Vlahov,

Robertson & Strathdee, 2010). However, these programs include more than syringe exchange; they also provide health information, condoms, paraphernalia, drug treatment, and rehabilitation services to IDU during the exchange. SEPs differ depending in their geographical location, the context of the legal system in which they operate, and cultural environment (Batos & Strathdee, 2000; Stancliff et al., 2003).

The first SEP was founded in Amsterdam, Netherlands in the 1980s (Bastos & Strathdee, 2000; Knittel, Wren, & Gore, 2010). Thereafter, most developed countries implemented NEPs as a harm reduction strategy. The first SEP in the U.S. territories was implemented in Connecticut in 1986 (Knittel et al., 2010). Stancliff et al. (2003) reported that by 1998, in the U.S., there were 131 SEP operating in 31 of its territories. However Downing et al. (2005) reported that there are as many as 209 SEP in 36 of its territories that are serving IDU.

Multiple strategies used by SEP to implement services have been documented, including face-to-face exchange, enhanced pharmacy services, exchange by clinicians, exchange with medical prescription, exchange without medical prescription, and vending machines (Downing et al., 2005; Knittel, Wren & Gore, 2010; Stancliff et al., 2003; Vlahov, Robertson & Strathdee, 2010). Currently in Puerto Rico, SEPs provide the above mentioned services via face-to-face exchange, vending machine, in pharmacies, and during outreach routes of different community based organization /non-governmental organizations. All legal SEPs in Puerto Rico are regulated by the Department of Health.

NEPs have played an important role in the decreased of HIV among IDUs and modifying injection risky behaviors (Batos & Strathdee, 2000; Delgado, 2004; Downing et al., 2005; Hagan et al., 1999; Pollack, 2001; Robertson & Strathdee, 2010; Stancliff et

al., 2003; Vlahov, Knittel, Wren & Gore, 2010). Pollack (2001) attributed many of the reductions in HIV infections in cosmopolitan and rural cities to SEPs. There is also sufficient evidence pointing that SEPs do not alter social networks structure among IDUs (including density, turnover, centrality among others; Batos & Strathdee, 2000; Delgado, 2004; Junge et al., 2000).

Yet HCV data are inconclusive regarding the benefits of SEPs. Pollack (2001) and Hagan et al. (1999) concluded that since HCV has a high virulence, SEPs are not completely effective in combating its transmission. The biological properties of HCV result in successful transmission of the virus to susceptible hosts in 3 – 9% of all HCV positive needle-sticking cases; while only 1% of all HIV positive needle-sticking cases become infected (Pollack, 2001). However; interventions used in SEPs typically only provide clean syringes and do not provide other health promotion materials. Indeed, Delgado (2004) and Knittel et al. (2010) remarked that the benefits of SEPs in combating the HCV epidemic have not been thoroughly evaluated; because of this, current literature does not be reflect the scope of health interventions provided to IDU through SEPs.

Social Networks and HCV/HIV

Social Networks Theory

Social network theory (SNT) can be traced back to the 18th century, when Leonhard Euler used a visual representation to show a city network of bridges and rivers. Euler's intentions were to solve the riddle regarding whether or not a person could cross the city without passing twice through the same bridge. During this exercise, Euler invented graph theory, which provides one of the mathematical foundations for network analysis (Luke & Harris, 2007).

During the 19th and early 20th centuries, the concept of network analysis had evolved and was being applied to social ties. Specific terminology was developed that applied analysis of social networks. In fact, during the early 20th century, social scientists were discussing the concept of *six degrees of separation* (any person is separated from other by no more than six persons; Luke & Harris, 2007). The sociogram is considered the first specific network analytic tool. The new tool was an innovation in the analysis of relationships that could be represented on paper. The sociogram was based on two elementary concepts: people (represented as points), and interpersonal relationships (represented by lines that connect individuals; Luke & Harris, 2007).

It was not until mid 1990's that mathematicians Erdős and Rényi demonstrated that as network size increases, the needed connections between nodes decreased for the network to be completely linked (Luke & Harris, 2007). Granovetter (1973) added the concept of *weak ties*. This referred to casual acquaintances that helped held the network together. Conversely to strong ties, which fulfill the primary necessities of the node (mainly represented by, family, neighbors, and coworkers), weak ties were considered casual but were completely necessary to fulfill other needs of the person. Granovetter's work provided two advances. First, it was possible to develop a sophisticated and realistic model of network structure. Second, Granovetter's work provided an explanation of social networks structure and was perhaps the first time human behavior was described using this approach (Luke & Harris, 2007).

Contemporary scientists, including mathematicians (Montanari, Saberi, 2010), anthropologists (Perelberg, 1983), public health researchers (Sabbah, 2011), and biologists (Sigman, 2009) have started examining the fundamental properties of

theoretical and real world networks. In general, SNA posits that individuals are tied to one another by invisible bonds that represent specific social structures. These invisible bonds (social structures) are independent and unique among individuals and create a distinct and significant social environment that affects behaviors, norms and risk taking activities (Scott, 1988). Also, these social bonds can change the social environment as well as be changed by it, generating a dynamic interplay between social environment and behavior over time. Therefore, analysis of social networks is necessary for public health researchers in order to understand and explain the nature of risk behavior and to then implement solutions that impact both individuals and their networks.

Luke and Harris (2007) summarized social network theory as consisting of three sets of analyses. *Individual (ego-centric)* analysis is performed with the purpose of identifying the position or location and characteristic of an actor within a network. Measures used in egocentric analysis include degree (the simplest of centrality measures, the extent to which an actor is connected to others; Luke & Harrinson, 2007), centrality (the importance or prominence of a given actor or node; Luke & Harrison, 2007), and structural equivalence (two nodes are said to be exactly structurally equivalent if they have the same relationships to all other nodes; Hanneman & Riddle, n.d.). *Subgraph analysis* is performed for the purpose of examining the characteristics of the group under observation. Common measures include the dyad (a pair of actors and the (possible) tie(s) between them; Wasserman & Faust, 1994), triad (a subset of three actors and the (possible) tie(s) among them; Wasserman & Faust, 1994), *k*-core (*k*-core are defined as areas of relative high cohesion within the map created by the graphical representation of the connections among nodes, Scott, 1991), and the cliques (maximal set of vertices that

have the potential to become social groups (within a network) and which should have at least three nodes; Wasserman & Faust, 1994). *Network level analysis* is performed to describe and make inferences based on the structure of the entire network. These network level analysis measures include density (the extent to which nodes are connected to each other within a participant network; Tobin & Latkin, 2009), diameter (the length of the longest path between connected actors; Wasserman & Faust, 1994), and centralization (the distance from an actor to all others in the network by focusing on the distance from each actor to all others; Wasserman & Faust, 1994).

These four areas are *transmission networks, information networks, social networks,* and *organizational networks. Transmission networks* involve social systems and are interest on what flows between actors in the network (such as diseases or information). There are two main types of transmission networks: disease and information. Disease transmission networks are networks of individuals connected by ties that can spread infection (Friedman & Aral, 2001). Analysis of disease transmission networks has successfully been applied to tuberculosis (CDC, 2005), HIV/AIDS (Buchanan & Latkin, 2009; Aitken, Higgs & Bowden; 2008), sexually transmitted diseases and sexually transmitted infections (STD/STI) (Wylie et al., 2010), gonorrhea (Stroner, Whittington, Hughes, Aral, & Holmes, 2000), severe acute respiratory syndrome (SARS) (CDC, 2003), and pneumonia (Myers, Newman, Martin, Schrag, 2003), among others. *Information networks* refer to the dissemination of information within a network; information network analysis is used mainly by health promotion practitioners and researchers (Luke & Harrison, 2007). Researchers can use this type of approach to explain how health information is transmitted through and to health

consumers. An example of SNT applied to the transmission of information is the National Cancer Institute's Tobacco Harm Reduction Network (the only national research network on tobacco and health disparities) and the Global Tobacco Research Network (Global Tobacco Research Network, 2009; National Cancer Institute, 2008). Both of this organizations use the SNT to evaluate the dissemination of anti-tobacco information and how networks prevents health damages.

S*ocial networks* focus on how social structure and relationships (defined in terms of social capital and social support) act to promote or influence health and health behaviors. Social network analysis has been used, for example, to compare social support and social capital index and its relation to the mortality and morbidity of diseases within a community (Luke & Harrison, 2007). Finally, *organizational networks* consider connections among different organizations and their impact in health services care. Organizational network analysis differs from analyses of transmission and social networks only in that the networks are comprised of agencies rather than of individuals. Organizational network analysis has been used to compare public versus private health services (Luke & Harrison, 2007).

In summary, SNT is both a methodological and theoretical framework that allows the researcher to pose and answer important health issues from a holistic, multilevel perspective. This theory is not considered to be reductionist, as it includes analysis of a variety of levels (for instance egocentric level and organizational network analysis) representing different aspects of the network, and each level has its own properties and its specific analysis strategies. SNT was developed using a multidisciplinary approach; thus,

it provides a powerful model for social structure analysis and measuring how networks impacts the health of a community.

In the drug user's social context, egocentric network analysis can be used to assess personal network characteristics of an individual; thus, such analysis can provide a robust estimate of risk for HCV and HIV infection. Egocentric network analysis has been used to show that IDU network characteristics are important in understanding risk for infection. These studies include IDU among (a) the homeless (Latkin et al., 2009), (b) injecting in shooting galleries (Latkin et al.,1995, 2009; Wylie, Shah, Jolly, 2006), (c) injecting in public (Koester, Glanz, Barón, 2005; Wylie, Shah, Jolly, 2006), (d) sharing paraphernalia (Davey-Rothwell, Latkin, Tobin, 2010; De et al., 2007b; Koester, Glanz, Barón, 2005; Latkin et al., 2009; Rhodes & Treloar, 2008; Latkin et al., 1995); (e) poly or multi drug use (Wylie, Shah, Jolly, 2006), (f) incarceration (Braine et.al., 2008; Montgomery et al. 2002), (g) number times the person had been arrested (Braine et al., 2008)**,** (h) number of sexual partners the person has(Aitken, Higgs & Bowden, 2008; Wylie, Shah, Jolly, 2006), (i) types of sexual practices (Aitken, Higgs & Bowden, 2008; Junge et al., 2000; Latkin et al., 2009; Wylie, Shah, Jolly, 2006), (j) number of persons sharing needles (De et al., 2007b; Koester, Glanz, Barón, 2005, Wylie, Shah, Jolly, 2006), (k) geographical area (Wylie, Shah, Jolly, 2006), (l) sex work (Braine et.al., 2008; Junge et al., 2000), (m) number of person within the network (De et al., 2007b ; Koester, Glanz, Barón, 2005; Latkin et al., 1995; Wylie, Shah, Jolly, 2006), (n) frequency of use (De et al., 2007, 2007b; Junge et al., 2000), (ñ) years as an IDU (Aitken, Higgs & Bowden, 2008) (o) network density and overlapping (De et al., 2007b; Koester, Glanz, Barón, 2005; Latkin et al., 1995, 2009;) (p) HIV and HCV knowledge (Rhodes &

Treloar, 2008), (q) joint purchases of drug (Koester, Glanz, Barón, 2005; Rhodes & Treloar, 2008), (r) employment status (Davey-Rothwell, Latkin, Tobin, 2010; Latkin et al., 2009), among others are widely associated to HCV and HIV risks. However, there have been no studies that have examined social network characteristics in Puerto Rican IDU networks.

HCV and HIV transmission have also been analyzed using egocentric network analysis. Social norms theory postulates that individuals in a network will behave in ways that are consistent with what they think others within the network believe and do (Gottileb, 1985). This represents perception of behavior, which may be independent of what the nodes know or the extent of their actual beliefs. Berkowitz (2004) and Davey-Rothwell et al. (2010) stated that social norms theory helps explain why an IDU may overestimate the permissiveness of networks attitudes and/or behaviors with respect drug use. Stern et al. (1999) explained that when high density, overlapping (describing when a node has one or more social areas or functions in common with other node during a specific time period), and centrality are found in social networks, social norms become stronger and individuals may act on the network's norms for reason other than self-interest. This phenomenon is also stronger when social support, significant interactions and low network turnover is observed (Stern et al., 1999). Latkin et al. (2009) postulated that once norms are established with a group, they are constantly reinforced to maintain network infrastructure. Davey-Rothwell et al. (2010), Latkin et al. (2009), and Rhodes and Treolar (2008) reinforce that social norms can be dynamic and new norms may influence individuals to engage in healthy behaviors changing the network risk.

Density

Density refers to the number of nodes that know each other within a participant's network. High density indicates that all or many of the nodes know each other (Tobin & Latkin, 2009). Density is measured by calculating the ratio of observed ties to possible ties (Luke & Harris, 2007). A tie is defined as a link between two nodes (Valente, 2010). Within the research literature, high and low density do not have a fixed threshold; however, typical values associated with high density are .60 – .70 or higher.

Latkin et al. (1995) reported that higher density networks (defined as density greater than .60) among IDU were associated with more risky sexual and injecting practices than those with lower density networks. De et al. (2007b) found that higher density was associated with increased risk for HCV and HIV. However, Costenbader, Astone, and Latkin (2006) found similar results for HIV risk behavior for networks with a density index less than 0.43 (increased risk of 31%). The low density associations to HIV risk behavior were explained as due to high turnover rates[1] which tend to decrease the density of a network; so that changes in network risks were primarily the result of characteristics of new members entering the network that increased overall HIV risky behaviors. Thus, the impact that density has in the HCV/HIV risks seem to be affected by the characteristics of the network.

Tobin and Latkin (2008) reported that high density networks among MSM were associated with increased risk for HIV infection (due to harmful injecting practices and sexual behaviors); they found nearly a five-fold increase in risk compared to bisexual,

[1] *Network turnover* refers to the proportion of new IDUs in the personal network during the past month relative to the number of members in the past 6 months (De et al.., 2007).

and gay identified men. Similarly, Paintsil et al. (2009) reported that higher density networks among IDU were associated with higher risk of HCV.

Other authors have found a negative association between network density risk of risky sexual practices and infection risk for blood borne diseases (Rothenberg, 2006). Suh et al. (1997) remarked that street IDU with lower density networks (≤ 0.75) had a 3% higher risk of HIV infection than those with high density (≥ 0.76). El-Bassel (2006) found in a study of 2,067 participants enrolled in seven methadone maintenance therapy programs (MMTP) that lower network density among IDU increased their sexual risk behaviors and HIV infections 60%.

Other researchers have found no association between density and risk for HCV/HIV transmission. Aitken, Higgs and Bowden (2008) analyzed social networks of Vietnamese IDU living in Australia and found that they reported higher density (connected) networks than other populations. Density was reported to be 8 times higher than values for other groups of Asians, Philippinos, and Australians; however, the density was not significantly associated to the prevalence or risks of transmission of HCV/HIV or any other blood borne disease (Aitken, Higgs & Bowden, 2008). The authors did find higher density was related to risky injecting behaviors among them than among comparison groups. Likewise, Latkin et al. (2009) in a sample of 818 IDU in Baltimore found that network density was not associated with increased risk related to injecting practices.

The literature reviewed has not examined density among Hispanic IDU networks and its relationship to risk. In addition, Puerto Ricans islanders have not been studied using social network analysis. Therefore, a gap in the literature remains in this area.

Homophily

Shaw et al. (2007) found in their study of syringe sharing among IDU that network homophily (similarity of characteristics among network members; also referred to by some authors in terms of heterogeneity) was associated with decreased risky injection behaviors. Latkin et al. (2009) compared four groups with different sex and injecting behaviors and concluded that those reporting networks with highest heterogeneity in behaviors and structure had higher risks of becoming infected with HCV/HIV. Tucker et al. (2009) reported that high heterogeneity networks increased risk of blood borne disease among homeless women.

Similarly, Tobin and Latkin (2008) showed that higher age, as well as gender heterogeneity, in the network increased the injecting and sex risk behaviors among MSM. Rothenberg (2006) found that gender and age heterogeneity in a network increased blood borne diseases. Rothenberg explained that networks for homosexual and bisexual IDU with high homophile increased their risks for HIV. This increased risk by gender is also documented by Latkin et al. (1995). Other studies found that employment (Braine et al. 2008; Latkin et al. 2009, 2009a), homelessness (Braine et al. 2008; Koester, Glanz & Barón, 2005; Latkin et al. 2009; Tucker et al., 2009), type of relationship and/or marital status (Latkin et al. 2009, 2009a; Tucker et al., 2009), educational level (Costenbader, Astone & Latkin, 1995; De et al., 2007; Latkin et al., 1995, 2009,2009a; Wylie, Shah and Jolly, 2006), overdosing (De et al., 2007), pooling resources for drug acquisition (Koester, Glanz & Barón, 2005), imprisonment and arrests history (Braine et al., 2008; Latkin et al., 2009), injecting in public places (De et al., 2007a; Latkin et al., 1995; Paintsil et al., 2009; Wylie, Shah and Jolly, 2006; De et al., 2007), injection frequency

(Aitken, Higgs & Bowden, 2008; Latkin et al., 1995; De et al., 2007; Paintsil et al., 2009) and years injecting (Aitken, Higgs & Bowden, 2008; De et al., 2007, 2007a; Latkin et al., 1995, 2009; Paintsil et al., 2009; Wylie, Shah and Jolly, 2006) among IDUs were related to higher risks of HCV/HIV infections.

Propinquity

Wylie, Shah, and Jolly (2006) found in a Canadian study that IDU whose networks consisted of members who live in the same geographical area (in this study, by zip code) were at increased risk for HCV/HIV infection. The authors reported that shooting galleries are high risk environments for blood borne diseases in that they increase risks for exposure to contaminated equipment (syringes and other sharp objects) left in the floor; galleries serve as a bridge from infected IDU to uninfected IDU. Rothengerg (2006) explained that geographical location plays a crucial role in the distribution of a disease within a community, even when geographical areas distance is low. He also argued that geostatistical approaches using areas such as domicile, public places and other clusters could explain the risks of transmission of a disease.

Braine et al. (2008) also argued that IDU sharing a geographical space (zip-code) also share similar risk factors for blood borne disease. Braine et al. show in their study that sexual and injecting practices are more similar among those within a geographical area than those with different areas that accidentally share the location for injecting or making a sexual transaction.

Shaw et al. (2007) showed that Canadian IDU who injected in hotels increased their risk of infection with HCV/HIV by 2.36 times compared to other injecting places (not including shooting galleries). The authors also found that those who injected in

shooting galleries did not have a significant increased risk of infection in comparison with those who did not. On the other hand, those who reported injecting with other IDU practiced more risky behaviors than those injecting alone (not joining an injecting network). Kang et al. (2005) studied Puerto Ricans living in the continental United States, and on the island. The researchers reported significant differences in drug use, HIV status, and sexual behaviors based in geographical location (mainland versus the island) during the time of the study. Interestingly, participants reported changes in risk behaviors after changing their location (mainland versus the island), which also impacted their social networks. The participants of the study reported changes in network structure (overlapping, gender, size, race/ethnicity, age, and drug use patterns); risk communication about HIV/AIDS, sex lives, and condom use; social norms; and self-efficacy. All participants self-identified as Puerto Rican, and those behavior changes were significantly altered only by changing location (to or from mainland versus the island), even when the change was recently done. These results are similar to those found by Delgado et al. (2008) who studied the acculturation phenomena of Puerto Ricans moving to Massachusetts. In this case islanders were 2.1 times more likely to participate in risky injecting practices than those in mainland.

Thereby, propinquity measures could be measured by zip code, geographical location (latitudes), or apartment location.

Network Structure: Turnover, Overlapping, and Network Size

Latkin et al. (1995) examined network structure in relation to drug related HIV risks. They found that lager networks were associated with increased injecting risk behaviors. On average, larger drug networks were associated with more needle sharing

behaviors. Authors explained this finding by positing that individuals with larger networks are more likely to have a needle sharing partners in their network. Suh et al. (1997) found similar results in their study among street injection drug users in the US. Those IDU with larger networks, and who had more persons in the network who they reported not providing social support were 2.13 more likely to inject in public places (i.e., shooting galleries). Researchers also described that those with larger drug networks who also had reported more social support from sexual partners and/or other IDU had increased risk of sharing needles than those without.

El-Bassel et al. (2006) completed a social network profile of IDU in New York, and showed the relationships with HIV sexual risks practices. The authors' findings showed that those with larger networks had more risky sexual practices (more than one sexual partner, had traded sex for drugs or money, or had sex with an HIV positive person). Costenbader, Atone and Latkin (2006) found in a United States sample that increased network size and turnover (the proportion of new IDU in the personal network during the past month relative to the number of members in the past 6 months) resulted in increased risky injection practices by a factor of 1.3. This study specifically included turnover as a factor, and the authors showed that turnover increases rather than decreases risky injecting behaviors.

De et al. (2007) showed in a Canadian sample that increased turnover, network size and nodes overlapping increased the risk of HCV/HIV infection by a factor of two among IDU. De et al. (2007b) explained that lager network size provides more opportunities for using contaminated equipment; large network size also tends to be associated with higher turnover and thus more unstable networks. Turnover can also be

increased as higher network size includes positive HCV/HIV persons, and many quit the network as a protective measure[2]. It is also hypothesized that overlapping function creates close social bonding (stronger ties) that promote unsafe injecting practices and sexual behaviors among IDUs.

Aitken, Higgs and Bowden (2008) found different results. In their study of Vietnamese living in Australia, they did not find that the increase in network size or turnover rates were related to the risks of blood borne infection. Paintsil et al. (2009), in a study conducted in Russia, did not find an association between network size, turnover, or overlapping and increased risk of blood borne transmission either. No information regarding Hispanics network size, overlapping or turnover could be identified in the literature reviewed.

Nodes Distance and Centrality

Only one article was found that examined the relationship between node distance and / or centrality and IDU blood borne transmission risk. Bell, Atkinson, and Carlson (1999) demonstrated that HIV transmission is impacted by the centrality of an individual within the network. The authors stated that degree of centrality, power/prestige, and eigenvector centrality[3] are the best predictors of HIV infection among cocaine injecting drug users[4]. However, it seems that centrality measures have not been fully explored

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[2] *Network turnover* refers to the proportion of new IDUs in the personal network during the past month relative to the number of members in the past 6 months (De et al.., 2007).

[3] Is a measure of the relevance a node has in a particular network (Bonacich, 2007)

[4] Centrality is the importance or prominence of a given actor or node, and is measured by one or more of the following measures (a) Betweenness (extent to which a node lies between 2 nodes that would not otherwise be connected); (b) Closeness (how close an actor is to all other actors on the basis of distance between nodes); (c) Degree (extent to which an actor is connected to others; the simplest of centrality measures); (d) Prestige (specifically for directed networks; extent to which other members chose a given actor or node) (Luke & Harrison, 2007).

among IDU, particularly among Hispanic IDU. In order to better assess centrality and node distance and how it relates to disease transmission other populations and diseases were explored.

Christely et al. (2005) measured centrality to estimate individuals' risk of infection. The researchers performed a simulation study in which susceptible-infectious-recovered models were used. Researchers found, based on results from the computer simulation models, that centrality measured by the number of contacts, random-walk betweenness (proportion of times an individual lies on the path between other individuals), shortest-path betweenness (the proportion of times an individual lies on the shortest path between other individuals), and farness (the sum of the number of steps between an individual and all other individuals) did impact the risks of infection for an individual. That is, the higher the centrality, the higher the risk of infection. The authors also noted that the time for an individual to become infected by an infectious agent during an outbreak is shorter when the centrality is higher. However, Bell, Atkinson, and Carlson (1999), found that this centrality measures were neither precise nor specific for HIV transmission among IDU.

On the other hand, Gundlapalli et al. (2009) described how centrality impacts the risk of infection among health care workers and patients in healthcare setting. The data showed that there were no increased risks for health workers of becoming infected based on centrality measures. The findings of Hawe and Ghali (2008) are consistent with those of Gundlapalli et al. (2008) in that centrality does not appear to have a net effect in the transmission of the disease.

Literature on Review of Methods

The literature reviewed in the study shows that injecting drug use has not been frequently assessed using social network theory in Hispanic IDU populations. Several methods have been found for assessing drug use but very few of those using social network analyses were based on theory. Most literature involving social networks among IDU has used quantitative approaches rather than qualitative or mixed methods. The majority of the researchers used a cross-sectional study design involving egocentric social network analysis, which only provides data about the prevalence of the behaviors while not focusing in its causes (Costenbader et al., 2006; El Bassel et al., 2006; Shu et al., 1997; Wylie, Shah, & Jolly, 2006). However, a cohort study design was performed by Hagan (1999) and one case-control design (intervention) was addressed by Latkin (2009a). Egocentric social network analysis is the strategy being employed in the current study.

Social network analysts have commonly used an egocentric approach. However, the egocentric approach does not provide an independent validation of the behaviors of IDU in the risk network (Braine et al. 2008; Shaw et al., 2007; Wylie et al., 2006; Yeon-kang et al., 2005). Also, in egocentric approaches, the time periods studies are typically limited to the past 30 days. This might have brought bias to the study, as individual behaviors are explored (typically) for the previous 6 months (Latkin et al. 2009, 2009a; Wylie et al., 2006).

Other researchers have reported the use of self-report of the networks, which also might influence participants' responses due to social desirability (Costenbader et al., 2006; Kang et al., 2005; Shu et al., 1997). This, in conjunction with the truncated

network report (using only part of the network nodes reported), tends to introduce bias into the studies (Kang et al., 2005, Shaw et al., 2007, Wylie et al.; 2006). Also, researchers have used non random sampling techniques that limit their power to generalize results (Latkin et al., 2009a; Shaw et al., 2007; Shu et al., 1997); others have also reported that participants have refused to participate (El Bassel et al., 2006), which also creates bias.

In general, the methods for assessing social networks seem to be rustically designed among different studies. The measures differ from one study to another; the way questionnaires are administrated or the basic scales are different. This can create differences in interpretation of the findings across studies. There have not been found a consensus among researchers in respect of social network questionnaire and how to delimit the frontiers of subject instrument in order to standardize social network assessment. There are still challenges for researchers conducting social network research for instance sample size (how far in the network should be gone?); network size (how many persons should be taken in consideration for egocentric analysis?), and time frame of the questions (Should questions go one or six months back in time?). Also, the use of qualitative or mixed methods was not used in any of the reviewed studies. This approach could be very useful to more clearly understand the qualitative nature of networks and risk.

In summary, literature reviewed shows that IDU networks among Hispanics have not been widely studied using social network analysis. In addition, literature has also showed that Puerto Rican islanders IDU have different injection practices than those living on the mainland, other Hispanics, or non-Hispanics whites. Therefore, the study

will contribute to understand Puerto Rican islanders' social networks and what characteristics are more likely to be related to risky behaviors for HCV/HIV and self-reported serum status. Last, there is scare literature that allows proving the effectiveness of NEP on Puerto Rican Islanders' IDU, and this study will contribute to that understanding.

Chapter 3: Research Method

Introduction

This chapter includes a detailed description of the methods of this exploratory study, whose purpose was to assess the characteristics of social networks of Puerto Rican injecting drug users and their implications for blood-borne virus transmission. The chapter is composed of the sections on the following topics: (a) the study design; (b) the method of sample selection; (c) the sample size; (d) the participants' demographics; (e) the assessment instrument; (f) the research question and hypothesis; (g) data analyses for testing the hypotheses, (h) procedures used to ensure protections for participants; and (i) summary of the information presented in the chapter.

Research Design and Approach

Egocentric network analysis involves analysis of data concerning a participant's acquaintances at a given point in time. This enables researchers to assess how network characteristics, as reported by the participant, influence the participant's behavior. Data obtained concerning an egocentric social network includes descriptions of members of the network surrounding the individual (i.e., kinds of persons and roles played), network size, the strength of the relationships between the participant and members of his or her networks, content and extent of communication between the participant and network members, and personal network-related exposures. Egocentric network questionnaires differ somewhat from simple surveys in that these questionnaires are focused not solely on the attributes of the respondent, but also on the respondent's social network. The egocentric approach is based on information provided by the participant about his or her

social network members; this differs from sociometric approaches in which the ego and all his altars are directly interviewed (Tieu, 2015).

Cross-sectional studies can provide understanding of the status of the disease under investigation at a precise point in time (Aguilar et al., 2003; Silva, 2000). Moreover, cross-sectional designs are useful in the identification of a community profile regarding risk factors. In comparison to longitudinal study designs, which can also be used, cross-sectional designs bring the advantages of low budget and short time period evaluations. It is also important to note that social network analysis is important because it facilitates the analysis of the influences on risk practices of those perceived to be close to the participant. Given that the aim of this study was to describe and analyze characteristics of Puerto Rican IDU social networks that are related to engagement in risk behaviors within a specific time point, a cross-sectional study using social network analysis was the best epidemiological design to accomplish this objective and intentions under time and budget constraints.

Setting and Sample

Iniciativa Comunitaria, Inc. (ICI) was incorporated as a nonprofit, community-based organization in April 1992. ICI has been a tax exempt agency under the *501 c (3)* code since 1993. ICI has 16 years of experience providing health-related services to the community. The organizational mission is to develop innovative models of clinical, direct, and preventive services accessible to the most unattended and underserved populations affected by the HIV/AIDS epidemic. These include drug users, those who are homeless, sex workers, sex partners of drug users, teenagers, and HIV-positive persons.

ICI actively participates in the formulation of public policy that benefits the target community. As a community-based organization (CBO), ICI offers services that have been developed and sustained by community members who also comprise the staff and volunteers. This component has been essential for responding effectively and efficiently to the cultural and social needs of the target population.

Currently, ICI has been recognized at the local, national, and international levels as a pioneer grassroots agency with aggressive strategies to provide HIV prevention programs as well as direct services for underserved and unattended populations highly affected by the HIV/AIDS epidemic. The organization has developed experience in such areas as (a) counseling services before and after HCV/HIV testing; (b) primary care services; (c) group counseling; (d) preventive case management; and (e) other support services that target special populations such as IDU, women, and adolescents. Newly added services include rehabilitation and treatment for female IDU, services for the homeless, and peer educator programs.

Syringe Exchange Programs

For more than a decade, data have consistently demonstrated that access to sterile needles and syringes is an important component of a comprehensive HIV prevention program (Braine et al., 2008; Hurley, Jolley & Kaldor, 1997; Vlahov & Junge, 1998). In addition, studies have shown that syringe exchange programs (SEP) have the potential to decrease HIV transmission directly by lowering the rate of needle sharing and the needles available for reuse, as well as indirectly through activities such as bleach distribution, referrals to drug treatment centers, provision of condoms, and education about risk behavior (Hurley, Jolley & Kaldor, 1997; Vlahov & Junge, 1998). ICI offered the first

SEP in Puerto Rico (*Punto Fijo*), which serves the IDU population. Essentially, SEPs provide sterile syringes in exchange for used syringes to reduce transmission of HIV and other blood-borne infections associated with reuse of contaminated syringes among IDUs and enable safe disposal of used syringes. Often, SEPs provide other public health services, such as HIV testing, risk-reduction education, and referrals for substance abuse treatment.

Punto Fijo (PF) is currently working in the San Juan and eastern areas of the island to provide street outreach, preventive case management, and HIV testing and counseling. The program goal is to reduce HIV incidence among IDU 18 years of age and older using a harm reduction perspective. PF offers services using three basic modalities: (a) walking routes (outreach via foot), (b) vending machines, and (c) syringe exchange rooms.

From July 2009 to March 2010, a total of 4,473 IDU participated as new clients of the program; these were in addition to 5,424 follow-up IDU clients in the San Juan and East areas. Over 4,000 syringes were exchanged, and similar quantities of prevention kits (band aids, hygiene material, and prevention information) were distributed. Also, PF staff offered over 8,000 orientation sessions about harm reduction strategies and HIV/STD and other blood-borne diseases; PF distributed 1,300 brochures well as other health education materials. In addition, PF provided approximately 890 meals to its participants. By 2010, PF had registered over 154,848 exchange interventions; however, over 85% of the interventions involved IDU 30 years of age or older.

Sample

Data were gathered from selected participants of nine needle exchange sites in Puerto Rico. A random number table was used to select a number (eight) from one to nine, and every eighth person waiting in line to exchange syringes was approached in order to determine study eligibility according to the inclusion criteria described below. A total of 22 participants were selected from each of the nine centers to ensure that there were 191 participants. Face-to-face interviews were conducted during daylight hours at each site to maximize the representativeness of NEPs' participants. Participants were included in the study after exchanging needles if they met the criteria and were interested in the research study. If they responded "yes," I assured that all inclusion criteria were met; thereafter, information regarding the project was provided. After all questions were answered by participants regarding the procedure and their understanding was assured, the interview was conducted. The interview took approximately 45 minutes and was conducted by me in a separate area within the facilities provided by ICI. After interview completion, the participant had the syringe exchange service provided and was not contacted again by me.

Eligibility criteria. To be considered eligible to participate in the study, participants had to be active injection drug users about to make an exchange who had used the syringe exchange services on at least one occasion prior to the present time. Participants were required to self-report at least two instances of illicit injection drug use in the past 6 months (they were asked how many times they have used illicit injection during that time frame) to participate. To verify evidence of injection drug use, all participants were asked to show injection marks on visible areas of the body such as the

arms, legs, and neck. Participants were required to be at least 21 years old and capable of understanding the invitation to participate.

Participant demographics. Preliminary studies conducted at PF suggested that the median client age was approximately 32 years (range 20 to 60 years; Dávila-Torres & Reyes-Ortiz, 2010). The majority of clients were male (90.9%). Previous reports had also shown that the median number of years that participants reported having injected drugs was 10 (range 1 to 29 years) and that the median injection frequency was 8 times/day with a range between 2 and 30 times/day.

Sample Size

The sample size of nodes required to provide information on the networks was determined using the following cross-sectional formula reported in Aday and Cornelius (2006). The formula states that

$$[Z^2_{1\text{-alpha}/2} * p * (1\text{-}p)] / d^2; \text{ where}$$

d=precision

Z=1.96

p=the probability of exchanging needles or paraphernalia[5]

1-p=the complement of p

Therefore,

$$[(1.96)^2 * (.15) * (.85)] / (.05)^2$$

$$= 190.82 \simeq 191 \text{ participants}$$

[5] Observational data collected by Dávila-Torres and Reyes-Ortiz (2010) in this specific population.

To achieve 191 participants, it was estimated that approximately 636 persons would need to be contacted; however, 506 participants were contacted to obtain the sample. This represented a 36% participation rate based on a sample size of 181. This percentage was very close to the original 30% response rate expected from ICI's participants. The original estimate of 636 persons was obtained by inflating the sampling number using the following formula: *n*/RR, where *n*=sample size and RR represents the expected response rate [191/.30=636].

Instrumentation and Materials

The instrument used in the research was a modified version of one published by Wyllie (2006). The questionnaire was divided into three sections. The first section (DEM1 – DEM22) addressed sociodemographic data, including age, age of initiation of injecting drug use, gender, level of education completed, main source of money for living, nationality, type of residency, and zip code. Modifications in this section included questions regarding incarceration and arrest history as well as HCV/HIV serostatus.

The second section represented a modification to the instrument used by Wyllie (2006). This part incorporated questions from the Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO (2011). The purpose of the inclusion of the BBV-TRAQ is to quantify the degree of exposure of injecting drug users to blood-borne infections. BBV-TRAQ includes questions for the respondent regarding specific injecting, sexual, and other risk practices reported in the last 30 days. For instance, information collected in the BBV-TRAQ includes needle and syringe contamination, injecting equipment sharing, contamination by a second person, and

sexual practices. In addition, four questions were included regarding syringes' sources, for a total of 35 questions.

The third section included social network questions. Participants were asked to think back over the last 30 days about the people with whom they had had more than casual contact. These were people whom they had seen or had spoken to on a regular basis. Most of these close contacts were people such as friends, family members, sex partners, people they injected drugs with, or people with whom they lived. If additional prompts were needed, participants were provided additional information. For example, they were told to think of people with whom they had used drugs or had sex during the past 30 days. If the participant was a sex worker, he or she was asked to list a maximum of 10 sex partners. If the participant had a regular sex partner or partners, he or she was asked to include the partner(s) on the list. Participants were also prompted to think of friends, relatives, and other individuals whom the participant felt close to, lived with, or hung out with. All network members were identified using initials or nicknames to assure anonymity. Participants were able to name up to 20 persons within their network (Valente & Vlahov, 2001); however, participants could provide more names if needed. For each network member, the participant was asked to identify whether the person in the network (Questions 1-7 on the network survey) had done the following: (a) injected drugs in the last 6 months; (b) smoked/snorted/inhaled drugs (other than marijuana) in the last 6 months; and (c) been a sex partner of the participant in the last 6 months. For each member of the network, the following additional information was requested: (a) gender, (b) age, and (c) type of relationship (family member, lover, spouse, girl/boyfriend, friend, acquaintance, or stranger; Braine et al., 2008; Wylie, Shah, & Jolly, 2006).

The next set of questions included those related to interactions among each of the network members. I asked, for each member of the network, whether that person knew the other network members. The result was a matrix (see Appendices C and D, Social Network Survey section) used for data analysis, from which density was calculated.

Next, the characteristics and interactions of the first five persons named in the list were explored in depth with additional questions on the survey. Researchers have demonstrated that the first three to six persons on the list are the most significant persons in a network, and they have recommended using this core network for deeper network analysis (Bell, Belli-McQueen, & Haider, 2007; Braine et al., 2008; El-Bassel et al., 2006; Kang et al., 2005; Shaw, et al., 2007; Suh et al., 1997; Valente & Vlahov, 2001; Wylie, Shah, & Jolly, 2006). Valente and Vlahov (2001) found that the first two named network members are more likely to be engaged in any kind of risk behaviors than those named thereafter. Researchers have also found that providing more than five or six names can make the survey too long, which introduces recall and maturation biases, especially when working with hard-to-reach populations (Bell, Belli-McQueen, & Haider, 2007; Valente, 2010). Researchers have recommended that participants name all persons they can (which averages 15 to 20 network members) to yield a measure of the total network size. Thereafter, full SNA can be performed with the most significant members of the list. Therefore, following these recommendations, detailed questions pertaining to the first five network members were collected from participants. This information allowed for indirect assessment of ties, accepted social norms, intimacy, injecting drug behaviors, sexual behaviors, and the type of relationships these persons shared with each of the members of the network, among others that are described in the variable section below.

Translation. A translation of the questionnaire was made into Spanish by a translator, and back translation was performed from Spanish to English by an independent translator. Quality of the translation was assured by a panel of experts who assessed the equivalence of the content. These experts were obtained from among the bilingual personnel working at the CBO.

Reliability and Validity

Wylie stated that the instrument he used in his research did not have demonstrated reliability or validity (personal communication, September 20, 2010). The BBV-TRAQ had been shown to have adequate internal reliability (Cronbach's alpha) in its English version (α=.74 – 0.84; Fry & Lintzeris, 2002; Stoové & Fry, 2006). The test-retest results of the instrument were high (r=0.84; Fry & Lintzeris, 2002). However, there was no information regarding the reliability or validity coefficient for Spanish translations; neither of the WHO persons contacted had been able to provide this information (personal communication, January 8, 2010).

Definition of Operational Measures

An operational definition consists of a summary of measures that indicates how a concept is made measurable (Reynolds, 1986). An operational definition includes the dependent, independent, and dummy variables. Dummy variables are considered categorical dichotomous variables recoded as either 0 or 1 value. A 0 recode refers to lack of the attribute, and 1 indicates presence of the desired attribute. In general, dummy variables facilitate the use of multivariate statistical analysis as a decision tool. Dummy variables are known as *design variables*, *Boolean indicators*, or *proxies* elsewhere (Garavaglia & Sharma; 1998). In addition, dummy variables as used in regressions aid in

accounting for how a factor impacts the dependent variable, diminishing errors and avoiding a biased assessment of impact.

The operational definitions are explained in detail in Appendix B including the Spanish translations. The operational definitions for variables included in this study are the following:

Injecting Drug Risk Index

Injecting drug risk was measured by the sum of variables NeSyrCo1 to 2PerCo15b; each had a scale value of 0 to 5 points. This sum was made after recoding according to the accompanying protective factors validated by Stoové, and Fry (2006). The validated document determined that risk practices are recoded to the lowest value (0) whenever the associated protective practice question (part b) scored a 4 ("Every time,"). Maximum possible value is 215 points (scoring 5 for all 15 items). In the scale, higher scores represent riskier behavior associated with IDU. Stoové, and Fry's validation of the scale considered scores higher than 56 points (25% or more) to be high risk behavior scores (Stoové, & Fry, 2006). Thus, in the present study, this demarcation was maintained to differentiate among low and high risk injecting practices.

Sexual Behavior Risk Index

The sexual risk behavior index was created by summing variables SexPra17 to SexPra22, each of which is measured on a scale ranging from 0 to 5 points. Maximum possible value was 35 points. In the scale, a higher score represents riskier behavior associated with sex risk.

Closeness

Closeness was measured using three different measures. Each of the three measures was entered separately in GEE analyses. These measures were:

Psychological Closeness was measured using questionnaire item INT1 ("How close are you to [person]"?) that measures the closeness of the participant to others in the social network. Responses for all individuals in the participant's network were summed and then divided by the size of the social network to get an average score for psychological closeness. The higher the score, the closer the participant feels on average to the people in the social network.

Frequency of Contact was measured using questionnaire item INT2 ("How frequently would you say you have contact with [person]?") Responses for all individuals in the participant's network were summed and then divided by the size of the social network to get an average score for frequency of contact. The higher the score, the more frequently on average the participant has contact with the people in the social network.

Trust was measured using the sum of items INT3 to INT10 to create an index that assesses the extent to which the respondent would rely on this person for a number of things (one example question is, *If I had an emergency this [Person] would be there for me*). Items INT3 to INT10 were summed and divided by 8 to provide an average index score. The index score was then summed across network members and divided by the size of the network, thus resulting in an average trust score. A higher index score represents a higher degree of trust.

Geographical Insularism

This is a measure of physical proximity that was constructed using the zip code or barrio name provided by the ego from his geographical location and the geographical location of his/her altars. The participant provided either zip code or barrio where he/she spent most of the time and the zip code or neighborhood where the altars spent most of their time. If the participant and all network members report the same zip code or barrio, the variable is coded as 1; otherwise, it was coded as zero.

Density

Density is the degree to which a person's network members are connected to one another (Tieu, 2015; Valente, 2010). This was operationalized using a matrix that indicated whether each network members, as reported by the participant, knew the others in the network. Density was calculated by summing the degree to which each of the altars is connected to others in the personal networks. The formula $D_E=l/N(\lambda)$ (where l=number of links N=network size, and λ=maximum numbers of nominations requested) defines the mathematical analysis that allows measure of density in a network. For instance, if a node has 7 links, his/her network consists of 15 persons, but it was requested to nominee 20 persons then the equation would be 7/(15*20) (where l=7, N=15 and λ =20) (Valente, 2010). Density could vary from 0 to 100% whereas the higher the number the higher density.

Network Size

Network size is a continuous variable and defined as the sum of reported network members. This measure was obtained from a list generator question in which the participant was asked to mention the names of those people closer to him. The list

provided for generating up to 20 people although if the participant had more it was provided additional space for it.

Relationship Type

In the original survey, this is a nominal variable with 4 categories (F=family member, L=lover, spouse, girl/boyfriend, R=Friend, C=Acquaintance/Stranger). For each member of the network, the participant was asked to provide the nature of the relationship. For each of the 4 categories, a code of 1 was assigned if those specific relationships were reported. Thus, for a given participant, the value of each of the 4 variables could range from zero to a maximum corresponding to the size of the network. This was then entered into analyses as a continuous variable.

Personal Network Exposure

Personal network exposure was assessed using four measures. Each of these measures were entered separately in the GEE analysis. These measures were:

Network Members Frequency of Injection was measured using the questionnaire item CDR1, which explored knowledge regarding network injecting practices in the last past month. Theoretical range was 0 to 4; a higher value indicates a higher frequency of injection by the network member (as reported by the participant). Responses for all individuals in the participant's network were summed and then divided by the size of the social network to get an average score for frequency of injection.

Years Network Members Had Injected was measured using the questionnaire item CDR2. CDR2 item explored length of time network members had been injecting drugs. This was an open-ended question in which participant provided the number

of years as a continuous variable. Responses for all individuals in the participant's network were summed and then divided by the size of the social network to get an average years injected. The highest the score the highest the personal social network exposition to blood borne virus the participant had.

Pooling money with Network Members was measured using the questionnaire item CDR3, which explored the frequency in which people in the network combined or pooled money to buy drugs or injecting equipment as reported by the participant. The theoretical range was 0 to 6; higher scores indicated higher the frequency of the behavior. Responses for all individuals in the participant's network were summed and then divided by the size of the social network to get an average score for frequency of pooling money for drugs.

Social Network Exposure was measured by creating an index by adding the responses of questions CDR4 to CDR9, each ranging from 0 to 4. Responses for all individuals in the participant's network were summed on these items; the index scores were then summed and divided by the size of the social network to get an average score for social network exposure.

Data Collection and Analysis

The data were entered using Access software at the time participants answered each question. Participants were approached to complete the survey. Those who were not able to finish at one session were given a follow up appointment in accordance with ICI NEP protocols. Those who did not attend the follow-up session were eliminated from the sample. This helped minimize the quantity of errors during data entry and also helped in clarifying data that could be missing or incorrect in the process.

The data were checked during and after the interview and prior to data analysis in order to assure quality. Van de Broeck, Argeseanu, Cunningham, Eeckels, and Herbs (2005) described the data cleaning process as a two-phase process including (a) screening and diagnosing, and (b) treating. The screening and diagnosing phase assures completed questionnaires were entered in the database correctly after the interview. Also, screening and diagnosis allowed the identification of patterns of missing data or inconsistencies in data values (such as wrong numbers or codification).

Prior to the data analysis, spot checks of 40 randomly selected questionnaires (20% of the sample) were completed to ensure quality. Any errors identified or inconsistencies not due to incorrect data entry as in the case of missing values or outlier values were examined. If the amount of missing data is not negligible, multiple imputation procedures should be used to replace missing data (Rubin, 1996). According to Schafer (1997) single imputation methods treat imputed values the same as the observed ones, whereas multiple imputation is a device for representing missing-data uncertainty. Multiple imputation techniques are more attractive for exploratory or multi-purpose analyses involving a large number of variables. In addition, as part of the quality process outliers were evaluated to test assumptions and to determine if a manipulation of values was needed. More specific information on missing data analysis is provided in Chapter 4.

Data Analyses

Data analyses were conducted using STATA (Version 12.0). A probability value $p < .05$ was used as the standard for significance (unless corrected using *Bonferoni* techniques as described below). Univariate analysis included descriptive data for each of

the key variables. Bivariate analysis of the data included Spearman and Pearson correlations tests and *t*-tests as appropriated to variable distribution and type. In the case where the data were not normally distributed, non-parametric tests were considered.

Research Questions and Hypotheses

There were two research questions. Key research (alternative) hypotheses associated with each research question were reported. Detailed statistical tests were included as an appendix showing dependent, independent and appropriate statistical tests as per hypothesis question.

Research Question 1: What are the relationships among personal network measures and high risk sexual and injection drug behavior?

$H_{o1\text{-}1}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) do not contribute unique explained variance in a measure of sexual risk behavior, as measured by the Sexual Risk Scale score from the BBV-TRAQ instrument, in a regression model.

$H_{a1\text{-}1}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) contribute unique explained variance in a

measure of sexual risk behavior, as measured by the Sexual Risk Scale score from the BBV-TRAQ instrument, in a regression model.

$H_{o1\text{-}2}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) do not contribute unique explained variance in a measure of injecting risk behavior, as measured by the Injecting Risk Behaviors scale score from the BBV-TRAQ instrument, in a regression model.

$H_{a1\text{-}2}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) contribute unique explained variance in a measure of injecting risk behavior, as measured by the Injecting Risk Behaviors Scale score from the BBV-TRAQ instrument, in a regression model.

Research Question 2: What are the relationships among social network characteristics and self-reported HIV and HCV status?

$H_{o2\text{-}1}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network

Members, and Social Network]) do not correlate with the self-reported HIV and HCV status, in a regression model.

$H_{a2\text{-}1}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) do correlate with the self-reported HIV and HCV status, in a regression model.

Due to the number of hypotheses developed in this study, there is the possibility of increased Type I error when performing the statistical analysis. To reduce this possibility, the Bonferroni adjustment (Logan, & Rowe, 2004) was used. This technique is used to maintain the experiment wise error rate to a significant level specified. The way it was done for this study was to divide the significant level by the number of comparisons dictated by the hypotheses. In addition, multivariate statistics were adjusted for individual socio-demographic characteristics to assure network contribution to riskier behaviors.

For all hypotheses, multivariate analyses were performed using generalized estimating equations (GEE). Adamis (2009) defined GEE as an extension of linear models capable of estimating population-averaged estimates even with repeated measurements in the dependent variable. As participants can select several members in their networks, data violate the assumption of independence required for multiple regression; GEE allows for analyses with correlated data.

GEE is a semi-parametric method that works with population averages in cases where normal linear regressions cannot be applied (Adamis, 2009; Carbonari, Writz, Muenz, & Stout, 1994). GEE is a flexible method for analyzing different numbers of observations and variable types simultaneously. Interval, dichotomous, ordinal and categorical variables can be used in GEE to assess the relationships between dependent (network characteristics) and independent (risky sexual practices and risky injecting practices) variables (Carbonari, Writz, Muenz ,& Stout, 1994). GEE assumes that variance is a known function of the mean and requires specifying (a) the link function (b) the working correlation matrix and (c) a method for estimating the variance-covariance matrix (Katz, 2006).

The link function is the type of model used to fit the data, which in this research will be a linear model (Adamis, 2009; Carbonari, Writz, Muenz, & Stout, 1994). This assumes that the independent variable fits the Gaussian distribution. The correlation matrix for this research was the exchangeable working correlation matrix, which assumes that any two observations within a cluster have the same correlation used when observations are not independent (Adamis, 2009). Finally, the method for estimating the variance-covariance matrix is the model-based estimated as cluster, since there were less than 20 cases per altar (Horton & Lipsitz, 1999).

The GEE equations tested whether the social network characteristics (size, out-degree, density, tie strengths, type of relations, personal network exposure, and propinquity) explained variance in self-reported HIV and HCV status, sexual risk behavior, and injecting risk behaviors.

Protection of Human Participants

The participants answered a structured interview conducted by a trained interviewer. All participants selected from lines in the exchange programs were brought to a private area for the interview. The interviewer read to the respondent a statement approved by the University of Puerto Rico, Medical Sciences Campus that explained the purpose of the study, methods, and the measures taken to assure confidentiality of the information given by the respondent and the voluntary participation in the study.

All questionnaires were confidential and had a serial code to avoid identification of the participants. In addition, all the data collected is kept in a secure place with limited access to general public in order to assure the confidentiality of data. A database containing questionnaire data was used by the PI. The PI assured that no participant could be identified.

Chapter 4: Results

The purpose of this exploratory quantitative study was to describe how social network characteristics of Puerto Ricans participating in a needle exchange program related to personal engagement in risk behaviors. Risk behaviors included substance use and sexual behaviors associated with transmission of HCV/HIV. Egocentric network variables were analyzed in regressions to explain the relationship between the network measures, as reported by the participant, and high-risk sexual (blood-borne virus transmission, sexual risk behaviors) and injection (syringe exchange behaviors) behaviors. The chapter presents the sociodemographic and general characteristics of the sample, distribution of network and behavior measures, data cleaning and management, missing data imputation procedures, and multivariate statistical analyses for hypothesis testing.

Sociodemographic Characteristics

The sample consisted of 180 out of an expected 191 participants recruited in seven different locations; this represents approximately 95% of the total desired sample size. Participants excluded from the study included those who did not meet all inclusion criteria (n=26) or refused to participate (n=299). Mean age of participants was 41.97 years (*SD*=10.29, range 22 to 85); 86.74% (n=157) self-reported as males, and none of the participants self-identified as female/male transgender. A total of 88.64% (n=156) of the participants were born on the island, and 11.36% (n=20) reported being born in the United States.

Tables 1 and 2 illustrate the educational level and income sources of the participants. Most of the participants (91.16%, n=165) had an educational level of high

school or less, and the majority reported panhandling for a living (66.30%, n=120). The second most frequent income source was regular work (13.81%, n=25), and 6.63% reported receiving welfare, employment insurance, pension, or other government support as their main source of income.

Table 1

Frequency Distribution of Participants' Educational Level

Educational level	*n*	%
Did not complete HS/grade school	89	49.17
Graduated Grade 12	75	41.44
Some university/college	5	2.76
Associate's degree	6	3.31
Bachelor's degree	5	2.76
Trade school	1	.55

Table 2

Frequency and Distribution of the Main Income Sources Reported by Participants

Income source	*n*	%
Panhandling	120	66.30
Regular work	25	13.81
Welfare, EI, pension, or other government support	12	6.63
Money from family/friends	7	3.87
Sexual Work/prostitution	6	3.31
Stealing	6	3.31
Dealing or doing drug runs	1	.55
Other:	3	2.21
Pimp/hustler	1	---
Not specified	2	---

Note. EI=Employment Insurance.

Injecting drug users (IDU) participating in the syringe exchange program (SEP) were also asked where they spent most of their time by zip code or city area, as shown in Table 3. Most of the participants in the sample spent most of their time at La Collectora (n=29; 16.02%), followed by Sellés, Vista Hermosa, and Bitumul communities (n=25, 13.81% each). The communities of Hato Rey and El Guano contributed with 23 cases each (12.71%). It is important to note that 76.10% of participants stated that they spent most of their time in the same communities in which they were surveyed and had not moved from or to other communities; however, on average, participants reported living in two different places within the community (*SD*=1.89, range 1 to 10).

Table 3

Frequency and Distribution of Communities Where IDUs Reported Spending Most of Their Time

Community	*n*	%
La Colectora	28	16.02
Bitimul	25	13.81
Sellés	25	13.81
Vista Hermosa	25	13.81
El Guano	23	12.71
Hato Rey	23	12.71
Buen Consejo	11	6.08
Manuel A. Pérez	8	4.42
La Perla	5	2.76
Río Piedras	3	1.66
Santurce	3	1.66
Carolina	1	.55
Total	180	100%

Continued residence in the island was high; only 4.02% (n=7) reported living on the island for less than a year. Incarceration prevalence during the last 6 months was low (14.92%, n=27), but lifetime incarceration was high (87.71%, n=157). The mean years in prison for the sample was 5.58 ($Q_{2=}$4.48, *SD*=5.11, range .04 to 21), and the mean years out of prison was 5.31 ($Q_{2=}$3, *SD*=5.24, range .002 to 21.93).

Participants were very likely to know their HIV status. Self-reported HIV positive status in the sample was 12.29% (n=22), and negative status was self-reported by 86.03% (n=154). Only three IDUs (1.68%) reported an unknown/unsure HIV status. However, 86.03% of participants had not had an HIV laboratory confirmation test for the past 6

months. Those with a self-reported HIV negative status were the least likely to have a laboratory test confirming their serum status. Conversely, almost all (95.54%) of those who reported being HIV positive had a laboratory confirmation test. In general, the average time since last tested for HIV was 16.64 months ($Q_{2=}$8 months *SD*=36.00, range 0 to 279 months).

HCV self-reported serum status in the sample was positive for 35.56% (n=64), negative for 62.22% (n=112), and unsure/unknown for 2.22% (n=4). Only about a third (31.66%) of the sample reported having a HCV test in the last 6 months, and as with HIV, few with a self-reported negative status had a laboratory test that confirmed their serum status (8.19%). Conversely, 95.51% of those who reported being HCV positive had laboratory confirmation tests. In general, the average time since last tested for HCV was 16.64 months ($Q_{2=}$8 months, *SD*=36.03, range 0 to 280 months).

Table 4 summarizes participants' lifetime drug use. Heroin use was reported by 95.56% (n=172) of the participants, cocaine by 97.78% (n=176); marijuana by 72.22% (n=120); and crack by 68.89% (n=124). Age at first injection ranged from 9 to 40 years old, with a mean of 19.83 years (Q_2=18, *SD*=5.39). Almost all (98.90%) IDU reported daily injection, with the average injections per day being 7.14 (Q_2=6, *SD*=4.58, range 1 to 40). The preferred substance reported by IDU was speedball (cocaine and heroin; 92.82%, n=168), followed by heroin without cocaine (5.52%).

Table 4

Frequency and Distribution of Drugs Used in Lifetime by IDU

Drug used	*n*	%
Alcohol	121	67.22
Methamphetamines	6	3.33
Xanax/Valium	32	17.78
Amphetamines	5	2.78
Barbiturates	7	3.91
Cocaine	176	97.78
Crack	124	68.89
Morphine	19	10.59
Sedatives or tranquilizers	26	14.53
Ecstasy	9	5.00
Gasoline or other solvents	5	2.78
Marijuana	130	72.22
PCP	6	3.31
Tylenol or Panadol PM	60	33.33
Heroin	172	95.56
Mushrooms	10	5.56
Percocet	83	46.11
Methadone	18	10.00
Methadone without prescription	6	3.33

Note. A participant could choose more than one option; thus, the summary of all percentages could be higher than 100.

The Blood-Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ)

After sociodemographic information and drug use were assessed, all participants were asked to respond to the BBV-TRAQ questionnaire to quantify risk practices. As per BBV-TRAQ interpretation, all values over 56 points are considered high risk. Table 5 summarizes the responses to the BBV-TRAQ. The average risk score was 27.61 points (Q_2=14; *SD*=32.25; range 0 to 131) of a total 215 possible points in the scale. Furthermore, 18.37% (n=18) reported a high risk score; 80.63% (n=80) reported low risk scores. In comparison with the original validation of the BBV-TRAQ, the Cronbach's α for the total scale in this study (0.84) is similar to results from other studies (0.74–0.84; Fry & Lintzeris, 2002; Stoové & Fry, 2006).

Table 5

Frequency and Distribution of Blood-Borne Virus Transmission Risks Assessment Questionnaire Items

BBV-TRA questionnaire item	*n*	%
In the last month, how many times have you injected with another person's used needle/syringe? (*n*=179)		
No times	155	86.59
Once	1	0.56
Twice	3	1.68
3–5 times	12	6.70
6–10 times	7	3.91
More than 10 times	1	0.56
On those occasions, how often did you rinse it with a combination of full strength bleach and water (i.e., the "2x2x2" method) before you used it? (*n*=23)		
Never	10	43.48
Rarely	—	—
Sometimes	7	30.43
Often	3	13.04
Every time	3	13.04
In the last month, how many times have you injected with a needle/syringe after another person has already injected some of its contents? (*n*=177)		
No times	154	87.01
Once	4	2.26
Twice	7	3.95
3–5 times	6	3.39
6–10 times	3	1.69
More than 10 times	3	1.69

(*table continues*)

BBV-TRA questionnaire items	*n*	%
In the last month, how many times have you received an accidental needle stick/prick from another person's used needle/syringe? (*n*=176)		
No times	133	75.57
Once	3	1.70
Twice	18	10.23
3–5 times	19	10.80
6–10 times	3	1.70
More than 10 times	—	—
In the last month, how many times have you reused a needle/syringe taken out of a shared disposal/sharps container? (*n*=174)		
No times	167	95.68
Once	1	0.57
Twice	1	0.57
3–5 times	4	2.30
6–10 times	1	0.57
More than 10 times	—	—
On those occasions, how often did you rinse it only with full-strength bleach before you re-used it? (*n*=7)		
Never	2	28.57
Rarely	3	42.86
Sometimes	1	14.29
Often	1	14.29
Every time	—	—

(*table continues*)

BBV-TRA questionnaire items	*n*	%
In the last month, how many times have you injected a drug that was filtered through another person's filter? (*n*=177)		
No times	140	79.10
Once	5	2.82
Twice	13	7.34
3–5 times	14	7.91
6–10 times	4	2.26
More than 10 times	1	0.56
In the last month, how many times have you injected a drug that was prepared in another person's used spoon or mixing container? (*n*=179)		
No times	81	45.25
Once	9	5.03
Twice	22	12.29
3–5 times	56	31.28
6–10 times	8	4.47
More than 10 times	3	1.68
On those occasions how often did you clean the spoon or mixing container before using it? (*n*=94)		
Never	49	52.12
Rarely	6	6.38
Sometimes	19	20.21
Often	6	6.38
Every time	14	14.89

(*table continues*)

BBV-TRA questionnaire items	*n*	%
In the last month, how many times have you injected a drug prepared with water which had been used by another person? (*n*=136)		
No times	101	74.26
Once	10	7.35
Twice	11	8.09
3–5 times	11	8.09
6–10 times	3	2.21
More than 10 times	—	—
In the last month, how many times have you injected a drug which had come into contact with another person's used needle/syringe? (*n*=178)		-
No times	159	89.33
Once	4	2.25
Twice	5	2.81
3–5 times	9	5.06
6–10 times	1	0.56
More than 10 times	—	—
In the last month, how many times have you wiped your own injection site with an object (e.g., swab, tissue, hanky, towel etc.) which had been used by another person? (*n*=177)		
No times	160	90.40
Once	2	1.13
Twice	8	4.52
3–5 times	6	3.39
6–10 times	1	0.56
More than 10 times	—	—

(*table continues*)

BBV-TRA questionnaire items	*n*	%
In the last month, how many times have you injected a drug that you prepared immediately after "assisting" another person with their injection (e.g., injecting them, holding their arm, handling used needle/syringe; touching their injection site to feel for a vein, to wipe blood away, or to stop bleeding)? (*n*=177)		
No times	96	54.24
Once	6	3.39
Twice	15	8.47
3–5 times	38	21.47
6–10 times	13	7.34
More than 10 times	9	5.08
On those occasions, how often did you wash your hands before preparing your mix? (*n*=81)		
Never	51	62.96
Rarely	7	8.64
Sometimes	13	14.81
Often	7	8.64
Every time	4	4.94
In the last month, how many times have you injected a drug that was prepared by another person who had already injected or assisted someone else's injection?		
No times	72	57.60
Once	5	4.00
Twice	17	13.60
3–5 times	21	16.80
6–10 times	9	7.20
More than 10 times	1	0.80

(*table continues*)

BBV-TRA questionnaire items	*n*	%
On those occasions, how often did they wash their hands prior to handling the needle/syringe that you used?		
Never	41	78.85
Rarely	2	3.85
Sometimes	5	9.62
Often	2	3.85
Every time	2	3.85
In the last month, how many times have you been injected by another person who had already injected or assisted in someone else's injection? (*n*=126)		
No times	54	42.86
Once	7	5.56
Twice	18	14.29
3–5 times	30	23.81
6–10 times	10	7.94
More than 10 times	7	5.56
On those occasions, how often did the person injecting you wash their hands before injecting you? (*n*=73)		
Never	55	75.34
Rarely	7	9.59
Sometimes	7	9.59
Often	2	2.74
Every time	2	2.74

(*table continues*)

BBV-TRA questionnaire items	*n*	%
In the last month, how many times have you injected with a needle/syringe which had been handled or touched by another person who had already injected? (*n*=126)		
No times	78	61.90
Once	9	7.14
Twice	15	11.90
3–5 times	19	15.08
6–10 times	4	3.17
More than 10 times	1	0.79
On those occasions, how often did they wash their hands prior to handling the needle/syringe that you used? (*n*=50)		
Never	74	74.00
Rarely	12	12.00
Sometimes	10	10.00
Often	—	—
Every time	4	4.00
In the last month, how many times have you touched your own injection site (e.g., to feel for a vein, to wipe away blood, or to stop bleeding) soon after "assisting" another person with their injection (e.g., injecting them, holding their arm, handling their use needle/syringe; touching their injection site to feel for a vein, to wipe away blood, or to stop bleeding)? (*n*=124)		
No times	88	70.97
Once	6	4.84
Twice	11	8.87
3–5 times	14	11.29
6–10 times	4	3.23
More than 10 times	1	0.81

(*table continues*)

BBV-TRA questionnaire items	*n*	%
On those occasions, how often did you wash your hands before touching your own injection site? (*n*=36)		
Never	31	86.11
Rarely	1	2.78
Sometimes	2	5.56
Often	1	2.78
Every time	1	2.78
In the last month, how many times has another person touched your injection site (e.g., to feel for a vein, to wipe away blood, or to stop bleeding)?		
No times	101	82.11
Once	4	3.25
Twice	8	6.50
3–5 times	9	7.32
6–10 times	1	0.81
More than 10 times	—	—
On those occasions, how often did the person wash their hands before they touched your injection site?		
Never	19	86.36
Rarely	1	9.09
Sometimes	—	—
Often	1	4.55
Every time	—	—

Table 6

Frequency and Distribution of Sexual Risk Behavior Scale Items

Item	*n*	%
In the last month, how many times have you engaged in unprotected vaginal sex with another person (i.e., penetration of the vagina with the penis)? (*n*=179)		
No times	135	75.42
Once	1	0.56
Twice	8	4.47
3–5 times	23	12.85
6–10 times	10	5.59
More than 10 times	2	1.12
In the last month, how many times have you engaged in unprotected vaginal sex with another person (i.e., penetration of the vagina with the penis) during menstruation? (*n*=177)		
No times	143	80.79
Once	8	4.52
Twice	13	7.34
3–5 times	11	6.21
6–10 times	2	1.13
More than 10 times	—	—
In the last month, how many times have you engaged in unprotected vaginal sex with another person (i.e., penetration of the vagina with the penis) without lubrication? (*n*=176)		
No times	137	77.84
Once	1	0.57
Twice	13	7.39
3–5 times	18	10.23
6–10 times	7	3.98
More than 10 times	—	—

(*table continues*)

Item	*n*	%
In the last month, how many times have you engaged in unprotected oral sex with another person (i.e., lips and tongue come into contact with the vagina, penis and/or anus)? (*n*=177)		
No times	137	77.40
Once	4	2.26
Twice	8	4.52
3–5 times	20	11.30
6–10 times	8	4.52
More than 10 times	—	—
In the last month, how many times have you engaged in unprotected manual sex with another person (i.e., fingers and hands come into contact with the vagina, penis and/or anus) during menstruation? (*n*=177)		
No times	145	81.92
Once	9	5.08
Twice	13	7.34
3–5 times	9	5.08
6–10 times	1	0.56
More than 10 times	—	—
In the last month, how many times have you engaged in unprotected manual sex with another person (i.e., fingers and hands come into contact with the vagina, penis and/or anus) after injecting? (*n*=175)		
No times	136	77.71
Once	1	0.57
Twice	10	5.71
3–5 times	19	10.86
6–10 times	9	5.14
More than 10 times	—	—

(*table continues*)

Item	*n*	%
In the last month, how many times have you engaged in unprotected manual sex with another person (i.e., fingers and hands come into contact with the vagina, penis and/or anus) without lubrication? (*n*=176)		
No times	141	80.11
Once	2	1.14
Twice	10	5.68
3–5 times	17	9.66
6–10 times	6	3.41
More than 10 times		

Sexual Risks Behaviors Scale (SRSBS)

In addition to the injecting risk factors, the sexual risks factors were also assessed. An index was constructed by adding the response scores of the seven questions included in the questionnaire. Table 6 illustrates the distribution of participants' responses to the SRSBS questionnaire. On average, the IDU scored 3.94 points (Q2=0; M=7.21; range 0 to 24) of a total 35 possible points in the scale. Cronbanch's α for this scale was 0.96. Most of the participants reported that they were not sexually active at the time of the study.

Syringe Exchange Behaviors

As part of the CBO collaboration, a requirement of the study was to assess the syringe exchange behaviors of participants with four questions. Participants were asked if they had exchanged needles or had acquired new needles at a syringe exchange program during the last 6 months. Nearly all participants (n=178; 98.69%) reported having done so. In addition, IDU were asked how many syringes they usually obtained at a syringe exchange program with answers ranging in five categories. One hundred and fifteen (63.54%) reported obtaining all syringes at the syringe exchange program, and a third (33.70%) reported obtaining most but not all syringes, accounting for 97.24% of those surveyed. IDU were asked to report if they exchanged their syringe themselves or if someone else did it for them. Interestingly, the same two people that reported not to have gotten new syringes at a syringe exchange program during the last 6 months reported to have other people to do it for them. All other participants (n=179, 98.90%) reported doing it themselves. Lastly, 62.98% (n=114) of IDU responded that obtaining a new

syringe was very easy; 30.94% (n=56) said it was easy, and 6.08% (n=11) reported to be very hard.

Social Network

On average, the size of social networks was 2.66 (Q_2=3; *SD*=1.05; range 0 to 6) and the average age of the personal network members was 38.94 years (Q_2=38.5; *SD*=7.43; range 19 to 59). Likewise, on average there were 2.25 network members the participants identified as injecting drug users (Q_2=2.27; *SD*=1.22; range 0 to 5), and an average of 1.33 network members were identified as drug inhalers (Q_2=1; *SD*=1.45; range 0 to 5). Only 12.29% of participants reported having a sexual partner in their network. The majority (87.71%) of participants did not have any network members identified as a sexual partner, and 9.50% (n=17) reported to have on average one member of the network as a sexual partner. Only 5 of the participants (2.79%) reported to have more than one sexual partner in their network.

The social networks were in general very homogenous in terms of the sex of their personal network members. A total of 121 out of 177 participants (68.36% of those surveyed) reported having only males in their social network. About a third (31.64%) of the participants reported having at least one woman in their social network, and only 2.90% reported that their social network was entirely composed of women. None of the IDU reported having a transgender in their social network at the time of the study. Last, personal social networks described by participants lacked family members (97.22% n=175) and lovers (94.44%, n=170). Personal network members were more likely to be identified as friends (60.00%, n=108) or acquaintance (41.01%, n=73). Table 7 provides more detailed information.

Density

The participants' social network average density was .33 (*SD*=.20, range 0 to 1), reflecting low density in the participants' social networks. Refer to Table 8 for more details.

Information on the Top 5 Network Members

Information was obtained for a total of 468 personal network members from their social networks. Participants stated that these closest persons were mostly friends.

Table 7

Summary of the Social Network Structure

Social network structure	Range	Average	*SD*
Assortative mixing related to drug use			
Injecting drug users (n =173)	0 – 5	2.26	1.22
Altars inhaling drugs (n=172)	0 – 5	1.33	1.45
Demographic characteristics of the network members			
Members reported as males (n=173)	0 – 5	2.25	1.07
Members reported as females (n=173)	0 – 4	0.38	0.69
Members reported as transgender (n=173)	--	--	--
Members reported as sexual partners (n=172)	0 – 4	0.14	0.53
Network's average age	19 -59	38.93	7.43
Type of relationship			
Family (n=173)	0 – 1	0.23	0.15
Lover (n=173)	0 – 2	0.06	0.27
Acquaintance (n=174)	0 – 5	1.00	1.35
Friend (n=174)	0 – 5	1.58	1.52

Note. Means represent averages across top 5 network members.

Tables 8 and 9 describe the socio-demographic characteristics and the type of injecting behaviors held the participants' closest five network members. The length of these relationships averaged 6.96 years (*SD*=7.29, range 0.83 to 40 years). Most of the participants did not know the educational level of the closest five network members, and among those who did know it, they reported low education. Similar to respondent's own occupational situation, most of the network members were reported to be panhandlers (66.02%, n=309), and very few of them had a job (11.53%, n=54). In most cases, network members were from the same geographical area[6] that participants reported to be, while very few cases (less than 5%) indicated they were from different places.

[6] Geographical insularity

Table 8

Frequency and Distribution of the Social Network Sociodemographic Characteristics

Social network sociodemographic characteristics	*n*	%
Educational Level (n=462)		
Unknown / not sure	295	63.85
Less than high school	78	16.88
High school	78	16.88
University	9	1.95
Vocational School	2	0.44
Main income sources (n= 468)		
Panhandling	309	66.02
Fulltime job	54	11.53
Welfare or other government support	25	5.34
Other	34	7.26
Stealing	16	3.42
Dealing or doing drugs runs	14	3.00
Unknown / not sure	12	2.57
Sex worker	4	0.86
Geographical Insularism (n=430)		
Yes (From the same geographic area)	409	95.11
No	21	4.89

Participants' network members appear to have a very low risk injecting behavior profile (Table 9) even when participants reported that they injected everyday (74.89%, n=343); those network members reported to be injecting drugs every day had an average report of 8.23 injections per day (median=8, *SD*=3.68, range 2 to 40). Most participants (83.81%, n=355) also reported having pooled money for drugs with at least one of the five closest members in their network.

In the past 6 months, 76.03% (n=352) of participants reported never using a needle for injecting drugs after at least one of their altars used it. IDU surveyed reported that none of the network members had ever injected with a syringe previously used by them in 75.66% (n=342) of the cases. About 29.13% (n=134) stated they did not know or were not sure if their altars had shared the syringes with other people. A more detailed description of the network injecting practices including paraphernalia sharing and sex trading can be seen in Table 9.

Table 9

Frequency and Distribution of the Social Network Injecting Risk Behaviors Characteristics

Social network behavioral characteristics	*N*	%
Frequency of the network members injection	(n=458)	
Everyday	343	74.89
Regularly 3-4 times/week	8	1.75
Sometimes 1-2 times/week	4	0.87
Occasionally but not every week	4	0.87
Never	44	9.61
Unknown / not sure	55	12.01
Pooling money for drugs (*n*=457)		
> than 100 times	13	2.84
50 – 99 times	56	12.25
25 – 49 times	72	15.75
10 to 24 times	114	24.95
5 -9 times	69	15.10
2 – 4 times	27	5.91
Once	4	0.88
Never	74	16.19
Unknown / not sure	28	6.13
Frequency of the network members injection after the participant injected (*n*=463)		
Never	352	76.03
Occasionally	38	8.21
Sometimes	16	3.46
Usually	--	--
Always	3	0.65
Unknown/n/a	54	11.66

Social network behavioral characteristics	*N*	%
	(*table continues*)	
Frequency of the participant injection after the network members injected	(n=452)	
Never	342	75.66
Occasionally	48	10.62
Sometimes	11	2.43
Usually	--	--
Always	3	0.66
Unknown/n/a	48	10.62
Paraphernalia sharing behavior (n=456)		
Never	175	38.38
Occasionally	147	32.24
Sometimes	46	10.09
Usually	27	5.92
Always	10	2.19
Unknown / n/a	51	11.18
Mixing drugs in a syringe previously used for injection by an network members	(n=462)	
Never	334	72.29
Occasionally	46	9.96
Sometimes	11	2.38
Usually	6	1.30
Always	2	0.43
Unknown/n/a	63	13.64
Network members syringes sharing behaviors with third parties	(n=460)	
Never	295	64.13

Social network behavioral characteristics	*N*	%
Occasionally	15	3.26
Sometimes	11	2.39
Usually	3	0.65
Always	2	0.43
Unknown/n/a	134	29.13
Network members sex behaviors [sex worker or trade sex for drugs]	(n=464)	
Never	316	68.10
Occasionally	6	1.29
Sometimes	4	0.86
Usually	1	0.22
Always	1	0.22
Unknown / n/a	49	29.31

IDU were asked about closeness of the relationships with their network members. Very few of those surveyed reported to have people *very close* to them (n=49, 10.52%) or *very distant* (n= 10, 2.15%), and only 17 (3.65%) of them reported their node relationship as *distant*. Thus, the network members were *somewhat close* (17.60%, n=82) or *close* (65.02%, n=303).

Other measure taken was the frequency of communication between the network members and the participants was in fact very high. A total of 428 network members (92.04%) had daily communication pattern with the participants. Other 6.02% (n=28) said they had communication almost every day followed by 1.29% (n=6) who reported communicating once per week with the network members. Only 3 of the participants reported to have a communication pattern of less than once per month (0.65%). Besides the regularity of the communication with their network members, IDU of the SEP mentioned the type of communication they had with the network members. These measures are detailed in Table 10.

Table 10

Frequency and Distribution of the Level Intimacy Measures Between Altars and Egos

Premise	*n*	%
Would you talk to [person] about things that are very personal and private?		
Yes	342	79.17
No	85	19.68
Unsure/not know	5	1.16
If you needed to borrow $25, would [person] lend or give it to you if they had the money?		
Yes	315	67.74
No	129	27.74
Unsure/not know	21	4.52
Would you ask [person] for advice or help about health problems like infections, AIDS, or hepatitis C?		
Yes	342	73.55
No	117	25.16
Unsure/not know	6	1.29
If I had an emergency this [Person] would be there for me.		
Yes	379	81.51
No	78	16.77
Unsure/not know	8	1.72
If I ask this [Person] would do anything for me if it is legal.		
Yes	351	75.48
No	100	21.51
Unsure/not know	14	3.01
If I ask this [Person] would do anything for me even if it is not legal.		
Yes	275	59.27
No	146	31.47
Unsure/not know	43	9.27
If I ask this [Person] would obtain drugs for me.		
Yes	284	62.01
No	152	33.19
Unsure/not know	22	4.80
If I ask this [Person] would obtain needles or other equipment for me.		
Yes	287	63.22
No	151	33.26
Unsure/not know	16	3.52

(*table continues*)

Premise	*n*	%
If I ask this [Person] would obtain drugs for me.		
Yes	290	62.50
No	152	32.76
Unsure/not know	22	4.74
If I ask this [Person] would obtain needles or other equipment for me.		
Yes	287	63.22
No	151	33.26
Unsure/not know	16	3.52

Data Cleaning and Management

Missing data across the BBVA-TRAQ (basis for the dependent variables) presented a challenge for the data analysis. This problem has been observed elsewhere by multiple researchers in the behavioral field (Roth, 1994; Lee, Galati, Simpson and Carlin, 2011; Otero-García, 2011). Therefore, and in accordance with the statistical plan, multiple imputation was performed for data. Using multiple imputation for bivariate and multivariate analyses increases statistical power while reducing bias in the parameter estimations (Roth, 1994).

There are many methods for imputing data including listwise deletion, pairwaise deletion, mean substitution, regresion imputation, colddeck imputation, and maximum likelihood, among others (Roth,1994; Otero-García, 2011). In this study, hotdeck imputation was used. Hotdeck imputation is a non-parametric procedure based in the assigment of a value for missing cases stochastically rather than deterministacally (Otero-García, 2011). Hotdeck imputation is convienent for small sample sizes as it preserves the distributional characteristics of the variable (Roth, 1994).

Schonlau's hotdeck imputation in STATA 12.0 was used in this study. This hotdeck technique replaced missing values not only taking in consideration the most

similar cases in data based but also replacing values using the same variable as reference for substitution (Schonlau, 2006). Each ordinal value is replaced with the ordinal value from the most similar case for which the variable is not missing (Stoddard, 2012). A missing value is defined instrinsically from the same sub-population defined in the data base rather than from an allien sub-popualtion within the database that would increase bias estimation.

Before imputating the data, analyses were performed to determine whether personal characteristics of the participants were related to missingness in the BBVA-TRAQ score. Differences by place, gender and the way they obtained money for a living (pandhandling or not) were noted. Therefrore, these three paramaters were taken into consideration for establishing the most similar case for imputation of data. These values were imputated on those from the same community/zipcode, sex, and whether or not they pandhandled.

Hypothesis Testing

Statistical analyses were completed in three steps. First, bivariate analyses were performed to understand relations among variables. Next, participant's characteristics were tested using ordinal and logistic regression to determine whether any impacted one or more of the four dependent variables. Then, if any of the participant's characteristics were related to dependent variables, they were included in the GEE analysis to assure all possible explanations were obtained.

Two research questions are addressed in this study. The first involved understanding the relationships among network measures and high risk sexual and injection drug behavior. The second question involved understanding the relationships

among social network characteristics and self-reported HIV and HCV status. For this first question, the following null and research hypotheses were developed.

Research Question 1. What are the relationships among network measures and high risk sexual and injection drug behavior?

Sexual Risk Behavior

$H_{o1\text{-}1}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) do not contribute unique explained variance in a measure of sexual risk behavior, as measured by the Sexual Risk Scale score from the BBV-TRAQ instrument, in a regression model.

$H_{a1\text{-}1}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) contribute unique explained variance in a measure of sexual risk behavior, as measured by the Sexual Risk Scale score from the BBV-TRAQ instrument, in a regression model.

Results of Pearson correlation test indicated no relationship between network size and sexual risk scale score, r=.09, p=.20, and density and sexual risk scale score, r=.09, p=.27. Pearson correlation tests also indicated no relationship between closeness and the

sexual risk scale score (*r*=.01, *p*=.86); beween frequency and sexual risk scale score (*r*=-.05, *p*=.54); and between trustiness and sexual risk scale score (*r*=0.09, *p*=.23).

For the network risk exposure, Pearson correlations indicate no corelation between the sexual risk scale sore and the *Frequency of Injection* (*r*=.07, *p*=.34)*„ Years Network Members Had Injected* (*r*=-.008, *p*=.91), and *Pooling money with Network Members* (*r*=.02, *p* .75). Finally, geographical insularism could not be related to the score points in the sexual risk scale as per spearman correlation test (*rho*=.10, *p*=.31).

In terms of relationship among the participants and the 5 closest edges in the network, Pearson correlations indicate no corelation between sexual risk scale dependent variable score and the number of edges who are family (r=.11, p=.14); the number of edges who are lovers (r=- .10, p=.16). However, the number of edges who are friends (r=-.17, p=.02) and number of edges who are acquaintances (r=.23, p=.002) are related to the total score in the sexual risk scale.

Next, ordinal logistic regression was used to test the relationship between individual characteristics and the scoring in the sexual risk scale (see Table 12). There were significant relationships between risky sexual practices and: (a) the sex of the participant (OR=3.32 , 95% IC [0.88 – 1.05]), (b) educational level (having less than high school in comparison to high school OR=2.56, 95% IC [0.09 – 0.76] and having less than high school in comparison to having more than high school OR=4.76, 95% IC [0.97 – 25.00]); (c) panhandling (OR=5.88 95% IC [0.93 – 33.33]); (d) community (OR=5.56, 95% IC [1.50 – 20.55]; (e) the time they spent in jail (OR=1.01, 95% IC [0.82 – 1.02]) and (f) the self-reported HIV positive serum-status (OR=2.93 95% IC [0.04 – 10.44]). Women were 3.32 times more likely to report being HIV positive in comparison to men.

Those having less than high school were 2.56 times more likely to self-report HIV positive in comparison to those with high school diploma and 4.76 times more likely in comparison to those with more than high school. Participants panhandling were 5.88 more likely to self-report an HIV positive serum-status than their counterparts.

For those who did had past history of incarceration the odds ratio for higher scores in the risky sexual behavior score was 1.01 for each additional month in jail. Likewise, those self-reporting a positive HIV serum-status were 2.93 times more likely to report a higher score in the risky sexual behave scale than those reporting a negative HIV serum-status after controlling for all other variables ($p < .05$). The way participants gained their livelihoods [panhandling or not] was marginally related to HIV self-reporting serum status ($p \leq .10$). Therefore, these six variables were included in the final GEE regression model to control bias associated to their omission, as these factors significantly impact the sexual behaviors of participants.

Table 11

Ordinal Regression Model for Determining Individuals' Factors Correlating to Risky Sexual Behaviors

Factor	Odds ratio	Standard error	Z (*p* value)	95% CI
Participants' age	0.96	0.42	-0.84 (.40)	(0.88 – 1.05)
Participants' sex	3.32	2.17	2.47 (.02)	(1.32 – 11.60)
Educational Level				
< High School	---	---	---	---
High School	0.39	0.17	-2.06 (.04)	(0.16 – 0.95)
> High School	0.21	0.17	-1.92 (.06)	(0.04 – 1.03)
Panhandling	0.17	0.16	-1.89 (.06)	(0.03 – 1.07)
Being Arrested	1.70	1.03	0. 88 (.38)	(0.51 – 5.59)
Being in jail	1.20	0.86	0. 26 (.80)	(0.29 – 4.89)
Time in jail	1.010	0.004	2.58 (0.01)	(1.003 – 1.02)
Time since last in jail	0.99	0.01	-1.13 (.26)	(0.99 – 1.00)
HCV	0.49	0.22	1.56 (.12)	(0.20 – 1.19)
HIV	2.93	1.90	1.66 (.09)	(0.82 – 10.44)
Community				
Buen Consejo	---	---	---	---
Hato Rey	2.56	2.11	1.14 (.25)	(0.51 – 12.87)
Sellés	4.77	4.28	1. 47 (.08)	(0.82 – 27.65)
La Colectora	4.02	3.33	1.68 (.09)	(0.79 – 20.40)
Vista Hermosa	5.56	3.71	2.57 (.01)	(1.50 – 20.55)
Bitmul	0.24	0.29	-1.17 (.24)	(0.02 – 2.58)
El Guano	3.28	2.75	1.42 (.15)	(0.64 – 16.97)
Others	0.99	1.22	-0.01 (.99)	(0.09 – 11.11)
Stable housing	0.76	0.47	-0.43 (.67)	(0.23 – 2.57)
Injecting times/day	1.01	0.04	0.15 (0.88)	(0.93 – 1.08)
Pseudo R^2	0.12	$p \leq 0.001$		

Note. *n*=180.

The GEE analysis used to test the hypothesis included demographic factors in addition to the structural and social characteristics of the network. The GEE analysis demonstrate that none of the social network variables were related to sexual behaviors of participants, and only demographic factors significantly impacted the risky sexual behaviors of the participants. Thus, the null hypothesis is accepted. Refer to Table 12 for details.

Table 12

Generalized Estimated Equation Model for Risky Sexual Behaviors

Factor	β	Standard error	Z (*p* value)	95% CI
Social network (SN)	-1.08	1.99	-0.55 (.59)	(-4.99 – 2.82)
Density	3.77	5.55	0.68 (.50)	(-7.11 – 14.67)
Geographical insularism	-1.11	1.29	-.86 (.39)	(-3.64 – 1.43)
Trustiness	0.14	0.16	0.92 (.36)	(-0.16 – 0.45)
Closeness	0.35	0.69	0.51 (.61)	(-1.01 - -1.71)
Frequency	0.02	0.80	-0.02 (.98)	(-1.55 – 1.59)
Number of family in SN	7.50	5.56	1.35 (.18)	(-3.40 -18.39)
Number of sexual partners in SN	3.07	3.21	0.95 (.34)	(-3.23 – 9.36)
Number of friends in SN	0.29	1.51	0.20 (.85)	(-2. 65 – 3.24)
Number of acquaintances in SN	0.98	1.52	0.65 (.52)	(-2.00 – 3.97)
Network members frequency of injection	-0.21	0.15	-1.36 (.17)	(-0.51 – 0.09)
Pooling money with network members	-0.17	0.22	-0.75 (.45)	(-0.60 – 0.27)
Years network members had injected	0.00005	0.0004	0.12 (.90)	(-0.007 – 0.008)
SN exposure	0.44	0.40	1.13 (.26)	(-0.33 – 1.23)
Participants' sex	5.13	1.83	2.78 (.005)	(1.52 – 8.73)
Community				
Buen Consejo	---	---	---	---
Hato Rey	0.85	1.80	0.47 (.64)	(-2.68 – 4.39)
Sellés	3.93	1.90	2.07 (.04)	(0.20 – 7.67)
La Colectora	4.51	1.56	2.89 (.004)	(1.45 – 7.57)
Vista Hermosa	6.68	1.67	4.00 (< 0.00)	(3.41 – 9.96)
Bitmul	-0.47	1.24	-0.38(.70)	(-2.92 – 1.97)
El Guano	2.74	2.08	1.31 (.19)	(-1.34 – 6.84)
Others	0.03	1.41	0.02 (.98)	(-2.74 – 2.80)
Panhandling	-4.02	2.70	-1.49 (.14)	(-9.31 – 1.27)
Educational Level				
< High School	---	---	---	---
High School	-1.93	1.12	-1.71 (.08)	(-4.13 – 0.28)
> High School	-3.08	1.26	-2.46 (.01)	(-5.53 – -0.63)
Time in Jail	0.019	0.008	2.24 (0.03)	(0.003 – 0.04)
HIV Self-reported status	1.90	1.31	1.45 (.15)	(-0.67 – 4.47)
Constant	-2.63	3.91	-0.67 (.50)	(-10.30 – 5.04)

Injecting Risk Behaviors

$H_{o1\text{-}2}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) do not contribute unique explained variance in a measure of injecting risk behavior, as measured by the Injecting Risk Behaviors scale score from the BBV-TRAQ instrument, in a regression model.

$H_{a1\text{-}2}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) contribute unique explained variance in a measure of injecting risk behavior, as measured by the Injecting Risk Behaviors Scale score from the BBV-TRAQ instrument, in a regression model.

The relationship between injecting risk behaviors, as measured by the injecting risk behaviors scale score from the BBV-TRAQ and social network characteristics was tested next. Pearson correlation indicated that there was a correlation between network size and injecting risk behaviors (r=.18, p=.01); density and injecting risk behaviors (r=.18, p=.02); and age and injecting risk behaviors (r=0.25, p=.0008). Conversely, Pearson correlation test indicate that there is no statistical correlation between closeness (r=.08, p=.32); ~~ties~~frequency (r=-.03, p=.68); or trustiness (r =0.06, p=.44). Pearson correlations indicate that there is not a statistical relationship between injecting risk

behaviors score and the number of edges who are family (r=.07, p=.36); the number of edges who are lovers (r=- .10, p=.16); number of edges who are friends (r=-.13, p=.06) and number of edges who are acquaintances (r=- .02, p=.83).

The network exposure risks were measured as previously described above. Pearson correlations indicate that there is no relationship between the injecting risk behaviors score and network member frequency of injection (*r*=.01, *p*=.87); the years network members had injected (*r*=-.009, *p*=.91) and pooling money with network members (*r*=.12, *p*=.11). Last, geographical insularism was not be related to injecting risk behaviors (*rho*=-.04, *p*=.56). In conclusion, data analyses at bivariate level suggest that only the social network size and the density of the network are related to higher injecting risk scores.

Next, the relationships between individual characteristics and the injecting risk dependent variables were tested. Results for the injecting risks behaviors showed that none of the individuals' characteristics correlating the dependable variable. Table 13 summarizes the results the analysis. Thus, these variables were omitted in the GEE analysis.

Table 13

Ordinal Regression Model for Determining Individuals' Factors Correlating to Risky Injecting Behaviors

Factor	Odds ratio	Standard error	Z (*p* value)	95% CI
Participants' age	0.99	1.12	-1.21 (.23)	(0.95 – 1.01)
Participants' sex	2.05	.017	1.31 (.19)	(0.69 – 6.01)
Education Level				
< High School	---	---	---	---
High School	1.15	0.39	0.43 (.67)	(0.60 – 2.24)
> High School	1.02	0.62	0.03 (.98)	(0.31 – 3.35)
Panhandling	0.74	0.60	-0.36 (.72)	(0.16 – 3.56)
Time in jail	1.00	0.002	-1.66 (.10)	(0.99 – 1.001)
Being Arrested	0.88	0.40	-0.28 (.79)	(0.36 – 2.15)
Ever being incarcerated	0.63	0.40	0.28 (.79)	(0.36 – 2.14)
Time since last in jail	1.0001	< 0.0001	0.82 (.41)	(0.9998 – 1.0002)
Geographical Insularism				
Buen Consejo	---	---	---	---
Hato Rey	1.68	1.34	0.66 (.51)	(0.35 – 8.00)
Sellés	1.40	1.20	0.40 (.69)	(0.26 – 7.51)
La Colectora	1.82	1.28	0.86 (.39)	(0.46 – 7.23)
Vista Hermosa	1.79	1.41	0.74 (.46)	(0.38 – 8.34)
Bitmul	1.39	1.06	0.42 (.67)	(0.31 – 6.24)
El Guano	2.03	1.54	0.94 (.35)	(0.46 – 8.94)
Others	0.89	0.73	-0.13 (.90)	(0.18 – 4.44)
HCV	0.82	0.24	-0.65 (.51)	(0.46 – 1.48)
HIV	0.64	0.31	-0.91 (.36)	(0.25 – 1.65)
Stable housing	1.82	0.71	1.56 (.12)	(0.87 – 3.89)
Injecting times/day	1.04	0.03	1.46 (.14)	(0.99 – 1.10)
Pseudo R^2	0.02	$p > .52$		

Note. n=180.

GEE analysis preformed included only the structural and social characteristics of the network as reported by participants. GEE model shows that the only two characteristics impacting the harmful injecting practices are average of years the network members had injected (β=-.02, p=0.03) and the injection practices of the edges (β=2.43, p=0.007). No other variable was observed to impact the dependable variable. Thus, the null hypothesis is rejected. Refer to Table 14 for details.

Table 14

Generalized Estimated Equation Model for Risky Injecting Behaviors

Factor	B	Standard Error	Z (*p* value)	95% CI
Social Network (SN)	4.63	6.42	0.72 (.47)	(-7.96 – 17.22)
Density	15.94	16.33	0.98 (.33)	(-16.08 – 47.95)
Geographical Insularism	-2.08	6.18	-0.34 (.74)	(-14.20 – 10.04)
Trustiness	0.01	0.55	0.02 (.99)	(-1.08 – 1.09)
Closeness	0.08	2.57	0.03 (.98)	(-4.95 – 5.11)
Frequency	-3.45	2.57	-1.34 (.18)	(-8.48 – 1.59)
Number of Family in SN	-3.59	13.18	-0.27 (.79)	(-29.43 – 22.25)
Number of Sexual Partners in SN	-1.88	5.40	-0.35 (.73)	(-12.48 – 8.70)
Number of Friends in SN	-1.38	4.83	-0.29 (.78)	(-10.85 – 8.09)
Number of Acquaintance in SN	-2.38	5.47	-0.44 (.66)	(-13.11 – 8.33)
Network Members Frequency of Injection	-0.56	1.44	-0.39 (.70)	(-3.38 – 2.25)
Pooling money with Network Members	-1.31	1.02	-1.28 (.20)	(-3.38 – 2.25)
Years Network Members Had Injected	-0.02	0.001	-2.14 (.03)	(-0.003 – -0.0002)
SN exposure	2.43	0.90	2.69 (.007)	(0.66 – 4.21)
Constant	8.30	10.54	0.83 (.40)	(-11.38 – 27.99)

Note. *n*=180.

Research Question 2. What are the relationships among social network characteristics and self-reported HIV and HCV status?

$H_{o2\text{-}1}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) do not correlate with the self-reported HIV and HCV status, in a regression model.

$H_{a2\text{-}1}$: Social network characteristics (Closeness [Psychological Closeness, Frequency of Contact, and Trust]; Geographic Insularity; Density; Network Size; Relationship Type; Personal Network Exposure [Network Member Frequency of Injection, Years Network Members had Injected, Pooling Money with Network Members, and Social Network]) do correlate with the self-reported HIV and HCV status, in a regression model.

HIV self-reported status. The relationship between self-reported HIV status and social network characteristics was tested using independent sample t-test. Only one of the social network characteristics were associated with HIV status. Closeness was statistically significant, t (179)=2.00, p=.05; this suggests a marginally significant relationship with the HIV status of participants.

There are no differences in the social network size (t (179)=1.10, p=.27), social network density (t (179)=0.15, p=.89), frequency (t (179)=0.69, p=.49) or trustiness (t (179)=-0.21, p=.83) by HIV status. There were also no differences between personal network exposure, as measured by the network members frequency of injection (t (179)=0.65, p=.52), years network members had injected (t (179)=1.44, p=.15), or pooling money with network members (t (179)=1.24, p=.22).

There are differences in the percentages for the positive self-reported HIV cases by geographic isularism of participants and their personal network members, X^2 (7, 180) =14.95, *p*=.04); where the comunities of Hato Rey (ICI), Sellés and Guano have higher percentages of cases that what expected. There were no differences in the average number of edges who were family (*t* (179)=.63, *p*=.53), lovers (*t* (179)=.52, *p*=.61), friends (*t* (179)=.80, *p*=.43), and number of edges who are acquantices (t (179)=.06, *p*=.95) by HIV self reported status.

To control bias associated to the omission of individual characteristics impacting HIV self-reported serum-status all individual factors were tested using a logistic regression. Responses of the HCV and HIV (dependent variables) were dichotomized as "0" for "*no*" and "1" for "*yes*". This regression allowed discriminating among individual factors significantly correlating the HIV positive self-reported status. Statistical analysis shows that HIV self-reported status was significantly impacted by the age of the participants (OR=1.07, 95% CI (1.001 – 1.140) *p*=0.04). For the population studied, a one-year increase in the age of participants supposes a 7% risk increase in HIV positive serum-status.

Table 15

Logistic Regression Model for Determining Individuals' Factors Correlating HIV Positive Self-Reported Status

Factor	Odds Ratio	Standard Error	Z (*p* value)	95% CI
Participants' age	1.01	0.02	0.69 (.49)	(0.97 – 1.06)
Participants' sex	2.79	1.88	1.54 (.12)	(0.75 – 10.41)
Educational level				
< High School	---	---	---	---
High School	0.52	0.23	-1.49 (.14)	(0.22 – 1.23)
> High School	0.66	0.48	-0.57 (.57)	(0.16 – 2.73)
Panhandling	1.82	1.78	0.61 (.54)	(0.26 – 12.49)
Being Arrested	1.23	0.64	0.40 (.69)	(0.44 – 3.40)
Ever being incarcerated	1.70	1.00	0.90 (.37)	(0.53 – 5.43)
Time in jail	1.0002	0.003	0.70 (.49)	(0.9957 – 1.009)
Time since last in jail	1.0002	0.0001	1.99 (.05)	(1.00 - 1.0004)
Geographical Insularism				
Buen Consejo	---	---	---	---
Hato Rey	1.82	1.52	0.71 (48)	(0.35 – 9.40)
Sellés	2.04	1.68	0.86 (.39)	(0.40 – 10.25)
La Colectora	1.26	0.98	0.30 (.77)	(0.28 – 5.78)
Vista Hermosa	0.89	0.71	-0.16 (.87)	(0.18 – 4.27)
Bitmul	0.72	0.58	-0.41 (.68)	(0 .15 – 3.44)
El Guano	3.14	2.65	1.36 (.17)	(0.60 – 16.44)
Others	4.14	4.06	1.45 (.15)	(0.60 – 28.29)
HCV Self Report	11.31	6.91	3.97 (<.001)	(3.41 – 37.43)
Stable housing	1.82	0.89	1.21 (.23)	(0.69 – 4.75)
Injecting times/day	0.98	0.04	-0.46 (.64)	(0. .92 – 1.05)
Constant	0.24	0.35	-2.61 (.009)	0.002 - 0.40)
Pseudo R^2	0.21	p=.00		

Note. n=180.

Taking in to consideration the participant's age GEE analysis was computed using the structural and social characteristics of the network. It is observed that the trustiness (β=-0.14, *p*=.02) and the closeness (β=0.07, *p*=.005) did impact the HIV serum-status. Also the number of family members named among the closest 5 edges in the social network was inversely related to the HIV serum-status (β=-0.22, *p*=.05). Refer to Table 16 for all detailed information.

Table 16

Generalized Estimated Equation Model for HIV

Factor	B	Standard Error	Z (*p* value)	95% CI
Social Network (SN)	-0.08	0.14	-0.57 (.57)	(-0.35 – 0.19)
Density	0 .37	0.30	1.25 (.21)	(-0.21 – 0.96)
Geographical Insularism	0.03	0.04	0.75 (.52)	(-0.03 – 0.06)
Trustiness	0.009	0.01	0.85 (0.39)	(-0.01 – 0.03)
Closeness	-0.03	0.04	-0.82 (.42)	(-0.10 – 0.04)
Frequency	0.02	0.04	0.37 (.71)	(-0 -.07 – 0.10)
Number of Family in SN	-0.08	0.28	-0.30 (.76)	(-0.63 – 0.46)
Number of Sexual Partners in SN	0.06	0.18	0.34 (.74)	(-0.24 – 0.20)
Number of Friends in SN	-0.02	0.11	-0.19 (.84)	(-0.24 – 0.20)
Number of Acquaintance in SN	-0.02	0.11	-0.17 (.87)	(-0.24 – 0.20)
Network Members Frequency of Injection	-0.01	0.02	-0.65 (51)	(-0.06 – 0.03)
Pooling money with Network Members	0.01	0.02	0.71 (.48)	(-0.02 – 0.04)
Years Network Members Had Injected	0.00001	0.000001	1.59 (.11)	(-0.00001 – 0.001)
SN exposure	-0.02	0.01	-1.87 (.05)	(-0.04 – 0.001)
HCV Self Report	0.50	0.09	5.48 (<.01)	(0.31 – 0.67)
Time since last in jail	0.003	0.00001	2.12 (0.03)	(0.0002 – 0.001)
Constant	0.30	0.17	1.67 (.09)	(-0.05 – 0.61)

Note. n=180.

HCV self-reported status. The HCV status of participants and the social network characteristics was also tested using student independent t-test and chi-square test. The only social network characteristics significantly related to HCV self report status were the ties strengths as measured by closeness, and the social network exposure when measured by the edges drug injecting practices (t (168)=2.67, $p < .05$). Ties strength (frequency of communication) has a marginal effect on the HCV self report status (t (168)=-1. 80, p=.07).

Network size (t (168)=-1.46, p=.15) and density (t (166)=-0.40, p=.97) did not have significant effect on self-reported HCV status. Ties strengths, as measured by frequency of communication, are marginally different between those self-reporting as HCV positive and negative (t (165)=1. 80, p=.07), with those having self-reported negative HCV serum status having stronger ties. Those reporting a HCV positive status had lower average scores for ties strength (M=3.00 , SD 0.96). There was no effect on trust by HCV self reported status, t (165)=-1.18, p=.24.

HCV self-reported status did not have an effect on edges' frequencies of injection, t (165)=-0.92, p=.36); years edges had injected drugs, t (165)=1.22, p=.22; and money pooling, t (168)=1.11, p=.27. HCV self-reported status did have an effect on personal network exposure, t (168)=-2.67, p=.008.

There are no differences in the percentages for the positive self-reported HCV cases when compared for the geographic location of participants and their edges, X^2 (155) =1.20, p=.28). There were also no differences in the average number of edges who were family, t (166)=-0.57, p=.56; lovers, t (167)=0.57, p=.57); friends, t (167)=-0.61, p=.54); and number of edges who are acquantices, t (166)=-0.41, p=.68.

Next, the relationship between individual characteristics and the odds of having a positive HCV self-reported serum status were tested using a logistic regression. None of the individual's characteristics significantly increase odds of infection. Table 17 summarizes the results.

Table 17

Logistic Regression Model for Determining Individuals' Factors Correlating HCV Positive Self-Reported Status

Factor	Odds Ratio	Standard Error	Z (*p* value)	95% CI
Participants' age	2.82	1.89	1.55 (.12)	(0.76 – 10.46)
Participants' sex	1.01	0.02	0.68 (.50)	(0.97 – 1.06)
Education Level				
< High School	---	---	---	---
High School	0.53	0.23	-1.47 (.14)	(0.22 – 1.24)
≥ High School	0.67	.049	-0.54 (.59)	(0.16 – 2.79)
Panhandling	1.81	1.79	0.60 (.55)	(0.26 – 12.61)
Being Arrested	0.88	0.43	-0.27 (.79)	(0.33 – 2.32)
Ever being incarcerated	0.58	0.34	-0.91 (.36)	(0.18 -1.86)
Time in jail	1.00001	0.0001	0.71 (.47)	(0.9998 – 1.0003)
Time since last in jail	1.0002	0.0001	2.03 (.04)	(1.00001 – 1.0003)
HIV Self-report status	11.26	6.86	3.97 (<0.000)	(3.41 – 37.18)
Stable housing	1.82	.89	1.22 (.22)	(0.70 – 4.76)
Injecting times/day	0.98	0.04	-0.45 (.65)	(0.92 – 1.05)
Geographical Insularism				
Buen Consejo	---	---	---	---
Hato Rey	1.81	1.52	0.71 (.49)	(0.35 -9.36)
Sellés	2.04	1.68	0.86 (.39)	(0.40 – 10.26)
La Colectora	1.26	0.96	0.29 (.77)	(0.27 – 5.76)
Vista Hermosa	0.88	0.71	-0.17 (.87)	(0.18 – 4.25)
Bitmul	0.72	0.58	-0.40 (.69)	(0.16 – 3.46)
El Guano	3.20	2.70	1.38 (.17)	(0.62 – 16.63)
Others	4.16	4.09	1.45 (.15)	(0.61 – 28.51)
Constant	0.05	0.07	-2.05 (0.04)	(.002 - .873)
Pseudo R^2	0.21	p=0.007		

Note. n=180.

The final logistic regression model explaining the variance in HCV self-reported status by social network factors was run including the individual factors “Time since last in jail” and “HIV Self-report Status”. The final model detailed in Table 18 shows that the only social network factor significantly related to self-reported HCV was years the edges had been injecting (social network behaviors), β=-0.02, p=.05. Therefore, the null hypothesis is rejected.

Table 18

Generalized Estimated Equation Model for HCV

Factor	B	Standard Error	Z (*p* value)	95% CI
Social Network (SN)	-0.08	0.14	-0.57 (.57)	(-0.35 -0.19)
Density	0.37	0.30	1.18 (.24)	(-0.23 -0.95)
Geographical Insularism	0.04	0.11	0.43 (.67)	(-0.16 – 0.26)
Trustiness	0.01	0.01	0.84 (.40)	(-0.01 – 0.03)
Closeness	-0.03	0.04	-0.78 (.43)	(-.10 – 0.04)
Frequency	0.11	0.43	0.27 (.78)	(-0.08 – 0.10)
Number of Family in SN	-0.08	0.29	-0.26 (.79)	(-0.64 – 0.49)
Number of Sexual Partners in SN	0.06	0.18	0.34 (0.73)	(-0.28 – 0.41)
Number of Friends in SN	-0.02	0.11	-0.18 (.86)	(-0.24 – 0.20)
Number of Acquaintance in SN	-0.02	0.11	-0.16 (.87)	(-0.24 – 0.21)
Network Members Frequency of Injection	-0.01	0.02	-0.62 (.54)	(-0.06 – 0.03)
Pooling money with Network Members	0.01	0.02	0.59 (.55)	(-0.02 – 0.42)
Years Network Members Had Injected	0.00003	0.00002	1.59 (.11)	(0.000007 – 0.00007)
SN exposure	-0.02	0.01	-1.82 (0.05)	(0.0004 – 0.001)
Time since last in jail	0.01	0.005	2.11 (.04)	(0.0008 – 0.02)
HIV Self-report status	0.50	0.09	5.48 (<0.001)	(0.32 – 0.68)
Constant	0.26	0.18	1.39 (.17)	(-0.11 – 0.62)

Note. n=180.

In summary, the results showed that in respect to the risky sexual behavior, none of the social network characteristics was related. The injecting risk behaviors were only impacted by *personal network exposures* measured by the average of years the edges had injected and by their injecting practices. HIV self-reported serum status showed to also be significantly impacted by the same two factors. Last the HCV self-reported serum status was only impacted by the injecting drugs practices their network performed.

Chapter 5: Discussion

The purpose of this exploratory quantitative study was to describe how social network characteristics of Puerto Ricans participating in a needle exchange program relate to personal engagement in risk behaviors. Risk behaviors included substance use and sexual behaviors associated with transmission of HCV/HIV. This study was guided by social network theory. Different from other theories, social networks theory provides state-of-the-art analysis on how social relationships influence individuals' health. Therefore, the research was intended to explain how individual choices concerning injection drugs and sexual contact (routes for the transmission of HCV and HIV) are affected by social network characteristics. Adding to existing research that focuses on the individual attributes impacting health behaviors or status (Hanneman & Riddle, 2005), this research was intended to foster deep understanding of the phenomena from a more holistic perspective that takes into account the social and geographical environment in which an individual operates (Perry & Pescosolido, 2010).

Research suggests that a social network is the infrastructure in which social support is provided and received (Zhu, Woo, Porter, & Brzezinski, 2013). Cornwell (2009) broadly discussed how social networks serve as bridges for macrosocial processes such as (a) diffusion of innovations and information, (b) spread of diseases such as HIV, and (c) community cohesion. Beyerlein and Hipp (2005) added that social cohesion among communities shapes how people perform in determinate environments. Thus, there was a place to think about how social networks impact the availability and adequacy of health behavior adoption. Nevertheless, literature to date has failed to

document how social networks impact the health of Hispanic injecting drug users not living in the continental United States.

This study documented the characteristics of Puerto Rican islander injecting drug users (PR-IDUs) and some of their social networks' structural and social characteristics. Similar to the results founds by Andía et al. (2008), Filinson et al. (2005), and Dávila-Torres and Reyes-Ortíz (2010), the PR-IDU had a low socioeducational status, low education levels, and ages ranging from the mid-30s to early 40s. However, in the present study, the sample of PR-IDU was mostly unemployed; approximately one fifth reported that they were working. Labault-Cabeza, Dávila-Torres, and Reyes-Ortiz (2014) reported that in a 2006 study, the sample of PR-IDU baby boomers had an employment rate (either part time or full time) of 58.8%. The discrepancy between the study data and their report can be explained partly by the high unemployment rates reported elsewhere as part of the worldwide economic crisis. Additionally, the target population of the Labault-Cabeza et al. (2014) study included only those born between 1946 and 1964, which represented a generational bias not intended to be explained in the study. In addition, no other study reported the working status of PR-IDU, making it difficult to establish comparisons. However, other populations of IDUs outside the island show results similar to the ones reported in the current study (Wylie, Shah, & Jolly, 2006; Shaw, Jolly, & Wylie, 2014).

The HCV, HIV, and coinfection rates in the sample surveyed show that 35.56% were HCV positive, 12.29% were HIV positive, and 29.25% reported being positive for both HCV and HIV. The numbers reported could be lower than actual numbers due to the lack of a confirmatory test at the time of survey; this presents a potential bias (Shaw, Jolly, & Wylie, 2014). Even so, these numbers are similar to those reported by Armstrong

(2007) for populations (incarcerated or not) participating in screening health activities, among whom prevalence estimates for HCV were about 30%. Shaw, Jolly, and Wylie (2014) reported that, among Canadian IDU reporting confirmatory laboratory tests, HCV prevalence was 52%.

Previous studies conducted in Puerto Rico using confirmatory tests showed a prevalence of 76.1% for those 20–59 years old (Pérez, 2010b). Gelpí-Acosta, Hagan, Jenness, Wendel, and Neaigus (2011) reported that among their sample of Puerto Rican IDUs with less than 3years in NYC, 7% tested positive for HIV and 77% tested positive for HCV. Other studies among islanders reported HCV prevalence to be 42% in the same population surveyed in this study (Orozco-González et al., 2011). The incongruence among different studies presented has also been documented in other groups. For instance, differences between laboratory serum status and self-reported serum status could account for 30% more cases of HCV (Whitehead, Hearn, Marsiske, Kahn, & Latimer, 2014). Further, authors have reported that HCV awareness and diagnosis among IDU are expected to be very low, which coincides with the conclusion of Korthuis et al. (2014) that there is a need to bring more and better services to IDU to improve awareness. Reyes-Ortiz et al. (2014) reported that, among those in the HCV Department of Health Registry for the west and south regions, only 25% had a PCR[7] confirmatory test; this reaffirms the need for better services for the HCV-positive population.

Despite the congruence of the results with the literature, I cannot explain the differences in percentages reported for HCV between Orozco et al. (2011) and the present

[7] Polymerase chain reaction (PCR) is a biological test for genetic identification.

study, other than attributing the discrepancy to sampling techniques. The results documented by Orozco et al, (2011) were obtained through a nonprobabilistic sampling technique. The authors selected the participants based on their availability during a 2-week period and recruited in 12 locations where the CBO was offering needle exchange services. Although inclusion criteria were the same as those used in this study, recruitment was expanded to all participants meeting inclusion criteria who could be interviewed during the needle exchange in a period of 2 weeks during the summer season. This sampling technique used by Orozco et al., (2011) cannot be generalized to all syringe exchange participants; thus, this could explain the differences documented between their study and the present one.

The present study differs from other studies in terms of sampling. First, this study was conducted after a budget reduction that limited CBO services to only nine spots in comparison to 12 that would have been available during the planning stages of the study. Second, the sample was randomly selected, with participants recruited using an "*N/n*" technique. Therefore, a more robust sampling technique was performed, assuring that results would be representative of participants currently using the syringe exchange program. Third, approximately 55% of all participants in the Orozco et al. (2011) study were recruited from the CBO headquarters, whose clients Arce et al. (2011) reported to have worse health status than those using the syringe exchange services within their communities. These three reasons support these findings of lower HCV self-reported results as well as the lower HIV self-reported serum status.

HIV prevalence in the sample obtained by Orozco et al. (2011) was 16%, which is slightly higher than the 12.29% reported in the present study. Both results compare well

with those of Shaw, Jolly, and Wylie (2014), who reported 16% prevalence using a similar population in Canada. However, these numbers are higher that the global trend reported by Strathdee and Stockman (2010), who attributed 10% of all HIV infections to injecting drug users. Pérez (2010a, 2010b) posited that, because PR-IDUs have higher HIV prevalence than elsewhere, the primary cause of HIV transmission must be injecting drug use. In addition, Amill et al. (2004) and Colón et al. (2001) reported higher risks for PR-IDU because they face more risk factors such as (a) more exposure to drug environments, (b) more access to drugs, and (c) more money pooling for buying drugs. Pérez (2010b) documented high rates of unawareness in comparison to other jurisdictions in the continental United States. All this evidence helps to explain the higher HIV prevalence reported for this sample.

Injecting risk behaviors were assessed. Findings suggested that most participants had a low risk profile (high risk behaviors n=159; low risk behaviors n=21). As all participants had been participating in the syringe exchange program, which included health education for HIV/HCV prevention, this result was expected. The purpose of syringe exchange programs is to reduce and control the transmission of blood-borne pathogens and other adverse effects related to drug injection (Batos & Strathdee, 2000; Delgado, 2004; Downing et al., 2005; Hagan et al., 1999; Pollack, 2001; Stancliff et al., 2003; Vlahov, Robertson & Strathdee, 2010). It can be said that the syringe exchange program had been effective in working with participants to reduce and control risky behaviors that increase odds for contagion with blood-borne pathogens. It could be theorized that most IDU within the program have internalized the harm reduction interventions independently of their characteristics.

Ordinal regression showed that none of the individuals' attributes significantly impacted the risky injecting behaviors of participants. IDU characteristics identified in literature such as sex (Tracy, 2014), frequency of injection and zone within the city where IDU live (Jain et al., 2014), illegal income and stable housing (Havinga, van der Velden, de Gee, & van der Poel, 2014), age, frequency of injection, and prior incarceration history (Todd et al. 2011) are commonly associated with increased risk of risky injecting behaviors. However, these factors did not correlate to risky injecting behaviors. The regression model showed that these characteristics only explained 2% of the variance and were not statistically significant. This demonstrates that the adoption of risky behaviors is explained by other factors that do not necessarily include individual characteristics. Therefore, it is possible that the syringe exchange program has positively impacted the health behaviors of participants and thus reduced health disparities attributable to their intrinsic characteristics.

Many of the participants during interviews expressed high distrust of each other. The distrust could also explain why they refused to share syringes with most of their peers (Cepeda et al., 2011). They were very likely to express that when sharing syringes, drug stealing could result, and thus they would not share their syringes with other social network members. However, they did express sharing cockers and cotton (for filtering drugs) for two reasons: (a) limited availability of the materials and (b) low perception of risk related to paraphernalia. In general, IDU reported that rinsing with clean water and/or the Clorox solution provided by the CBO would protect them from contagion.

Other studies also documented similar behaviors among migrant Puerto Ricans in NYC with less than 3 years (Gelpí-Acosta, Hagan, Jenness, Wendel, and Neaigus, 2011).

This sample reported in 40.5% of cases being receptive to sharing syringes, in comparison to 52.5% who were receptive to sharing the cooker, cotton, or water. Thus, it seems more common to share paraphernalia than to share syringes in this population. In conversations with the CBO representatives, a historical bias was observed, as they had ran out of cockers and cottons but kept handing syringes to participants. Thus, it will be important to clarify this finding to correctly establish whether paraphernalia sharing is a behavior commonly practiced by IDU or whether it was something circumstantial.

Sexual risk behaviors were rated very low among participants. All participants reported themselves in the low risk profile, which was unexpected. One hundred and twenty-three of all participants reported either no sexual intercourse or not practicing risky behaviors. In comparison, Gelpí-Acosta, Hagan, Jenness, Wendel, and Neaigus (2011) found that 37.4% of the PR IDU living in NYC for less than 3 years reported having unprotected intercourse with a casual/exchange partner. Likewise, 28.7% of their Puerto Rican sample had three sexual partners or more, and up to 82% were sexually active. However, the authors pointed out that having sexual encounters could be a way to survive within a new environment.

Anecdotal information was obtained through participants' statements in interviews that other than for sexual trade, they preferred not to have sex because, as one participant put it, heroin becomes your life … no other pleasure or thing is worthy or need it. This was a comment of one of the participants (in his 40's) who reported having gone years without sexual contact. Over time, the physical attributes and hygiene of most IDUs decay, and it becomes more difficult for them to attract others. Also, Pearson correlation tests showed an inverse statistically significant relationship between age and

risky sexual behavior scores, which confirms anecdotal information (as time when first injected was not collected).

The only individual factors in ordinal regression that correlated to risky sexual behaviors were time spent in jail, educational level, panhandling, and HCV self-reported status. These factors have been widely documented in literature as ones that impact high-risk sexual behaviors. It could be argued that the fact that most of the participants reported not engaging in any risky sexual practices or not being sexually active could be masking individual characteristics impacting the score in the scale. Although outside the scope of this study, the CBO could gain useful information by analyzing individual factors impacting high-risk sexual behaviors using the scale in the study, which had high internal consistency (Cronbach's alpha=.96).

The social networks of the PR-IDU showed characteristics that differed from those of other IDU social networks studied in the literature. For instance, literature shows that social networks are bigger elsewhere, ranging from 1-32 social network members but averaging between 3 and 5 members (Cepeda et al., 2011; El-Bassel, 2006; Latkin et al. 1995; Suh et al., 1997; Wylie, Shah & Jolly, 2006). PR-IDU surveyed in the present study reported smaller social networks than those in literature; averaging 2.66 nodes (range 0-3). However, Suárez et al., (2000) reported that Puerto Ricans have smaller social networks than any other Latino/Hispanic group studied. Suárez and colleagues urged researchers to study other network structural properties such as density, linkages, durability, intensity, and homogeneity to better explain the phenomena that seem to be important factors among women with breast cancer. The authors also explained that in

the case of Puerto Rican women with cancer living in the United States, the quality of social network interactions is much more important than social network size.

Therefore, this small network size can be explained by factors inherent to the Puerto Rican culture not observed in other cultures. The quality of the relations could also help to explain the low scores for risky injecting and sexual behaviors. Michael, Berkman, Colditz, Holmes, and Kawachi (2002) argued that adequate composition and not the size of the social network brings support to people, preventing adverse impacts to health; this was also supported by Zhu, Woo, Porter, and Brzezinski (2013).

Also, several researchers have shown how small social network size impacts blood-borne virus transmission (Cepeda et al., 2011; El-Bassel, 2006; Latkin et al., 1995; Suh et al., 1997). Indeed, Cepeda et al. (2011) showed the impact of the network size in trust (a protective factor), where larger network sizes were associated with less trust and lower risky injection practices. Network sizes reported by Costenbader, Astone, and Latkin (2006) were also consistent, illustrating differences between the network sizes of PR-IDU and those reported in the United States.

Low network density in PR-IDU networks is not consistent with the work of several authors elsewhere who also measured network density among IDUs (Costenbader, Astone and Latkin, 2006; El-Bassel, 2006 & Cepeda et al. 2011; Latkin et al., 1995; Suh et al., 1997;). Several researchers worldwide have reported IDU network average density to vary between 0.50 and 0.80; PR-IDU in the present study had an average social network density of 0.33. This lower density was an unexpected result based primarily on reports by Hatzenbuehler, Phelan, and Link (2013) and Harris and Rhodes (2013). The IDU in the present study had a high number of persons in the

network and geographic insularism. Thus, if a high level of social cohesion is observed, a corresponding high density is expected, which was not found here. These authors explained that stigma related to an undesirable behavior or condition plays a crucial role in the types of relations established among people as well as the preventive health measures they take. In addition, Cornwell (2009) explained that people with very similar health problems tend to have high-density networks with more stringent (rigid) rules and highly defined roles and expectations. However, based in the distrust reported among many of the participants, it could be explained why the social networks are not dense as in the literature documented elsewhere. Anonymity of actions taken and people with whom they hang out might be serving as protection factors for PR-IDU.

In terms of the type of people within the network, PR-IDU networks were very homogenous for sex composition and route of drug administration (injecting). Not surprisingly, these results are consistent with literature indicating that low injecting risk and sexual risk behaviors have networks with very low heterogeneity regarding sex composition (Latkin et al., 1995; Latkin et al., 2009; Rothenberg, 2006; Tobin, and Latkin, 2008; Tucker et al., 2009). The age of the members in the network did not statistically differ from participants'; this concordance is associated with reduced injecting and sexual risk behaviors (Rothenberg, 2006; Tobin, and Latkin, 2008). Several studies have indicated that people very similar in terms of age and sex will have similar injecting and sexual risk behaviors, which in this case were low. For example, geographical insularism (Braine et al., 2008), means of generating income (Braine et al., 2008; Latkin et al., 2009, 2009a), educational level (Costenbader, Astone, & Latkin, 2006; De et al., 2007; Latkin et al., 1995, 2009, 2009a; Wylie, Shah, & Jolly, 2006);

pooling resources for drug acquisition (Koester, Glanz, & Barón, 2005); injection frequency (Aitken, Higgs, & Bowden, 2008; De et al., 2007; Latkin et al., 1995; Paintsil et al., 2009) and years injecting (Aitken, Higgs & Bowden, 2008; De et al., 2007; De et al., 2007a; Latkin et al., 1995, 2009; Paintsil et al., 2009; Wylie, Shah, & Jolly, 2006) are related to low risk profiles allowing survival. When the profiles of the people in a network are very similar in terms of these characteristics, social structures develop through which individuals recodify their reality, adopting collectively similar risk behaviors (Gelpí-Acosta, Hagan, Jenness, Wendel, & Neaigus, 2011).

Other structural network characteristics of PR-IDU differ from other IDU networks reported in the literature in terms of their composition. For instance, the quantity of lovers or sex networks in our sample was "0" for most of our participants, with an average of 0.14. Several researchers have posited that IDU in mainland USA and other locations do not report participants to stop having sex due to their addiction. Their sex-network average size ranges from 1.03 – 2.6 (Costenbader, Astone and Latkin, 2006; El-Bassel, 2006; Latkin et al. 1995; Suh et al. 1997). The average number of family members in the network 0.21 (range 0 – 1) is consistent with the reported number by El-Bassel (2006) and Wylie, Shah and Jolly (2006) that average 0.8 (range 0.33 – 1.0) and 0[8] (range 0.0 – 1.0) respectively. El-Bassel (2006) and Wylie, Shah and Jolly (2006) documented that IDU are frequently left behind by family members, and social roles are substituted by acquaintances and friends. These observations are consistent with our data in which networks were mainly acquaintances and friends (1.00 and 1.58 respectively).

[8] Median value, not average.

In addition to the composition of the network, the study explored the social bonding among members using three measures: the psychological closeness of participants with the participant; the frequency participants communicate with those members; and the level of trust they share with the network members. As expected, bonding among the participants was low in terms of trust. In general, participants scored 2 points in an 8 point scale meaning that most of the edges are in lower 25% of the scale. This result validates the anecdotal information in which participants commonly report distrust as participants expressed there are no friends, no love, no one you can trust. Other researchers of PR-IDU also have argued the need to evaluate how trust differs by gender and could lead to increasing health disparities (Labault-Cabeza, Dávila-Torres, Reyes-Ortiz, 2010), however the generalized low scored among participants for trustiness does not sustain such statement. As expected, the surveyed population in this study did not communicate frequently with the edges. Although the few edges within the network were reported to have a *close* relationship with participants, the concept *closeness* seems to need more analysis. The data suggest that even when communication patters aren't frequent nor they are too intimate, participants greatly value the relationship with the network members.

In the case of the population surveyed by Labault-Cabeza, Dávila-Torres and Reyes-Ortiz (2010), social isolation helps explaining why and how older adults valorize the strength of ties. Machielse (2015) posited that older populations suffer higher levels of social isolation, which implies less frequent communication and feeling unconnected to their social network. This sense of non-connection makes older members over-value ties. More research is required to be able to explain the possible social isolation not

observed in other IDU populations (Wylie, Shah, & Jolly, 2006) and how it correlates to the value ones gives to a tie.

Wylie, Shah and Jolly (2006) described stronger social ties among the IDU originally using the questionnaire. Crawford, et al. (2014) also described that the social discrimination suffered by IDU commonly causes social agglutination[9] forming as *de facto* stronger ties. However, although our sample shows high geographical insularism their connections among them are weak. Crawford, et al. (2013) had also documented that stronger ties and high homogeneity in networks promotes more drug-using ties and other high risk behaviors. Likewise, our finding is not in agreement with Cornwell (2009) who postulates, that smaller network sizes have higher density and stronger ties. Nevertheless, the lower density and weak ties helps explaining the low risky injection and sexual practices scores (Crawford, et al., 2013, 2014).

PR-IDU networks are different than those commonly documented in literature. Therefore, in terms of social network approaches, it seems convenient to follow Suárez (2000) recommendation for Puerto Rican populations. Anthropological research using phenomenological and ethnography approaches would help understand better why PR-IDU networks are atypical.

In the other hand, some structural and social characteristics of the PR-IDU helped explain risky behavior adoption. For instance, after controlling for all network and individual characteristics, sexual risky behaviors are only explained by individual factors. For instance the community they reported to spent more time at, the low educational level

[9] Social agglutination—aggregates of people with similar characteristics due to environmental forces and not necessary self-motivated.

and the longer time they had spent in jail. Yet, risky injecting behaviors are better explained by the years the social network members have been injecting and the injecting practices they had. Both results are broadly consistent with previous research demonstrating that having biggest networks also increases the odds of risky behaviors (Adams, Moody, & Morris, 2013; DeRubeis & Jolly, 2010;Wylie, Shah, & Jolly, 2006; Wylie, Shaw, Finneran, & Stephenson, 2014). Literature suggests that smaller IDU networks usually have more rigid rules that serve as a preventive factor for riskier behaviors such as those increasing HIV transmission (Cornwell, 2009). Among those IDU with lower density and weaker ties, adoption of risky behaviors is less likely to happen (Crawford, et al., 2013, 2014). Another factor that helps explain the risky sexual behaviors adoption is the social network demographic characteristics. Networks lack lovers within their closer 5 nodes and are share the participant's same sex (in a mostly heterosexual community). Therefore, chances for risky sexual behaviors are less likely to occur (no lovers), and network homogeneity is acting as a protecting factor as well.

In terms of the injecting risky behaviors, it was expected that network size impacts risk score. Štulhofer, Chetty, Rabie, Jwehan, and Ramlawi (2012) reported that network size was the only network characteristic predicting risky injecting practices. It was not the case for the sample in the study. The only social characteristic impacting the dependent variable was years the social network members had reported to be injecting drugs and their practices at the time of injection. Wylie, Shah, and Jolly, (2006) documented a positive relation between reporting nodes who had 5 or more years injecting drugs and higher scores in risky injecting behaviors. Wylie et al., (2006)

reported risks for these IDU to be almost 4 times higher than for those reporting non-injecting nodes.

Arce et al. (2011), who completed analysis of secondary data involving the same population used in this study, found that most of the participants had been in the SEP for more than 10 years. This is important, as SEP also includes other services such as health information support, condoms, paraphernalia, drug treatment, and rehabilitation to IDU during the exchange (Batos & Strathdee, 2000; Stancliff et al., 2003). This population may be more highly educated on risk prevention practices lowering the risk behaviors adoption; therefore the SEP could have successfully modified behaviors in accordance with the harm reduction model.

Several authors and health authorities have established how Puerto Rican HCV and HIV virus transmission epidemic differs from similar populations in the continental USA, the Caribbean, and in other areas of the world (Amill et al., 1999; Colón et al., 2001; CDC, 2008, 2009c; Delgado, Lundgren, Deshpande, Lonsdale, Purington (2008); WHO, 2009). In the effort to fight the epidemic, the present study also assessed how the social networks of IDU participating in the SEP impact risk for HCV and HIV. The hypothesis tests indicated that HIV is explained by at least one relation characteristic of the social network but none of the structural characteristics. GEE analysis demonstrated that the correlations among HIV are held towards the social network exposure. This means that the only network characteristic being related to the self-reported HIV positive status was the social network exposure as measured by the practices the network members had when injecting.

Networks in the present study have very low number of family members, lovers and weak ties consistent with lack of support and environments shortage similar to those reported by El-Bassel (2006) and Wylie, Shah, and Jolly (2006). Kalichman, Watt, Sikkema, Skinner, and Pieterse (2012) documented the adoption of riskier drug behaviors and sexual practices to meet survival needs among South African shebeens[10]. These authors explained that the lack of resources is somehow buffered by resources provided by the network. But those lacking such social support will adapt to survive and satisfy their needs. As El-Bassel (2006) documented, PR IDU substitute the roles that family normally plays with acquaintances or friends in the network. These new networks eventually determine the risks that the IDU will accept, as a form of *social normalization* in the group even when the "acceptance" implies engaging in higher risk behaviors (Gottileb, 1985). For example, if the network shares needles that have not been bleached, the new member will go along with taking the risk although before joining the network they would not. Thus, the inclusion of family members and reinforcement of ties with low risk profile people in the network of PR-IDU could serve to prevent transmission of HIV.

In terms of HCV, the multivariate analysis shows that social network exposure is the only relational network exposure significantly correlated to self-reported positive status. Therefore, if those considered low risk profilers, meaning those that are not IDUs, such as pastors, community leaders, CBOs, get involved in the lives of the IDU, by becoming part of their network, it may be helpful in stopping the transmission of

[10] Shebeens—ethnic group in South Africa.

HCV/HIV. In other words, replacing network members with lower profile members will reduce the number of members that will not automatically follow the high risk behavior. It is also important to mention, that in both HIV and HCV the number of years the participants had been incarcerated was statistically associated with the serum-status self-report. This implies that reducing the time a person is incarcerated could significantly reduce the odds of self-reporting as a HIV/HCV serum positive.

Gottileb, (1985) posited that drug addicts engage in an undesirable social behavior that threats their health and that these threats not only increase with time, but the IDU are more vulnerable as they age and face other biopsychosocial complications inherent to the addiction environment in which they live. Thus, IDU behave within social norms pattern that allow them attenuate the level of social arousal even when they are conscious of the unhealthy behavior. Following the results reported by Pollack (2001), that HCV contagion after a single injection occurred in 3–9% of all cases in comparison to 1% for HIV, the social network interactions needs to be carefully observed.

However, Puerto Rico's laws do not allow having sanitary measures that allow harm reduction in jails. For instance, to have a syringe exchange program within jails or the use of condoms are prohibited for prisoners. Also Puerto Rico's laws keep a punitive approach upon drug use and drug users. Subject approaches make it hard to avoid imprisonment, reinforcing environment shortage and the adoption of survival behaviors that include higher risk of blood born transmission.

Limitations

It is important also to mention that are some limitations that could impact generalization of the study results. For instance, at the time of the study, the CBO suffer a

budget reduction that forced the CBO to limit the services from nine locations from its original 12. This was accompanied by multiple police operations forcing IDUs to a diaspora that limited access for many to the syringes exchange spots. In some locations, data collection was stopped for many reasons, such as (a) drugs dealers were re-organizing the "order" (meaning that due to police interventions and arrests, new leaders emerge and a new "order" and bylaws are created); (b) drugs dealers turn the syringe exchange spot too dangerous to make the transactions; (c) they start to control the CBO: instead of each individual making the exchange of syringes for their own needs, one individual was making needle exchange for the entire shooting gallery; and (d) CBO was alerted to stop making the exchange by IDUs or the drugs dealers. For this reason the study ended collecting data only in seven locations instead of the original nine.

Therefore, because of the number of police interventions and the subsequent instability they caused in the communities, there may have been a volunteer bias in that we got the healthiest participants or those who felt they could go out for exchanges more safely. The availability of volunteers for this study was limited by the CBO's ability to penetrate the communities. Whatever reached the CBO had in attracting individuals to come out and exchange their needles represents the sample. Those that are the most unlikely to seek help, that use drugs more often, and those that are too ill to come out in public were outliers that did not participate by recruiting through the CBO. Finally, although participants agreed to disclose highly unsociable behaviors, as with any survey, they were still likely to provide socially desired responses.

On the other hand, the fact that we did not ask notes questions about how long they had been participating in the CBO program or the time at first injection limits the

assessment of the role SEP could be playing in the prevention of HCV/HIV epidemic and the adoption of risky behaviors. Results cannot be generalized to all PR-IDU, PR-IDU not participating in SEP programs, or in rural areas that injecting drug behaviors are theorized to be different. Finally, the results suggest association of network characteristics to injecting and sexual behaviors as well as HCV/HIV self-reported status; the analyses cannot be used to support causal associations.

The study did not assess knowledge of preventive measures for HCV/HIV contagion. Knowledge plays an important role in the risky behaviors adoption and HCV/HIV transmission to uninfected nodes (Korthuis et al., 2012). Knowledge of HCV/HIV prevention among participants could have played an important explanatory role in understanding differences in the risky behaviors adoption and self-reported status.

Implications for Positive Social Change

Based in the results and limitation of the study, the CBO currently participating in this study should search for strategies that allow PR-IDU to have more contact with family. Family contact has been shown elsewhere and confirmed in this study to be a protective factor. In this way, IDU also increase the network size with low risk profilers; this is also a protective factor for the HIV/HCV transmission and for reducing risky behaviors. It is also important that the CBO measure the knowledge of IDU and their networks on HCV/HIV protecting measures.

In the other side, it is necessary to lobby for adoption of non-punitive policies that allow IDU to receive treatment and clean syringes independently of the police interventions. Government is being called to reflect on the effectiveness of their actions in the long term, taking in consideration health impact of punitive laws in the HCV/HIV

transmission and adoption of injecting/sexual risky behaviors. Unfortunately, Puerto Rico's drug policies do not seem to favor change towards the decriminalization of drugs and much less its legalization.

This study was also an evaluation for a CBO. This requires being able to reach to circumstantial everyday life of people using drugs in Puerto Rico. For the first time, a study has pointed to the loneliness of PR-IDU. Theoretically, IDU face lot of threats in the streets, and elsewhere we observed the adverse results of drugs use in the society. Nevertheless, during the study, people spoke of their invisibility to the health system and to the society.

The results indicate that most of the IDU reported low syringe sharing, suggests that CBO work had positively impacted the knowledge and health practices among PR-IDU. However, the study brings evidence that there is a need to improve the cohesion in the IDU networks and the investment in social capital is that helps also reducing HCV/HIV contagion. In addition, the research demonstrates how universities can collaborate with CBO to evaluate health services and improve the health of those receiving their services. For example as the results of this project were obtained new initiatives were taken for improving health outcomes. For instance, the CBO developed a HCV knowledge questionnaire for their population, in that way knowledge regarding HCV was measured and a new scale adapted for PR-IDU is under construction (Zayas-Ríos, et al. 2015). Peer counseling groups are being organized and to some point the CBO is expanding services and spending less money but increasing empowerment. Two of the outreach works also stated that the current study brings to outreach workers an expanded

scope of their work and to understand their relevance within organization which at times is underestimated.

Conclusion

The study brings evidence that PR-IDU networks of those participating in the SEP differ from other IDU networks in size and closeness, with both being smaller and weaker than those observed in the literature. Also PR-IDUs were likely to report that they did not have sexual contact due to drug use. In terms of their injecting practices, PR-IDU scored very low for risky injection and sexual practices. Nevertheless, the HCV/HIV prevalence status was higher than those reported worldwide. The HCV/HIV positive serum-status reported was directly related to the years of the people within the network had been in jail, their HIV status and the injecting practices they attach to. Likewise, injecting practices were positively related to the years of people in the network had been injecting as well as the injecting practices they attach to and the sexual practices were not positively related to any of the network characteristics.

Based in these findings, CBO in charge of the SEP program needs to improve their strategies for changing injecting behaviors among participants. In one or other way it would be ideal that CBO could encourage communities to become part of IDU everyday life; actions that could help in the reduction of HIV/HCV transmission. The awareness among community members about their role in the life of these people may impact the empowerment of IDU for reducing unsafety injections and better community health. Although this is an expansion of the current CBO functions besides the IDU population data suggest potential benefits for both the CBO and the communities.

Last, for public health practitioners, it becomes fundamental to understand key differences between the Puerto Rican IDU islanders and Puerto Rican IDU elsewhere or other IDU populations documented in literature. Therefore, interventions for Puerto Rican IDU had to be tailored taking in consideration their uniquely unsafe injection behaviors and sexual practices. Otherwise, intervention programs may be condemned to failure due to the intrinsic properties of the Puerto Rican IDU population.

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Appendix A: Hypothesis and Statistical Testing Plan

Hypothesis	Dependent Variable	Independent Variable	Statistics test
$H_{o1\text{-}1}$: There is no relationship between network size, as measured by the sum of network members reported by the participant, and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants in the NEP. $H_{a1\text{-}1}$: There will be a relationship between network size, as measured by the sum of network members reported by the participant, and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants in the NEP.	Harmful Injecting Practices – continuous	Network size – continuous	Univariate – per cent, mean, median, etc. Bivariate – Pearson correlation Multivariate - GEE
$H_{o2\text{-}1}$: There is no relationship between network size, as measured by the number of participants reported in the network, and risky sexual practices among reported network members, as measured by an average level of risks calculated using the Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006). $H_{a2\text{-}1}$: There will be a relationship between network size, as measured by the number of participants reported in the network, and risky sexual practices among reported network members, as measured by an average level of risks calculated using the Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006).	Risky sexual practices - continuous		
$H_{o1\text{-}2}$: There is no relationship between network density, as measured by the sum connections to others in the personal networks, and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{a1\text{-}2}$: There will be a relationship between network density, as measured by the sum connections to others in the personal networks, and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.	Harmful Injecting Practices – continuous	Network density – continuous	Univariate – per cent, mean, median, etc. Bivariate – Pearson correlation Multivariate - GEE

$H_{o2\text{-}2}$: There is no relationship between density network, as measured by the sum of the connections to others in the personal networks, and risky sexual practices as measured by an average level of risks calculated using the Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{a2\text{-}2}$: There will be a relationship between density network, as measured by the sum of the connections to others in the personal networks, and risky sexual practices as measured by an average level of risks calculated using the Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.	Risky sexual practices – continuous		
$H_{o1\text{-}4}$: There is no relationship between tie relations, as measured by an index based on sum of the responses to five questions in the questionnaire, and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{a1\text{-}4}$: There will be a relationship between tie relations, as measured by an index based on sum of the responses to five questions in the questionnaire, and having riskier harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.	Harmful Injecting Practices – continuous	Tie relations – continuous	Univariate – per cent, mean, median, etc. Bivariate – Pearson correlation Multivariate – GEE
$H_{o2\text{-}4}$: There is no relationship between tie relations, as measured by an index based on sum of the responses of the five questions in the questionnaire, and risky sexual practices, as measured by an average level of risks calculated using the Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{a2\text{-}4}$: There will be a relationship between tie relations, as measured by an index based on sum of the responses of the five questions in the questionnaire, and risky sexual practices, as measured by an average level of risks calculated using the Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.	Risky sexual practices – continuous		
$H_{o1\text{-}5}$: There is no relationship between personal network exposure to HCV/HIV, as measured by the type of risky behaviors characterized by the network members as reported by the participant, and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in	Harmful Injecting Practices – continuous	Personal network exposure – continuous	Univariate – per cent, mean, median, etc.

combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{a1\text{-}5}$: There will be a relationship between personal network exposure to HCV/HIV, as measured by the type of risky behaviors characterized by the network members as reported by the participant, and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.			Bivariate – Pearson correlation Multivariate – GEE
$H_{o2\text{-}5}$: There is no relationship between personal network exposure to HCV/HIV, as measured by the type of risky behaviors characterized by the network members and as reported by the participant, and risky sexual practices, as measured by an average level of risks calculated using the Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{a2\text{-}5}$: There will be a relationship between personal network exposure to HCV/HIV, as measured by the type of risky behaviors characterized by the network members and as reported by the participant, and risky sexual practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.	Risky sexual practices – continuous		
$H_{o1\text{-}6}$: There is no relationship between propinquity, as measured by the physical distance from the participant to other actors in the network using participant zip code, and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{o1\text{-}6}$: There will be a relationship between propinquity, as measured by the physical distance from the participant to other actors in the network using participant zip code, and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.	Harmful Injecting Practices – continuous	Propinquity – categorical	Univariate – per cent, mode, etc. Bivariate – t-test student (parametric) or M-Whitney test (non parametric)
$H_{o2\text{-}6}$: There is no relationship between propinquity, as measured by the physical distance from the participant to other actors in the network using participant zip code, and risky sexual practices, as measured by a Blood Borne Virus Transmission Risk Assessment	Risky sexual practices – continuous		Multivariate – GEE

Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{a2\text{-}6}$: There will be a relationship between propinquity, as measured by the physical distance from the participant to other actors in the network using participant zip code, and risky sexual practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.			
$H_{o1\text{-}7}$: There is no relationship between profile relations (number of people in the network at high risk for HIV and/or Hepatitis C based on criteria defined in the literature) and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{a1\text{-}7}$: There will be a relationship between profile relations (number of people in the network at high risk for HIV and/or Hepatitis C based on criteria defined in the literature) and harmful injecting practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.	Harmful Injecting Practices – continuous	Profile relations – continuous	Univariate – per cent, mean, median, etc. Bivariate – Pearson correlation Multivariate – GEE
$H_{o2\text{-}7}$: There is no relationship between profile relations (number of people in the network who are at high risk for HIV and/or Hepatitis C as indicated in the literature) and risky sexual practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP. $H_{a2\text{-}7}$: There will be a relationship between profile relations (number of people in the network who are at high risk for HIV and/or Hepatitis C as indicated in the literature) and risky sexual practices, as measured by a Blood Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ) developed by WHO in combination with Social Network Instrument develop by Wyllie (2006), among participants of the NEP.	Risky sexual practices – continuous		

Appendix B: Operational Variables Plan

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
DEM1	Age	What is your date of birth?	¿Cuál es tu fecha de nacimiento?	Continuous variable collected as year/month/day. For inferential analysis will recode as ordinal variable: ≤ 29 years 30-39 years 40-49 years ≥ 50 years
DEM2	Gender	What gender do you identify yourself as?	Con cuál género te identificas más?	Nominal variable with 4 categories: 0 Male 1 Female 2 Transgender female 3 Transgender male
DEM3	Place of birth	Where were you born?	¿Dónde nació usted?	Nominal variable with 3 categories: 1 Puerto Rico 2 USA 3 Other: _____
DEM4	Educational level	What is the highest level of education you have completed?	¿Cuál es el grado educativo más alto completado?	Ordinal variable with 7 categories: 0 Did not complete HS / grade school 1 Graduated grade 12 2 Trade school 3 Some University / College 4 Associate Degree 5 Bachellor 6 Other, (specify_____)

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
DEM5	Primary Income Source	Over the last year what was the main way you got money to live on? *(circle only one)*	Durante el último año ¿cuál fue la manera más frecuente en la que conseguiste dinero para vivir? *Marque sólo una.*	Nominal variable with 7 categories: 0 Regular work (full, part time or contract) 1 Welfare, EI, pension or other government support 2 Money from family/friends 3 Sex trade/prostitution 4 Dealing or doing drug runs 5 Panhandling 6 Stealing 7 Other, (specify_____)
DEM6	City Postal Code	Using your postal code, what part of the city do you live in??	¿Cuál es el zip-code del área donde vives o en que barrio o sector vives?	Qualitative variable. Two options are provide to the participant to responds the question: (1) zip-code or (2) neighborhood name. Based on the answers a nominal variable will be constructed.
DEM7	Immigrant	Have you moved to Puerto Rico within the past 12 months?	¿Hace menos de un año que vives en Puerto Rico?	Nominal variable with 2 categories: 0 No 1 Yes
DEM8	Previous Living Place	Where were you living before you came to Puerto Rico?	¿Dónde vivías antes de venir a Puerto Rico?	Qualitative variable. A blank is provide to include the town or place of the previous residency. Based on the answers a nominal variable will be constructed.
DEM9	Arrested	Have you been arrested in the last 6 months?	¿Has sido arrestado en los pasados 6 meses?	Nominal variable with 2 categories: 0 No 1 Yes
DEM10	Incarcerated	Have you been incarcerated?	¿Has estado en la cárcel?	Nominal variable with 2 categories: 0 No 1 Yes

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
DEM11	Time Incarcerated	How long time was you incarcerated?	¿Por cuánto tiempo estuviste encarcelado?	Continuous variable collected as a number of years/months/ days in the jail. For inferential analyses an ordinal variable will be constructed such as: 1. less than one year 2. 1-5 years 3. 6-10 years 4. 11 or more years
DEM12	Time Release	When you were last released?	¿Cuándo saliste de la cárcel?	Continuous variable collected as a number of years/months/ days since release For inferential analyses an ordinal variable will be constructed such as: 1. less than one year 2. 1-5 years 3. 6-10 years 4. 11 or more years
DEM13	HIV	Are you HIV +?	**¿**Eres VIH positivo?	Nominal variable with 2 categories: 0 No 1 Yes:
DEM14	HIV Confirmation	Is the HIV serostatus test confirmed?	¿Ese diagnóstico fue confirmado por una prueba de laboratorio?	Nominal variable with 2 categories: 0 No 1 Yes
DEM15:	Date of Test	Date last tested?	¿Cuándo fue la última vez que te realizaste la prueba?	Qualitative variable. A blank is provides to include the age. Based on the answers a continuous variable will be constructed.
DEM16	Incarcerated	Have you been incarcerated in the last 6 months?	**¿**Tienes Hepatitis C?	Nominal variable with 2 categories: 0 No 1 Yes:
DEM17	Time of incarcerated	How much time was you incarcerated?	¿Ese diagnóstico fue confirmado por una prueba de laboratorio?	Nominal variable with 2 categories: 0 No 1 Yes

DEM18	HIV	Are you HIV positive?	¿Cuándo fue la última vez que te realizaste la prueba?	Qualitative variable. A blank is provides to include the age. Based on the answers a continuous variable will be constructed.
DEM19	HCV	The first time you injected, how old were you?	Cuándo te inyectaste la primera vez ¿Qué edad tenías?	Qualitative variable. A blank is provides to include the age. Based on the answers a continuous variable will be constructed.
DEM20	Drugs Lifetime	What of the following drugs have you use in your lifetime? (***drug of choice, circle all that apply)***	Cuál de las siguientes drogas haz utilizado durante tu vida?	Nominal and multiple choices variable such as: 1 Alcohol 2 Methamphetamines 3 Xanax/Valium 4 Amphetamines 5 Barbiturates 6 Cocaine 7 Crack 8 Demerol/morphine/opium 9 Downers/tranquilizers 10 Ecstasy 11 Gasoline/solvents 12 Marijuana 13 PCP/Angel dust 14 Tylenol/Panado PM 15 Heroin 16 Mushrooms 17 Percoset 18 Methadone prescribed 19 Methadone unprescribed 20 None 21 Other, (specify_____) 55 Unsure 66 Not applicable 99 Refused to answer
DEM21	Prefer Injecting Drugs	What drug is your favourite to inject? (***circle only oney)***	¿Cuál es tu droga favorita para inyectar? *Circule sólo una de la opciones*	Nominal variable such as: 0 Cocaine (uptown) 1 Morphine 2 Heroin (horse, junk, smack, downtown) 3 Heroin and cocaine (speedball) 4 Heroin mixed with another drug

				5 Amphetamines (speed, uppers) 6 Methadone 7 Crack/rock cocaine 8 Methamphetamine (crystal meth) 9 PCP (angel dust) 10 Dilaudid 11 Barbiturates (downers) 12 Ritalin alone 13 Xylacym (horse anestesia) 13 Other, (specify_____) 55 Unsure 66 Not applicable 99 Refused to answer
DEM22	Frequency of Injection	In the past month, how often did you inject (shoot up)? (circle only one)	En los últimos seis meses ¿cuántas veces te has inyectado? *Marcar sólo una de las opciones.*	Nominal variable such as: 0 Not at all 1 Once in a while, not every week 2 Regularly, once or twice a week 3 Regularly, three or more times a week 4 Every day (How many times per day _____)

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
NeSyrCo1a	Exchange	In the last month, how many times have you injected with another person's used needle/syringe?	Durante el pasado mes, ¿Cuántas veces al inyectarte usaste una jeringuilla de otra persona?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
NeSyrCo1b	Rinse	On those occasions, how often did you rinse it with a combination of full strength bleach and water (i.e, the '2x2x2' method) before you used it?	En esa/s ocasión/es que tantas veces lavaste la jeringuilla con una solución fuerte de agua y cloro antes de usarla? Ej. Método 2X2X2	Ordinal variable of five categories: 1. Never 2. Rarely 3. Sometimes 4. Often 5. Every time
NeSyrCo2	Needle Exchange	In the last month, how many times have you injected with a needle/syringe after another person has already injected some of its contents?	En el pasado mes ¿cuántas veces te has inyectado parte de la droga de otra persona con la misma jeringuilla que ella?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
NeSyrCo3	Accidental needle stick	In the last month, how many times have you received an accidental needle stick/ prick from another person's used needle/syringe?	En el pasado mes ¿Cuántas veces te has pinchado con una jeringuilla/aguja utilizada por otra persona accidentalmente?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
NeSyrCo4b:	Frequency of rinse	On those occasions, how often did you rinse it only with full-strength bleach before you re-used it?	En esa/s ocasión/es con cuanta frecuencia lavaste la jeringuilla/aguja con cloros puro antes de usarla?	Ordinal variable of five categories: 1. Never 2. Rarely 3. Sometimes 4. Often 5. Every time
NeSyrCo5	Filtered	In the last month, how many times have you injected a drug that was filtered through another person's filter?	En el pasado mes ¿cuántas veces te has inyectado drogas que son filtradas a través del filtro de otra persona?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
NeSyrCo6a	Used spoon	In the last month, how many times have you injected a drug that was prepared in another person's used spoon or mixing container?	Durante el pasado mes, ¿cuántas veces te has inyectado drogas preparadas en el cooker de otra persona?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
NeSyrCo6b	Spoon	On those occasions how often did you clean the spoon or mixing container before using it?	En esa/s ocasión/es ¿con qué frecuencia limpiaste el cooker antes de usarlo?	Ordinal variable of five categories: 1. Never 2. Rarely 3. Sometimes 4. Often 5. Every time

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
NeSyrCo7:	Water	In the last month, how many times have you injected a drug prepared with water which had been used by another person	En el pasado mes ¿cuántas veces te has inyectado drogas preparadas con agua que ha sido utilizada por otra persona?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
NeSyrCo8	Drugs used	In the last month, how many times have you injected a drug which had come into contact with another person's used needle/syringe?	En el pasado mes ¿cuántas veces te has inyectado drogas que han estado en contacto con la jeringuilla/aguja usada por otra persona?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
NeSyrCo9	Wiped	In the last month, how many times have you wiped your own injection site with an object (e.g, swab, tissue, hanky, towel etc) which had been used by another person?	En el pasado mes ¿Cuántas veces te has limpiado el lugar de la inyección con un objeto (gasa, trapo, algodón, gasa de alcohol, toalla etc.) que ha sido utilizado por otra persona?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
2PerCo10a	Frecuency of injected	In the last month, how many times have you injected a drug that you prepared immediately after 'assisting' another person with their injection (e.g, injecting them, holding their arm, handling used needle/syringe; touching their injection site to feel for a vein, to wipe blood away, or to stop bleeding)?	En el pasado mes ¿cuántas veces te has inyectado luego de ayudar a otra persona a inyectarse (ej. Los has inyectado, les has aguantado el brazo, has manejado la aguja o jeringuilla, le has ayudado a conseguir la vena, has limpiado la sangre del área de inyección, o has ayudado para que no sangre más)?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
2PerCo10b	Wash	On those occasions, how often did you wash your hands before preparing your mix?	En dichas ocasiones, ¿cuántas veces te lavaste las manos antes de preparar la mezcla?	Ordinal variable of five categories: 1. Never 2. Rarely 3. Sometimes 4. Often 5. Every time
2PerCo11a	Prepared Drug Mix	In the last month, how many times have you injected a drug that was prepared by another person who had already injected or assisted someone else's injection?	En el pasado mes, ¿cuántas veces te has inyectado droga que ha sido preparada por otra persona que ya se ha inyectado o ha ayudado a otro/a a inyectarse?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
2PerCo11b	Wash hands	On those occasions, how often did the person preparing the mix wash their hands before preparing the mix?	En dichas ocasiones: ¿cuántas veces esa persona se lavó las manos antes de preparar la mezcla?	Ordinal variable of five categories: 1. Never 2. Rarely 3. Sometimes 4. Often 5. Every time
2PerCo12a	Injected drugged	In the last month, how many times have you been injected by another person who had already injected or assisted in someone else's injection?	En el pasado mes ¿cuántas veces has sido inyectado por otra persona que ya se ha inyectado o ha ayudado a otro/a a inyectarse?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
2PerCo12b	Frequency of people wash their hands	On those occasions, how often did the person injecting you wash their hands before injecting you?	En dichas ocasiones: ¿cuántas veces esa persona se lavó las manos antes de inyectarte?	Ordinal variable of five categories: 1. Never 2. Rarely 3. Sometimes 4. Often 5. Every time

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
2PerCo13a	Spoiled Syringe	In the last month, how many times have you injected with a needle/syringe which had been handled or touched by another person who had already injected?	En el pasado mes ¿cuántas veces has inyectado a alguien con una jeringuilla/aguja usada o tocada por otra persona que ya se ha inyectado?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
2PerCo13b	Spoiled Wash Hand	On those occasions, how often did they wash their hands prior to handling the needle/syringe that you used?	En esas ocasiones ¿cuántas veces la persona que usó o tocó la jeringuilla se lavó las manos antes de usar o tocar la jeringuilla/aguja?	Ordinal variable of five categories: 1. Never 2. Rarely 3. Sometimes 4. Often 5. Every time
2PerCo14a	Frequency of touched	In the last month, how many times have you touched your own injection site (e.g, to feel for a vein, to wipe away blood, or to stop bleeding) soon after 'assisting' another person with their injection (e.g, injecting them, holding their arm, handling their use needle/syringe; touching their injection site to feel for a vein, to wipe away blood, or to stop bleeding)?	En el pasado mes, ¿cuántas veces has tocado el área donde te inyectas (ej. Palpar la vena antes de inyectarte, limpiado tu sangre, o aguantado el sangrado) rápido luego de ayudar a otra persona a inyectarse (ej. Los has inyectado, les has aguantado el brazo, has manejado la aguja o jeringuilla, le has ayudado a conseguir la vena, has limpiado la sangre del área de inyección, o has ayudado para que no sangre más)?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
2PerCo14b	Frequency of wash hands	On those occasions, how often did you wash your hands before touching your own injection site?	En dichas ocasiones, ¿cuántas veces te lavaste las manos antes de tocarte el área donde te inyectas?	Ordinal variable of five categories: 1. Never 2. Rarely 3. Sometimes 4. Often 5. Every time

2PerCo15a	Injection site touch	In the last month, how many times has another person touched your injection site (e.g, to feel for a vein, to wipe away blood, or to stop bleeding)?	En el pasado mes, ¿cuántas veces otra persona ha tocado el área donde te inyectas (ej. Palpar la vena antes de inyectarte, limpiado tu sangre, o aguantado el sangrado)?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
2PerCo15b	Injection Site Hand Wash	On those occasions, how often did the person wash their hands before they touched your injection site?	En dichas ocasiones, ¿cuántas veces la persona que tocó el área donde te inyectas se lavó las manos antes de tocar?	Ordinal variable of five categories: 1. Never 2. Rarely 3. Sometimes 4. Often 5. Every time
SexPra16:	Unprotected Vaginal Sex	In the last month, how many times have you engaged in unprotected vaginal sex with another person *(ie. penetration of the vagina with the penis)*?	En el pasado mes, ¿cuántas veces haz tenido sexo vaginal (ej. penetración de la vagina con el pene) sin protección con otra persona?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
SexPra17:	Unprotected Menstruation Vaginal Sex	In the last month, how many times have you engaged in unprotected vaginal sex with another person *(ie. penetration of the vagina with the penis*) during menstruation?	En el pasado mes ¿cuántas veces haz tenido sexo vaginal (ej. penetración de la vagina con el pene) sin protección con otra persona durante la menstruación?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
SexPra18	Vaginal Sex No Lubrication	In the last month, how many times have you engaged in unprotected vaginal sex with another person *(ie. penetration of the vagina with the penis)* without lubrication?	En el pasado mes ¿cuántas veces haz tenido sexo vaginal (ej. penetración de la vagina con el pene) sin protección con otra persona sin lubricación?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
SexPra19	Frequency if engaged oral sex	In the last month, how many times have you engaged in unprotected oral sex with another person *(ie. lips and tongue come into contact with the vagina, penis and/or anus)*?	En el pasado mes ¿cuántas veces has tenido sexo oral (ej. que los labios o la lengua tengan contacto con el pene, la vagina y/o el ano) con otra persona sin protección?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
SexPra20	Frequency of engaged manual sex	In the last month, how many times have you engaged in unprotected manual sex with another person *(ie. fingers and hands come into contact with the vagina, penis and/or anus)* during menstruation?	En el pasado mes ¿cuántas veces has tenido sexo manual (ej. que tus manos o dedos hayan tenido contacto con la vagina, pene, y/o ano) con otra persona mientras está en menstruación?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
SexPra21	Frequency of engaged manual sex with other	In the last month, how many times have you engaged in unprotected manual sex with another person *(ie. fingers and hands come into contact with the vagina, penis and/or anus)* after injecting?	En el pasado mes ¿cuántas veces has tenido sexo manual (ej. que tus manos o dedos hayan tenido contacto con la vagina, pene, y/o ano) con otra persona luego de inyectarte?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times
SexPra22	Frequency of engaged of manual sex with another	In the last month, how many times have you engaged in unprotected manual sex with another person *(ie. fingers and hands come into contact with the vagina, penis and/or anus)* without lubrication?	En el pasado mes ¿cuántas veces has tenido sexo manual (ej. que tus manos o dedos hayan tenido contacto con la vagina, pene, y/o ano) con otra persona sin lubricación?	Ratio variable of five categories: 0. No times (go to question 2) 1. Once 2. Twice 3. 3 – 5 times 4. 6 -10 times 5. More than 10 times

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
Social Network Step 1	Network	Which of these people has injected drugs in the last 6 months:	¿Cuál de estas personas se han inyectado drogas en los pasados 6 meses?:	Nominal variable of three categories: 2. Y (Yes) or 1. N (No) or 0. U (Unsure)
Social Network Step 1	Smoker/snorted	Not including marijuana use, which of these people has smoked/snorted/inhaled drugs in the last 6 months	Sin incluir marihuana, ¿cuál de estas personas ha fumado, inhalado o utilizado drogas en los pasados 6 meses?	Nominal variable of three categories: 2. Y (Yes) or 1. N (No) or 0. U (Unsure)
Social Network Step 1	Sex partner	Which of these people has been a sex partner of yours in the last 6 months	¿Cuál de estas personas han sido tu pareja sexual en los últimos 6 meses?	Nominal variable of two categories: 2. Y (Yes) or 1. N (No)
Social Network Step 1	Gender	What is the gender of each of these people?	¿Cuál es el sexo de cada una de estas personas?	Nominal variable of four categories: 4. **M** male, 3. **F** female, 2. **TM** transgender male, 1. **TF** transgender female.
Social Network Step 1	Age network	What is the age of each of these people?	¿Cuál es la edad de cada una de estas personas?	Continuous variable collected as years old. For inferential analysis will recode as ordinal variable: $\leq$ 29 years 30-39 years 40-49 years $\geq$ 50 years
Social Network Step 1	Relationship	What is this person's relationship to you:?	¿Qué tipo de relación tiene esta persona contigo?	Nominal variable of four categories: 4. **F** (Friend), 3. **L** (lover, spouse, girl/boyfriend), 2. **R** (Relative), 1. **C** (Acquaintance/Stranger).
Social Network Step 1	Size	Number of network members	Número de miembros de la red	Continuos variable. The participant indicated the name or nickname of the people in their network.
Social Network Step 3	Density	Interaction of network members	Interacción de los miembros de la red	Is the degree to which a person's ties are connected to one another. Entails summing the degree to which each of the alter is connected to others in the personal networks. $D_E = l/N(\lambda)$ where l=number of links N=network size λ=maximum numbers of nominations requested

Place in the questionnaire	Variable name	English question	Spanish translation	Operational variable
Social Network Step 1	Out-degree	Number of network members	Número de miembros de la red	Using size variable we can establish how sociable the participant is.
Social Network Step 2	Type of relations	What is this person's relationship to you?	¿Qué tipo de relación tiene esta persona contigo?	Nominal variable with 4 categories: F (family member), L (lover, spouse, girl/boyfriend), R (Friend), C (Acquaintance/Stranger).
DEM6	Propinquity	Using your postal code, what part of the city do you live in?	¿Cuál es el zip-code del área donde?	Qualitative variable. Two options are provide to the participant to responds the question: (1) zip-code or (2) neighborhood name. Based on the answers a nominal variable will be constructed.
SexPra16 to SexPra22	Sexual Risk Practices	In the last month, how many times have you engaged in unprotected vaginal sex with another person *(ie. penetration of the vagina with the penis)*? In the last month, how many times have you engaged in unprotected vaginal sex with another person *(ie. penetration of the vagina with the penis*) during menstruation? In the last month, how many times have you engaged in unprotected vaginal sex with another person *(ie. penetration of the vagina with the penis)* without lubrication? In the last month, how many times have you engaged in unprotected oral sex with another person *(ie. lips and tongue come*	En el pasado mes, ¿cuántas veces haz tenido sexo vaginal (ej. penetración de la vagina con el pene) sin protección con otra persona? En el pasado mes ¿cuántas veces haz tenido sexo vaginal (ej. penetración de la vagina con el pene) sin protección con otra persona durante la menstruación? En el pasado mes ¿cuántas veces haz tenido sexo vaginal (ej. penetración de la vagina con el pene) sin protección con otra persona sin lubricación? En el pasado mes ¿cuántas veces has tenido sexo oral (ej. que los labios o la lengua tengan contacto con el pene, la vagina y/o el ano) con otra persona sin protección?	An index will me make based on the responses of the seven questions. The index is the sum of the: number in each question. The higher score the riskier the sexual behavior is.

		into contact with the vagina, penis and/or anus)? In the last month, how many times have you engaged in unprotected manual sex with another person *(ie. fingers and hands come into contact with the vagina, penis and/or anus)* during menstruation? In the last month, how many times have you engaged in unprotected manual sex with another person *(ie. fingers and hands come into contact with the vagina, penis and/or anus)* after injecting? In the last month, how many times have you engaged in unprotected manual sex with another person *(ie. fingers and hands come into contact with the vagina, penis and/or anus)* without lubrication?	En el pasado mes ¿cuántas veces has tenido sexo manual (ej. que tus manos o dedos hayan tenido contacto con la vagina, pene, y/o ano) con otra persona mientras está en menstruación? En el pasado mes ¿cuántas veces has tenido sexo manual (ej. que tus manos o dedos hayan tenido contacto con la vagina, pene, y/o ano) con otra persona luego de inyectarte? En el pasado mes ¿cuántas veces has tenido sexo manual (ej. que tus manos o dedos hayan tenido contacto con la vagina, pene, y/o ano) con otra persona sin lubricación?	

NeSyrCo1a to 2PerCo15b	Risk Injection Practices	In the last month, how many times have you injected with another person's used needle/syringe? On those occasions, how often did you rinse it with a combination of full strength bleach and water (i.e, the '2x2x2' method) before you used it? In the last month, how many times have you injected with a needle/syringe after another person has already injected some of its contents? In the last month, how many times have you received an accidental needle stick/ prick from another person's used needle/syringe? On those occasions, how often did you rinse it only with full-strength bleach before you re-used it? In the last month, how many times have you injected a drug that was filtered through another person's filter? In the last month, how many times have you injected a drug that was prepared in another person's used spoon or mixing container?	Durante el pasado mes, ¿Cuántas veces al inyectarte usaste una jeringuilla de otra persona? En esa/s ocasión/es que tantas veces lavaste la jeringuilla con una solución fuerte de agua y cloro antes de usarla? Ej. Método 2X2X2 En el pasado mes ¿cuántas veces te has inyectado parte de la droga de otra persona con la misma jeringuilla que ella? En el pasado mes ¿Cuántas veces te has pinchado con una jeringuilla/aguja utilizada por otra persona accidentalmente? En esa/s ocasión/es con cuanta frecuencia lavaste la jeringuilla/aguja con cloros puro antes de usarla? En el pasado mes ¿cuántas veces te has inyectado drogas que son filtradas a través del filtro de otra persona? Durante el pasado mes, ¿cuántas veces te has inyectado drogas preparadas en el cooker de otra persona? En esa/s ocasión/es ¿con qué frecuencia limpiaste el cooker antes de usarlo?	An index will me make based on the responses of the twenty two questions. The index is the sum of the: number in each question. The higher score the riskier the injecting behavior is

		On those occasions how often did you clean the spoon or mixing container before using it? In the last month, how many times have you injected a drug prepared with water which had been used by another person In the last month, how many times have you injected a drug which had come into contact with another person's used needle/syringe? In the last month, how many times have you wiped your own injection site with an object (e.g, swab, tissue, hanky, towel etc) which had been used by another person? In the last month, how many times have you injected a drug that you prepared immediately after 'assisting' another person with their injection (e.g, injecting them, holding their arm, handling used needle/syringe; touching their injection site to feel for a vein, to wipe blood away, or to stop bleeding)?	En el pasado mes ¿cuántas veces te has inyectado drogas preparadas con agua que ha sido utilizada por otra persona? En el pasado mes ¿cuántas veces te has inyectado drogas que han estado en contacto con la jeringuilla/aguja usada por otra persona? En el pasado mes ¿Cuántas veces te has limpiado el lugar de la inyección con un objeto (gasa, trapo, algodón, gasa de alcohol, toalla etc.) que ha sido utilizado por otra persona? En el pasado mes ¿cuántas veces te has inyectado luego de ayudar a otra persona a inyectarse (ej. Los has inyectado, les has aguantado el brazo, has manejado la aguja o jeringuilla, le has ayudado a conseguir la vena, has limpiado la sangre del área de inyección, o has ayudado para que no sangre más)? En el pasado mes, ¿cuántas veces te has inyectado droga que ha sido preparada por otra persona que ya se ha	

		In the last month, how many times have you injected with a needle/syringe which had been handled or touched by another person who had already injected? On those occasions, how often did they wash their hands prior to handling the needle/syringe that you used? On those occasions, how often did you wash your hands before preparing your mix? In the last month, how many times have you injected a drug that was prepared by another person who had already injected or assisted someone else's injection? On those occasions, how often did the person preparing the mix wash their hands before preparing the mix? In the last month, how many times have you been injected by another person who had already injected or assisted in someone else's injection? On those occasions, how often did the person injecting you wash their hands before injecting you?	inyectado o ha ayudado a otro/a a inyectarse? En dichas ocasiones: ¿cuántas veces esa persona se lavó las manos antes de preparar la mezcla? En dichas ocasiones, ¿cuántas veces te lavaste las manos antes de preparar la mezcla? En el pasado mes ¿cuántas veces has sido inyectado por otra persona que ya se ha inyectado o ha ayudado a otro/a a inyectarse? En dichas ocasiones: ¿cuántas veces esa persona se lavó las manos antes de preparar la mezcla? En el pasado mes, ¿cuántas veces otra persona ha tocado el área donde te inyectas (ej. Palpar la vena antes de inyectarte, limpiado tu sangre, o aguantado el sangrado)? En dichas ocasiones, ¿cuántas veces la persona que tocó el área donde te inyectas se lavó las manos antes de tocar?	

		In the last month, how many times have you injected with a needle/syringe which had been handled or touched by another person who had already injected? On those occasions, how often did they wash their hands prior to handling the needle/syringe that you used? In the last month, how many times have you touched your own injection site (e.g, to feel for a vein, to wipe away blood, or to stop bleeding) soon after 'assisting' another person with their injection (e.g, injecting them, holding their arm, handling their use needle/syringe; touching their injection site to feel for a vein, to wipe away blood, or to stop bleeding)?	En el pasado mes ¿cuántas veces has inyectado a alguien con una jeringuilla/aguja usada o tocada por otra persona que ya se ha inyectado? En esas ocasiones ¿cuántas veces la persona que usó o tocó la jeringuilla se lavó las manos antes de usar o tocar la jeringuilla/aguja? En el pasado mes, ¿cuántas veces has tocado el área donde te inyectas (ej. Palpar la vena antes de inyectarte, limpiado tu sangre, o aguantado el sangrado) rápido luego de ayudar a otra persona a inyectarse (ej. Los has inyectado, les has aguantado el brazo, has manejado la aguja o jeringuilla, le has ayudado a conseguir la vena, has limpiado la sangre del área de inyección, o has ayudado para que no sangre más)? En dichas ocasiones, ¿cuántas veces te lavaste las manos antes de tocarte el área donde te inyectas?	

		On those occasions, how often did you wash your hands before touching your own injection site?		

INT1 to INT9	Tie strengths	How close are you to [person]? Would you talk to [person] about things that are very personal and private? . If you needed to borrow $25, would [person] lend or give it to you if they had the money? Would you ask [person] for advice or help about health problems like infections, AIDS, or hepatitis C? If I had an emergency this [Person] would be there for me. If I ask this [Person] would do anything for me if it is legal If I ask this [Person] would do anything for me even if it is not legal If I ask this [Person] would obtain drugs for me If I ask this [Person] would obtain needles or other equipment for me.	¿Qué tan cercano te sientes de esta pesona? ¿Hablarias con esta persona de cosas privadas y muy personales? Si necesitaras $25 prestados, ¿tu crees que esta persona de los prestaría o daría si los tuviera? Le preguntaría o pedirías ayuda a esta persona si tuvieras problemas de salud tales como VIH o Hepatitis C? Si tuviera una emergencia esta persona estaría conmigo Si le preguntase a esta persona él/ella haría cualquier cosa por mí si es legal: Si le preguntase a esta persona él/ella haría cualquier cosa por mí si aún sino es legal: Esta persona obtendría drogas para mí Esta persona obtendría parafernalia y jeringuillas para mi.	An index will me make based on the responses of the four questions. The index is the sum of the: number (1) in each question. The higher score the strongest the tie is.
CDR1 CDR2, CDR3 and CDR4 to CDR14	Personal network exposure will be measured by three measures. CDR1, CDR2, CDR3 and the sum of variables	CDR1 - To the best of your knowledge, in the past month, how often did [person] shoot up? CDR2 Approximately, how long have they been injecting drugs?	A tu mejor conocimiento, en el pasado mes, ¿que tan frecuente esa persona se inyectó? Aproximadamente, ¿por cuánto tiempo estas personas han estado inyectándose drogas?	CDR1 will be using an ordinal variable ranking from 0 to 4, where the higher the number the higher the frequency the person in the network injects. CDR2 will be an open ending question in which

	CDR4 to CDR14, each ranking different ordinal values. In the scale higher score are representative of higher personal network exposure risks to HCV/HIV.	(Record as day, month or year and specify which {d, m or y}) CDR3 In the past month, how many times have you and [person] combined or pooled money so that you had enough money to buy drugs or injecting equipment? In the past month, how often did you inject with [person]? Have you <u>ever</u> injected with a needle after [person] used it first? In the past month, how often have you injected with a needle after [person] used it first? In the past month, how often has [person] injected with a needle after you used it first? In the past month, how often have you used [person's] cooker, rinse water, or cotton after they had already used them? In the past month, how often did you	En los pasados 6 meses, ¿cuántas veces has combinado o juntado dinero para comprar drogas o equipo con esta persona por que no has tenido suficiente dinero? En los pasados 6 meses que tan frecuente te has inyectado con esa persona? ¿Te has inyectado alguna vez con una jeringuilla luego de que esta persona la haya utilizado? En los pasados 6 meses ¿qué tan frecuente te has inyectado con una aguja que ha sido utilizada por alguna de las personas en tu red social? En los pasados 6 meses, que tan frecuente esta persona se ha inyectado con una jeringuilla luego que tú te has inyectado? En los últimos 6 meses ¿cuántas veces has usado el cooker, el agua de limpiar la parafernalia, o el algodón luego de que cualquiera de las personas en tu red lo hayan utilizado? En los pasados 6 meses ¿qué tan frecuente te has inyectado tu droga luego de que la hayan mezclado con la	participant will provide the number of years in a continuous variable. CDR3 will be using an ordinal variable ranking from 0 to 6 were the higher the number the higher the frequency the behavior is observed. Last, the personal network exposure will be measured by creating an index by adding the responses of questions CDR4to CDR9, each ranking ordinal values from 0 to 4. In the scale conformed by CDR3 to CDR9 higher score are representative of higher personal network exposure risks to HCV/HIV. Each of this variables [CDR1, CDR2, CDR3, and the index] will be entered separately in the GEE analysis.

		inject drugs after [person] mixed your drugs in a syringe that they had already injected with? To the best of your knowledge, in the past month, how often has [person] had share needles/syringe with someone besides you? To the best of your knowledge, in the past month, how often has [person] had done sex work or trade sex for drugs?	jeringuilla de otra persona en tu red? A tu mejor entendimiento durante el pasado mes, ¿qué tan frecuente las personas en tu red social han compartido las jeringuilla con otras personas además de contigo? A tu mejor entendimiento durante el pasado mes, ¿qué tan frecuente las personas en tu red social se han prostituido o han tenido sexo a cambio de sexo?	

Appendix C: Spanish Questionnaire

Cuestionario Influencia de las redes sociales en los comportamientos de riesgo para la transmisión del virus de Hepatitis C y VIH en una población de usuarios de drogas inyectables en Puerto Rico.

Número de control: _____

Fecha/Hora: _____

Perfil Socio-demográfico:

Lea al participante: La primera sección de preguntas son acerca de usted:

DEM1: ¿Cuál es tu edad? (Años)

_____

DEM2: Con cuál género te identificas más? (Sólo si es necesario)

0 Masculino
1 Femenino
2 Mujer Transgénero
3 Hombre Transgénero
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM3: ¿Dónde nació usted?

1 Puerto Rico
2 USA
3 Other: _____

DEM 4: ¿Cuál es el grado educativo más alto completado?

0 No complete la Escuela Superior
1 Completé la Escuela Superior.
2 Escuela Vocacional
3 Estudios universitarios sin completar
4 Grado Associado
5 Bachillerato
6 Otro: _____
99 No contesta

DEM 5: Durante el último año ¿cuál fue la manera más frecuente en la que conseguiste dinero para vivir? *Marque sólo una.*

0 Trabajo Regular (a tiempo completo o parcial, contrato, etc.)
1 Cupones u otra asistencia gubernamental como pensión, seguridad social, etc.
2 Dinero que me daban mis amigos/familiares
3 Trabajos sexuales / prostitución
4 Trabajos como mula o en venta de drogas
5 Pidiendo limosna / mendingando
6 Robando
7 Otro: _____
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM 6: ¿Cuál es el zip-code del área donde vives o en que barrio o sector vives?

_____

DEM 7: ¿Hace menos de un año que vives en Puerto Rico?

0 Sí (Pasa pregunta DEM8)
1 No (Pasa pregunta DEM9)
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM 8: ¿Dónde vivías antes de venir a Puerto Rico?

_____

DEM 9: ¿Has sido arrestado en los pasados 6 meses?

0 Sí
1 No
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM 10: ¿Has estado en la cárcel?

0 Sí (pasa la pregunta DEM 12)
1 No (pasa la pregunta DEM 11)
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM 11: ¿Por cuánto tiempo estuviste encarcelado?

_____ Años _____ Meses

_____ Días

DEM 12: ¿Cuándo saliste de la cárcel?

_____ Años _____ Meses

_____ Días

DEM 13: ¿Eres VIH positivo?

0 Sí
1 No (Pasa a **DEM 16**)
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM 14: Ese diagnóstico fue confirmado por una prueba de laboratorio?

0 Sí
1 No
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM 15: ¿Cuándo fue la última vez que te realizaste la prueba?

_____

DEM 16: ¿Tienes Hepatitis C?

0 Sí
1 No (Pasa a **DEM 18**)
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM 17: Ese diagnóstico fue confirmado por una prueba de laboratorio?

0 Sí
1 No
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM 18: ¿Cuándo fue la última vez que te realizaste la prueba?

_____

DEM19: Cuándo te inyectaste la primera vez ¿Qué edad tenías?

_____

ESPACIO DEJADO EN BLANCO INTENCIONALMENTE

DEM 20: ¿Cuál de las siguientes drogas haz utilizado durante tu vida?

0 Alcohol
1 Metanfetaminas
2 Xanax/Valium
3 Anfetaminas
4 Barbitúricos
5 Cocaína
6 Crack
7 Demerol/morfina/opio
8 Sedantes o tranquilizantes
9 Ecstasy
10 Gasolina/solventes [Cinel}
11 Marihuana
12 PCP/Polvo de Ángel
13 Tylenol o Panadol PM
14 Heroína
15 Hongos
16 Percocet
17 Metadona prescrita
18 Metadona no prescrita
19 None
20 Other, (specify_____)
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM21: ¿Cuál es tu droga favorita para inyectar? *Circule sólo una de la opciones*

0 Cocaína
1 Morfina
2 Heroína
3 Heroína y cocaína (speedball)
4 Heroína mezclada con otras drogas
5 Anfetaminas (estimulantes)
6 Metadona
7 Crack/ cocaína en piedra
8 Metanfetamina (crystal meth)
9 PCP (polvo de ángel)
10 Dilaudid
11 Barbitúricos (sedantes)
12 Ritalin
13 Xylacym (Anestesia de caballo)
14 Otro, (especifique _____)
55 Indeciso/inseguro
66 No aplica
99 No contesta

DEM 22: En los último mes ¿cuántas veces te has inyectado? *Marcar sólo una de las opciones.*

0 Nunca
1 De vez en cuando pero no todas las semanas
2 Regularmente 1 ó 2 veces por semana.
3 Regularmente 3 ó más veces por semana.
4 Todos los días (¿Cuántas veces al día _____ ___?)

ESPACIO DEJADO EN BLANCO INTENCIONALMENTE

NeSyrCo1a: Durante el pasado mes, ¿Cuántas veces al inyectarte usaste una jeringuilla de otra persona?

0. Nunca (ir a la pregunta **NeSyrCo2**)
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

NeSyrCo1b: En esa/s ocasión/es que tantas veces lavaste la jeringuilla con una solución fuerte de agua y cloro antes de usarla?

1. Nunca
2. Raras veces
3. Algunas veces
4. Casi siempre
5. Todo el tiempo

NeSyrCo2: En el pasado mes ¿cuántas veces te has inyectado parte de la droga de otra persona con la misma jeringuilla que ella?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

NeSyrCo3: En el pasado mes ¿Cuántas veces te has pinchado con una jeringuilla/aguja utilizada por otra persona accidentalmente?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

NeSyrCo4a: En el pasado mes ¿cuántas veces has utilizado una jeringuilla/aguja que has sacado del zafacón o un recipiente de jeringuillas/agujas?

0. Nunca (ir a la pregunta **NeSyrCo5**)
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

NeSyrCo4b: En esa/s ocasión/es con cuanta frecuencia lavaste la jeringuilla/aguja con una solución fuerte de agua y cloro antes de usarla?

1. Nunca
2. Raras veces
3. Algunas veces
4. Casi siempre
5. Todo el tiempo

NeSyrCo5: En el pasado mes ¿cuántas veces te has inyectado drogas que son filtradas a través del filtro de otra persona?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

NeSyrCo6a: Durante el pasado mes, ¿cuántas veces te has inyectado drogas preparadas en el cooker de otra persona?

0. Nunca (ir a la pregunta **NeSyrCo8**)
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

NeSyrCo6b: En esa/s ocasión/es ¿con qué frecuencia limpiaste el cooker antes de usarlo?

1. Nunca
2. Raras veces
3. Algunas veces
4. Casi siempre
5. Todo el tiempo

NeSyrCo7: En el pasado mes ¿cuántas veces te has inyectado drogas preparadas con agua que ha sido utilizada por otra persona?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

NeSyrCo8: En el pasado mes ¿cuántas veces te has inyectado drogas que han estado en contacto con la jeringuilla/aguja usada por otra persona?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

NeSyrCo9: En el pasado mes ¿Cuántas veces te has limpiado el lugar de la inyección con un objeto (gasa, trapo, algodón, gasa de alcohol, toalla etc.) que ha sido utilizado por otra persona?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

2PerCo10a: En el pasado mes ¿cuántas veces te has inyectado luego de ayudar a otra persona a inyectarse (ej. Los has inyectado, les has aguantado el brazo, has manejado la aguja o jeringuilla, le has ayudado a conseguir la vena, has limpiado la sangre del área de inyección, o has ayudado para que no sangre más)?

0. Nunca **(Pase a 2PerCo11)**
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

2PerCo10b: En dichas ocasiones, ¿cuántas veces te lavaste las manos antes de preparar la mezcla?

1. Nunca
2. Raras veces
3. Algunas veces
4. Casi siempre
5. Todo el tiempo

ESPACIO DEJADO EN BLANCO

2PerCo11a: En el pasado mes, ¿cuántas veces te has inyectado droga que ha sido preparada por otra persona que ya se ha inyectado o ha ayudado a otro/a a inyectarse?

0. Nunca (ir a la pregunta **2PerCo12a**)
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

2PerCo11b: En dichas ocasiones: ¿cuántas veces esa persona se lavó las manos antes de preparar la mezcla?

1. Nunca
2. Raras veces
3. Algunas veces
4. Casi siempre
5. Todo el tiempo

2PerCo12a: En el pasado mes ¿cuántas veces has sido inyectado por otra persona que ya se ha inyectado o ha ayudado a otro/a a inyectarse?

0. Nunca (ir a la pregunta **2PerCo13a**)
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

2PerCo12b: En dichas ocasiones: ¿cuántas veces esa persona se lavó las manos antes de inyectarte?

1. Nunca
2. Raras veces
3. Algunas veces
4. Casi siempre
5. Todo el tiempo

2PerCo13a: En el pasado mes ¿cuántas veces has inyectado a alguien con una jeringuilla/aguja usada o tocada por otra persona que ya se ha inyectado?

0. Nunca (ir a la pregunta **2PerCo14a**)
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

2PerCo13b: En esas ocasiones ¿cuántas veces la persona que usó o tocó la jeringuilla se lavó las manos antes de usar o tocar la jeringuilla/aguja?

1. Nunca
2. Raras veces
3. Algunas veces
4. Casi siempre
5. Todo el tiempo

2PerCo14a: En el pasado mes, ¿cuántas veces has tocado el área donde te inyectas (ej. Palpar la vena antes de inyectarte, limpiado tu sangre, o aguantado el sangrado) rápido luego de ayudar a otra persona a inyectarse (ej. Los has inyectado, les has aguantado el brazo, has manejado la aguja o jeringuilla, le has ayudado a conseguir la vena, has limpiado la sangre del área de inyección, o has ayudado para que no sangre más)?

0. Nunca (ir a la pregunta **2PerCo15a**)
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

2PerCo14b: En dichas ocasiones, ¿cuántas veces te lavaste las manos antes de tocarte el área donde te inyectas?

1. Nunca
2. Raras veces
3. Algunas veces
4. Casi siempre
5. Todo el tiempo

2PerCo15a: En el pasado mes, ¿cuántas veces otra persona ha tocado el área donde te inyectas (ej. Palpar la vena antes de inyectarte, limpiado tu sangre, o aguantado el sangrado)?

0. Nunca (ir a la pregunta **2PerCo16**)
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces

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4. entre 6 -10 veces
5. Más de 10 veces

2PerCo15b: En dichas ocasiones, ¿cuántas veces la persona que tocó el área donde te inyectas se lavó las manos antes de tocar?

1. Nunca
2. Raras veces
3. Algunas veces
4. Casi siempre
5. Todo el tiempo

SexPra16: En el pasado mes, ¿cuántas veces haz tenido sexo vaginal (ej. penetración de la vagina con el pene) sin protección con otra persona?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

SexPra17: En el pasado mes ¿cuántas veces haz tenido sexo vaginal (ej. penetración de la vagina con el pene) sin protección con otra persona durante la menstruación?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

SexPra18: En el pasado mes ¿cuántas veces haz tenido sexo vaginal (ej. penetración de la vagina con el pene) sin protección con otra persona sin lubricación?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

SexPra19: En el pasado mes ¿cuántas veces has tenido sexo oral (ej. que los labios o la lengua tengan contacto con el pene, la vagina y/o el ano) con otra persona sin protección?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

Sex Pra20: En el pasado mes ¿cuántas veces has tenido sexo manual (ej. que tus manos o dedos hayan tenido contacto con la vagina, pene, y/o ano) con otra persona mientras está en menstruación?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

SexPra21: En el pasado mes ¿cuántas veces has tenido sexo manual (ej. que tus manos o dedos hayan tenido contacto con la vagina, pene, y/o ano) con otra persona luego de inyectarte?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

SexPra22: En el pasado mes ¿cuántas veces has tenido sexo manual (ej. que tus manos o dedos hayan tenido contacto con la vagina, pene, y/o ano) con otra persona sin lubricación?

0. Nunca
1. Una vez
2. Dos veces
3. Entre 3 – 5 veces
4. entre 6 -10 veces
5. Más de 10 veces

Fuente de Jeringuillas:

NS1: En los pasados 6 mes, ¿has obtenido o intercambiado jeringuillas en un centro de intercambio de jeringuillas?

0 Sí
1 No
55 Indeciso/inseguro
66 No aplica
99 No contesta

NS2: En los pasados 6 meses, ¿cuántas de tus jeringuillas tú obtuviste de un programa de intercambio de jeringuillas?

0 Todas
1 La mayoría pero no todas
2 La mitad de las jeringuillas
3 Menos de la mitad de las jeringuillas.
4 Ninguna
55 Indeciso/inseguro
66 No aplica
99 No contesta

NS3: En los pasados 6 meses, ¿has intercambiado tus propias jeringuillas o alguien realiza el intercambio por ti?

0 Por lo regular lo hago yo mismo
1 Por lo regular hay alguien que lo hace por mí.
55 Indeciso/inseguro
66 No aplica
99 No contesta

NS4: En los pasados 6 meses ¿que tan fácil fue para ti obtener una jeringuilla nueva cuando la necesitaste?

0 Muy fácil
1 Bastante fácil
2 Bastante difícil
3 Muy difícil
55 Indeciso/inseguro
66 No aplica
99 No contesta.

Red Social:

1. **Miembros de la red social:**

   Leer: Esta parte del cuestionario tiene la intención de evaluar la relación entre el contacto personal y las enfermedades infecciosas que pueden transmitirse a través de jeringuillas usadas, como el VIH y la hepatitis. Me gustaría hacerle algunas preguntas acerca de las personas con las que normalmente usted se comparte. El investigador no se le pedirá ninguna información que pueda ser utilizada para identificar a las personas y la información que proporcione será confidencial.

   Primero quiero que pienses acerca de los últimos 30 días y recuerdes aquellas personas con las que has tenido algo más que un contacto casual[11]. Estas personas son aquellas a las que ves y con las que hablas regularmente. En su mayoría estas personas suelen ser amigos, familiares, parejas sexuales, personas con las que te inyectas drogas o aquellos que viven contigo.

   Vamos a realizar una lista de estas personas (entrevistador – el máximo de personas permitidas en la lista son 20. Si el individuo nombra a las 20 personas pídale que le pregunte a cuantas personas más adicionales él o ella pueden nombrar y apunta el número en la hoja de contestaciones). Utilice la naturaleza de la relación para identificar a estas personas. En el caso de que haya más de uno dime un número después de la relación, por ejemplo, amigo-1, amigo-2 etc. Por favor, no utilices sus nombres o apellidos. Voy a ofrecer un seudónimo (nombre falso) para cada contacto (Por ejemplo, si usted dice cónyuge le daré el nombre falso de María, si dices hermano le daré el nombre falso de José). Vamos a utilizar estos nombres falsos en la lista para asegurarse de que la identidad de un contacto que no se da a conocer. Recuerde que estamos interesados en la gente que ha tenido contacto en los últimos 30 días.

[11] Se refiere a una conversación que va más allá de la conversación de mendicidad o una conversación tipo "hola / adiós".

Para ayudar a recordar el máximo de personas el entrevistador puede hacer las siguientes preguntas:

- **Personas con las que haz compartido drogas en los últimos 30 días;**
- **Personas con las que haz tenido sexo en los últimos 30 días (si la persona es un/a trabajador/a sexual liste no más de 10 parejas sexuales, si no conoce el nombre del cliente puede nombrarlo como desconocido #1, desconocido #2, etc. si tienen una pareja sexual regular asegúrese de que la incluya en el grupo);**
- **Amigos, familiares, o personas que estén de alguna manera cercanos a el o ella;**
- **Las personas con las que vive;**
- **Las personas con las que se pasa el tiempo.**

2. <u>Tipo de contacto;</u>

Entrevistador: Una vez el participante de las relaciones y se le asignen los nombres falsos, por favor pregúntele a los participantes las preguntas que se dan abajo y circule la letra apropiada para cada uno de los nombre en la siguiente página.

Preguntas a hacer acerca de cada miembro de la red social que se incluyen en la siguiente página:

1. ¿Cuál de estas personas se han inyectado drogas en los pasados 6 meses?: Circule Y (Sí) **o N** (No) **o U** (Inseguro)

2. Sin incluir marihuana, ¿cuál de estas personas ha fumado, inhalado o utilizado drogas en los pasados 6 meses? Circule Y (Sí) **o N** (No) **o U** (Inseguro)

3. ¿Cuál de estas personas han sido tu pareja sexual en los últimos 6 meses? Circule Y (Sí) **o N** (No) **o U** (Inseguro)

4 ¿Cuál es el género de cada una de estas personas? Circule M (Masculino), **F** (Femenino), **TM** (Transgénero Masculino), **TF** (Transgénero Femenino).

5 ¿Cuál es la edad de cada una de estas personas?

6 ¿Qué tipo de relación tiene esta persona contigo? Circule F (Miembro de la Familia), **L** (Amante, esposo, novio/a); **R** (Amigo); **C** (Conocido/extraño).

7 ¿Es esta persona Puertoriqueña? Circule Y (Sí) **Si no especifique:_____**

Espacio Dejado en Blanco Intencionalmente

Lista de los miembros de la red

# de miembro en la Red	Identificador del Miembro en la Red (Nombre Falso)	Usuario de drogas inyectables	Fuma/Inhala o utiliza Drogas	Pareja Sexual	Género	Edad	Relación *(Compañeros de trabajo, suplidores de droga, "panas" ect. deben de ser clasificados como conocidos, a menos que persona diga que son amigos (**R**).*	Es esta persona puertorriqueña Y (sí) & N (no) especifique
1		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N
2		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N
3		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N
4		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N
5		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N
6		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N
7		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N
8		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N
9		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N
10		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N

# de miembro en la Red	Identificador del Miembro en la Red (Iniciales/Apodo, etc)	Usuario de drogas inyectables	Fuma/Inhala o utiliza Drogas	Pareja Sexual	Género	Edad	Relación *(Compañeros de trabajo, suplidores de droga, "panas" ect. deben de ser clasificados como conocidos, a menos que persona diga que son amigos (**R**).*	Es esta persona puertorriqueña Y (sí) & N (no) especifique
11		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____
12		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____
13		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____
14		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____
15		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____
16		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____
17		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____
18		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____
19		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____
20		Y N U	Y N U	Y N	M F TM TF		F L R C	Y N _____

Si el encuestado incluye a 20 miembros de su red social, pregúntele cuantas personas adicionales ellos pueden nombrar y apunte el número aquí:

Numero de miembros adicionales de la red: _____

ESPACIO DEJADO EN BLANCO INTENCIONALMENTE

3) Interacción entre los miembros de la red:

Entrevistador: Luego de terminar el paso 2, transfiera los nombres de todos los miembros de la red a la tabla que se muestra a continuación. Para cada persona enumerada, pídale al participante cual de las personas en la lista está en contacto o conoce a cualquier otro de los miembros de la lista. Si la persona está en contacto o conoce a otro de los miembros de la red haga una marca de cotejo (√) de lo contrario deje el espacio en blanco.

Identificador del Miembro en la Red (Iniciales/Apodo, etc)	Identificador del Miembro de la Red que Conoce																			
	Persona # 1	Persona # 2	Persona # 3	Persona # 4	Persona # 5	Persona # 6	Persona # 7	Persona # 8	Persona # 9	Persona # 10	Persona # 11	Persona # 12	Persona # 13	Persona # 14	Persona # 15	Persona # 16	Persona # 17	Persona # 18	Persona # 19	Persona # 20
Persona # 1																				
Persona # 2																				
Persona # 3																				
Persona # 4																				
Persona # 5																				
Persona # 6																				
Persona # 7																				
Persona # 8																				
Persona # 9																				
Persona # 10																				
Persona # 11																				
Persona # 12																				
Persona # 13																				
Persona # 14																				
Persona # 15																				

Identificador del Miembro en la Red (Iniciales/Apodo, etc)	Identificador del Miembro de la Red que Conoce																			
	Persona # 1	Persona # 2	Persona # 3	Persona # 4	Persona # 5	Persona # 6	Persona # 7	Persona # 8	Persona # 9	Persona # 10	Persona # 11	Persona # 12	Persona # 13	Persona # 14	Persona # 15	Persona # 16	Persona # 17	Persona # 18	Persona # 19	Persona # 20
Persona # 16																				
Persona # 17																				
Persona # 18																				
Persona # 19																				
Persona # 20																				

4 <u>Escoge los miembros:</u>

Entrevistador – Tranfiera los identificadores de todos los usuarios de drogas inyectables [IDUs] en la siguiente parte del cuestionario. Si hay más de 5 IDUs en la lista escoja los primeros 5 que el participante nombró en el listado original para el seguir con el cuestionario.

<u>Preguntas sobre la reorganización de los contactos en la red</u>

Entrevistador – Enumere los 5 miembros siguiendo la lista anterior [recuerde nunca usar los nombres completos sólo apodos o las iniciales de estos nombres] de la red según las instrucciones mencionadas arriba y asigne un código a cada contacto según las siguientes instrucciones (esta información será usada por la persona que entrará los datos para identificar cada participante.

a) Enumera las primeras iniciales de los contactos escogidos de la lista bajo la categoría "Identificador del Miembro en la Red (Iniciales/Apodo, etc)**"**

b) Asigne el código nuevo a cada uno de los participantes desde el número 1 hasta el 5.

Ej.	**Identificador del Miembro en la Red**	**Código**
	Ejemplo Eustakio Pérez=EP;	**1**
	Macho de las gladiolas=MG	**2**
	El Bizco=EB	**3**

ESPACIO DEJADO EN BLANCO INTENCIONALMENTE

Para las siguientes premisas haz una marca de cotejo a menos que la pregunta requiera una contestación completa.

Información demográfica de los contactos de los participantes.

CD1 ¿Qué tipo de relación tiene esta persona contigo? Esta pregunta es básicamente repetida de la parte anterior pero en esta ocasión las opciones son mucho más detalladas por lo que se le vuelve a preguntar a la participante nuevamente acerca de sus 5 contactos.

	# del Miembro de la Red				
	1	**2**	**3**	**4**	**5**
0 Amigo					
1 2ndo esposo/a					
2 Novio/a Amante					
3 Ex - amante					
4 Ex- esposo/a					
5 Madre					
6 Padre					
7 Hermano					
8 Hermana					
9 Hijo					
10 Hija					
11 Primo/a					
12 Suegro/a					
13 Sobrina					
14 Sobrina					
15 Tio					
16 Tia					
17 Otro familiar					
18 Conocido					
19 Extraño					
20 Dueño del Punto					
21 Mula					
22. Persona con la que comparto jeringuillas					
22 Otro especifique*					
55 No seguro / indeciso					
99 No contestó					

*** Si ha seleccionado otro en alguno de los encasillados anteriores por favor especifique en la tabla adelante:**

# de Miembro de la Red	Otro, especifique
# 1	
# 2	
# 3	
# 4	
# 5	

CD2 ¿Por cuánto tiempo has conocido a esta persona?

# de Miembro de la Red	Meses//Años
# 1	
# 2	
# 3	
# 4	
# 5	

CD3 ¿Cuál es el nivel educativo más alto que tiene la persona?

	# del Miembro de la Red				
	1	**2**	**3**	**4**	**5**
0. Graduado de 4to año					
1. Todavía en la escuela					
2. Desertor escolar en el grado _____					
3.Escuela nocturna					
4. Universidad					
5.Escuela técnica					
6.Otro especifique*					
55 No seguro / indeciso					
99 No contestó					

*** Si ha seleccionado otro en alguno de los encasillados anteriores por favor especifique en la tabla que se muestra adelante:**

# de Miembro de la Red	Otro, especifique
# 1	
# 2	
# 3	
# 4	
# 5	

CD4 Durante el último año ¿cuál fue la fuente de ingreso de esta persona?

	# del Miembro de la Red				
	1	**2**	**3**	**4**	**5**
0. Trabajo Regular (Part time / Full time)					
1. Cupones // Asistencia Social // Pensión					
2. Trabajador sexual // Prostituta					
3. Trabajando en el punto					
4. Pidiendo en las calles // Mendigando					
5. Robando					
6. Boosting					
7. Otro					
55 No seguro / indeciso					
66 No Aplica					
99 No Contestó					

CD5 ¿En que parte de la ciudad vive esta persona? Utiliza el código postal, o el nombre del vecindario (Si vive fuera de la ciudad, pregúntale el nombre de la ciudad y el barrio).

# del Miembro de la Red	**Código Postal o el nombre del vecindario**	**Indeciso o No Seguro**	**No aplica.**	**No contestó**
1				
2				
3				
4				
5				

CD9. ¿En que parte de la ciudad estas personas pasan el tiempo? Utiliza el zip code, o el nombre del vecindario (Si vive fuera de la ciudad, pregúntale el nombre de la ciudad y el barrio).

# del Miembro de la Red	**Código Postal o el nombre del vecindario**	**Indeciso o No Seguro**	**No aplica.**	**No contestó**
1				
2				
3				
4				
5				

Riesgo Relacionado a la Inyección de Drogas de los Miembros de la Red

CDR1 A tu mejor conocimiento, en el pasado mes, ¿que tan frecuente esa persona se inyectó?

del Miembro de la Red

	1	2	3	4	5
0. Nunca					
1. De vez en cuando pero no todas las semanas					
2. Regularmente, 1 ó 2 veces por semana.					
3. Regularmente, 3 ó 4 veces por semana					
4. Todos los días					
55 No seguro / indeciso					
66 No Aplica					
55 No seguro / indeciso					

Si dijo que se inyectaba todos los días por favor especifique ¿cuántas veces en un día?

# de Miembro de la Red	Otro, especifique
# 1	
# 2	
# 3	
# 4	
# 5	

CDR2. Aproximadamente, ¿por cuánto tiempo estas personas han estado inyectándose drogas?

# del Miembro de la Red	**Día, Mes o años**
1	
2	
3	
4	
5	

CDR3 En los pasados 6 meses, ¿cuántas veces has combinado o juntado dinero para comprar drogas o equipo con esta persona por que no has tenido suficiente dinero?

del Miembro de la Red

	1	2	3	4	5
0. Nunca					
1. Una vez					
2. 2 a 4 veces					
3. 5 a 9 veces					
4. 10 a 24 veces					
5. 25 a 49 veces					
6. 50 a 99 veces					
7. 100 veces o más					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

ESPACIO DEJADO EN BLANCO INTENCIONALMENTE

CDR4. En los pasados 6 meses ¿qué tan frecuente te has inyectado con una aguja que ha sido utilizada por alguna de las personas en tu red social?

del Miembro de la Red

	1	2	3	4	5
0. Nunca					
1. Ocasionalmente					
2. Algunas veces					
3. Usualmente					
4. Siempre					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

CDR5. En los pasados 6 meses, ¿qué tan frecuente esta persona se ha inyectado con una jeringuilla luego que tú te has inyectado?

del Miembro de la Red

	1	2	3	4	5
0. Nunca					
1. Ocasionalmente					
2. Algunas veces					
3. Usualmente					
4. Siempre					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

CDR6. En los últimos 6 meses ¿cuántas veces has usado el cooker, el agua de limpiar la parafernalia, o el algodón luego de que cualquiera de las personas en tu red lo hayan utilizado?

del Miembro de la Red

	1	2	3	4	5
0. Nunca					
1. Ocasionalmente					
2. Algunas veces					
3. Usualmente					
4. Siempre					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

CDR7. En los pasados 6 meses ¿qué tan frecuente te has inyectado tu droga luego de que la hayan mezclado con la jeringuilla de otra persona en tu red?

del Miembro de la Red

	1	2	3	4	5
0. Nunca					
1. Ocasionalmente					
2. Algunas veces					
3. Usualmente					
4. Siempre					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

ESPACIO DEJADO EN BLANCO INTENCIONALMENTE

CRD8. A tu mejor entendimiento durante el pasado mes, ¿qué tan frecuente las personas en tu red social han compartido las jeringuilla con otras personas además de contigo?

del Miembro de la Red

	1	2	3	4	5
0. Nunca					
1. Ocasionalmente					
2. Algunas veces					
3. Usualmente					
4. Siempre					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

CRD9. A tu mejor entendimiento durante el pasado mes, ¿qué tan frecuente las personas en tu red social se han prostituido o han tenido sexo a cambio de drogas?

del Miembro de la Red

	1	2	3	4	5
0. Nunca					
1. Ocasionalmente					
2. Algunas veces					
3. Usualmente					
4. Siempre					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

Intimidad

INT1 ¿Qué tan cercano te sientes de esta persona?

del Miembro de la Red

	1	2	3	4	5
0. Muy distante					
1. Distante					
2. De alguna manera cerca					
3. Cerca					
4. Muy Cerca					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

INT2 ¿Cuán frecuente dirías que te comunicas con esta persona?

del Miembro de la Red

	1	**2**	**3**	**4**	**5**
0. Todos los días (5 veces por semana o más)					
1. 2 – 4 veces por semanas					
2. Una vez por semana					
3. 1 – 3 veces por mes					
4. Menos de una vez al mes					
55 No seguro / indeciso					
99 No contestó					

INT3 ¿Hablarías con esta persona de cosas privadas y muy personales?

del Miembro de la Red

	1	2	3	4	5
0. Sí					
1. No					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

INT4. Si necesitaras $25.00 prestados ¿tú crees que esta persona te los prestaría o daría si los tuviera?

del Miembro de la Red

	1	2	3	4	5
0. Sí					
1. No					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

INT5 ¿Le preguntarías o pedirías ayuda a estas personas si tuvieras problemas de salud tales como VIH/SIDA o hepatitis C?

del Miembro de la Red

	1	2	3	4	5
0. Sí					
1. No					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

INT6 Si tuviera una emergencia ¿esta persona estaría conmigo?

del Miembro de la Red

	1	2	3	4	5
0. Sí					
1. No					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

INT7 Si le preguntase a esta persona, ¿él/ella haría cualquier cosa por ti, si es legal:

del Miembro de la Red

	1	2	3	4	5
0. Sí					
1. No					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

INT8 Si le preguntase a esta persona ¿él/ella haría cualquier cosa por ti aún si no es legal?:

del Miembro de la Red

	1	2	3	4	5
0. Sí					
1. No					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

INT9 ¿Esta persona obtendría drogas para mí?

del Miembro de la Red

	1	2	3	4	5
0. Sí					
1. No					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

INT10. ¿Esta persona obtendría parafernalia y jeringuillas para mi?

del Miembro de la Red

	1	2	3	4	5
0. Sí					
1. No					
55 No seguro / indeciso					
66 No Aplica					
99. No contestó					

¡GRACIAS!

ESPACIO DEJADO EN BLANCO INTENCIONALMENTE

Appendix D: English Questionnaire

Questionnaire # _____

Interviewer # _____

Date/Hour: _____

DEMOGRAPHICS:
Read: "The first set of questions is general questions about yourself".

DEM1. How old are you? (years)

_____

DEM2. What gender do you identify yourself as?
(Only ask about gender if necessary to clarify):

0 Male
1 Female
2 Transgender female
3 Transgender male
55 Unsure
66 Not applicable
99 Refused to answer

DEM3. Where were you born?

1 Puerto Rico
2 USA
3 Other: _____

DEM4. What is the highest level of education you have completed?

0 Did not complete HS / grade school
1 Graduated grade 12
2 Trade school
3 Some University / College
4 Associate Degree
5 Bachellor
6 Other, (specify_____)
99 Refused to answer

DEM5. Over the last year what was the main way you got money to live on? *(circle only one)*

0 Regular work (full, part time or contract)
1 Welfare, EI, pension or other government support
2 Money from family/friends
3 Sex trade/prostitution
4 Dealing or doing drug runs
5 Panhandling
6 Stealing
7 Other, (specify_____)

DEM6. Using your postal code, what part of the city do you live in?

_____

DEM7. Have you moved to Puerto Rico within the past 12 months?

0 No
1 Yes
55 Unsure
66 Not applicable
99 Refused to answer

DEM8 Where were you living before you came to Puerto Rico?

_____

DEM9 Have you been arrested in the last 6 months?

0 No
1 Yes
55 Unsure
66 Not applicable
99 Refused to answer

DEM10 Have you been incarcerated?

0 No
1 Yes
55 Unsure
66 Not applicable
99 Refused to answer

DEM11 How long time was you incarcerated?

_____ Years _____ Months

_____ Days

DEM12 When you were last released?

_____ Years _____ Months

_____ Days

DEM13 Are you HIV +?

0 No
1 Yes
55 Unsure
66 Not applicable
99 Refused to answer

DEM14 Is the HIV serostatus test confirmed?

0 No
1 Yes
55 Unsure
66 Not applicable
99 Refused to answer

DEM15 Date last tested?

_____

DEM16 Are you HCV +?

0 No
1 Yes
55 Unsure
66 Not applicable
100 Refused to answer

DEM17 Is the HCV serostatus test confirmed?

0 No
1 Yes
55 Unsure
66 Not applicable
100 Refused to answer

DEM18 Date last tested?

_____

DEM19 The first time you injected, how old were you?

_____

DEM20 What of the following drugs have you use in your lifetime? (***drug of choice, circle all that apply)***

0 Cocaine (uptown)
1 Morphine
2 Heroin (horse, junk, smack, downtown)
3 Heroin and cocaine (speedball)
4 Heroin mixed with another drug
5 Amphetamines (speed, uppers)
6 Methadone
7 Crack/rock cocaine
8 Methamphetamine (crystal meth)
9 PCP (angel dust)
10 Dilaudid
11 Barbiturates (downers)
12 Ritalin alone
13 Xylacym (horse anestesia)
14 Other, (specify_____)
55 Unsure
66 Not applicable
99 Refused to answer

DEM21 What drug is your favourite to inject? (***circle only oney)***

0 Cocaine (uptown)
1 Morphine
2 Heroin (horse, junk, smack, downtown)
3 Heroin and cocaine (speedball)
4 Heroin mixed with another drug
5 Amphetamines (speed, uppers)
6 Methadone
7 Crack/rock cocaine
8 Methamphetamine (crystal meth)
9 PCP (angel dust)
10 Dilaudid
11 Barbiturates (downers)
12 Ritalin alone
13 Xylacym (horse anestesia)
14 Other, (specify_____)
56 Unsure
67 Not applicable
99 Refused to answer

DEM22 In the past month, how often did you inject (shoot up)? (circle only one)

0 Not at all
1 Once in a while, not every week
2 Regularly, once or twice a week
3 Regularly, three or more times a week
4 Every day (How many times per day _____)

LEFT BLANK INTENTIONALLY

NeSyrCo1. In the last month, how many times have you injected with another person's used needle/syringe??

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

NeSyrCo1b. On those occasions, how often did you rinse it with a combination of full strength bleach and water (i.e, the '2x2x2' method) before you used it?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Every time

NeSyrCo2. In the last month, how many times have you injected with a needle/syringe after another person has already injected some of its contents??

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

NeSyrCo3. In the last month, how many times have you received an accidental needlestick/ prick from another person's used needle/syringe?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

NeSyrCo4a. In the last month, how many times have you re-used a needle/syringe taken out of a shared disposal/sharps container?

0. No times (go to question **NeSyrCo5**)
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

NeSyrCo4b On those occasions, how often did you rinse it only with full-strength bleach before you re-used it?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Every time

NeSyrCo5. In the last month, how many times have you injected a drug that was filtered through another person's filter?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

NeSyrCo6a In the last month, how many times have you injected a drug that was prepared in another person's used spoon or mixing container?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

NeSyrCo6b. On those occasions, how often did you clean the spoon or mixing container before using it?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Every time

NeSyrCo7. In the last month, how many times have you injected a drug prepared with water which had been used by another person?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

NeSyrCo8. In the last month, how many times have you injected a drug which had come into contact with another person's used needle/syringe?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

NeSyrCo9. In the last month, how many times have you wiped your own injection site with an object (e.g, swab, tissue, hanky, towel etc) which had been used by another person?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

2PerCo10a. In the last month, how many times have you injected a drug that you prepared immediately after 'assisting' another person with their injection (e.g, injecting them, holding their arm, handling used needle/syringe; touching their injection site to feel for a vein, to wipe blood away, or to stop bleeding)?

0. No times **(go to question 2PerCo 11)**
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

2PerCo10b. On those occasions, how often did you wash your hands before preparing your mix?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Every time

2PerCo11a. In the last month, how many times have you injected a drug that was prepared by another person who had already injected or assisted someone else's injection?

0. No times **(go to question 2PerCo 12)**
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

2PerCo11b. On those occasions, how often did the person preparing the mix wash their hands before preparing the mix?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Every time

2PerCo12a. In the last month, how many times have you been injected by another person who had already injected or assisted in someone else's injection?

0. No times **(go to question 2PerCo 13)**
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

2PerCo12b. On those occasions, how often did the person injecting you wash their hands before injecting you?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Every time

2PerCo13a. In the last month, how many times have you injected with a needle/syringe which had been handled or touched by another person who had already injected?

0. No times **(go to question 2PerCo 14)**
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

2PerCo13b. On those occasions, how often did they wash their hands prior to handling the needle/syringe that you used?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Every time

2PerCo14a. In the last month, how many times have you touched your own injection site (e.g, to feel for a vein, to wipe away blood, or to stop bleeding) soon after 'assisting' another person with their injection (e.g, injecting them, holding their arm, handling their use needle/syringe; touching their injection site to feel for a vein, to wipe away blood, or to stop bleeding)?

0. No times **(go to question 2PerCo 15)**
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

2PerCo14b. On those occasions, how often did you wash your hands before touching your own injection site?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Every time

2PerCo15a. In the last month, how many times has another person touched your injection site (e.g, to feel for a vein, to wipe away blood, or to stop bleeding)?

0. No times **(go to question SexPra16)**
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

2PerCo15b. On those occasions, how often did the person wash their hands before they touched your injection site?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Every time

SexPra16. In the last month, how many times have you engaged in unprotected vaginal sex with another person *(ie. penetration of the vagina with the penis)*?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

SexPra17. In the last month, how many times have you engaged in unprotected vaginal sex with another person *(ie. penetration of the vagina with the penis*) during menstruation?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

SexPra18. In the last month, how many times have you engaged in unprotected vaginal sex with another person *(ie. penetration of the vagina with the penis)* without lubrication?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

SexPra19. In the last month, how many times have you engaged in unprotected oral sex with another person *(ie. lips and tongue come into contact with the vagina, penis and/or anus)*?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

SexPra20. In the last month, how many times have you engaged in unprotected manual sex with another person *(ie. fingers and hands come into contact with the vagina, penis and/or anus)* during menstruation?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

SexPra21. In the last month, how many times have you engaged in unprotected manual sex with another person *(ie. fingers and hands come into contact with the vagina, penis and/or anus)* after injecting?

0. No times
1. Once
2. Twice
3. 3 – 5 times
4. 6 -10 times
5. More than 10 times

SexPra22. In the last month, how many times have you engaged in unprotected manual sex with another person *(ie. fingers and hands come into contact with the vagina, penis and/or anus)* without lubrication?

0. No times
1. Once
2. Twice
3. 3 – 5 times

NEEDLE SOURCES

NS1. In the last 6 months, have you exchanged needles or gotten new needles at a needle exchange program?

0 No
1 Yes
55 Unsure
66 Not applicable
99 Refused to answer

NS2. In the last 6 months, how many of your needles did you usually get at a needle exchange program?

0 All
1 Most, but not all
2 About half
3 Less than half
4 None
55 Unsure
66 Not applicable
99 Refused to answer

NS3. In the last 6 months, have you usually exchanged your own needles, or does someone else do it for you?

0 Usually do it myself
1 Usually done for me by someone else
55 Unsure
66 Not applicable
99 Refused to answer

NS4. In the last 6 months how easy was it for you to obtain a brand new needle/syringe when you needed one?

0 Very easy
1 Somewhat easy
2 Somewhat difficult
3 Very difficult
55 Unsure
66 Not applicable
99 Refused to answer

LEFT BLANK INTENTIONALLY

SOCIAL NETWORKS

1.) Network members:
Read: This part of the questionnaire intends to assess the relationship between close personal contact and infectious diseases that are transmissible through used syringes, like HIV and hepatitis. I would like to ask you some questions about the people you normally associate with. The Researcher will not ask you for any information that could be used to identify those individuals and any information you provide will be confidential.

First, please think back over the last 30 days about the people with whom you have had more than casual contact[12]. These would be people that you have seen or have spoken to on a regular basis. Most of these close contacts would be people such as friends, family, sex partners, people you inject drugs with, or people you live with.

Let's make a list of these people *(Interviewer - the maximum allowed on the list is 20 people. If the individual reaches 20 people ask them how many additional people they would be able to nominate and note their response on the answer sheet).* **Please use the nature of the relationship for identifies these people. In the case there are more than one just tell me a number after the relationship; for instance Friend-1, Friend-2 etc. Please do not use their names or last names. I will provide a pseudonym (fake name) for each contact (For example if you say spouse I will give her the fake name *María*; if you say brother I will give him the fake name José). We will use these fake names in the list to make sure we the identity of a contact is not disclosed. Remember that we are interested in people that you've had contact with in the last 30 days.**

Interviewer: use the following prompts as needed, to help clients recall their associates.

People that you used drugs with in the last 30 days.
People who you had sex with during the last 30 days.
For subjects who are sex workers: list a maximum of 10 sex partners. If the name of a client is not known they can be listed as unknown1, unknown2, etc. If they have a regular sex partner(s) try to ensure that they are included on the list)
Friends, relatives or other individuals that you feel close to?
People you live with.
People you hang out with.

2.) Type of contact: *Interviewer: Once fake names are listed, please ask the participant the questions listed below and circle the appropriate letter by each name on the following page.*

Questions to ask regarding each of the network members listed on the following page:

1. **Which of these people has injected drugs in the last 6 months:** Enter **Y** (Yes) or **N** (No) or **U** (Unsure)

2. **Not including marijuana use, which of these people has smoked/snorted/inhaled drugs in the last 6 months**: Enter **Y** (Yes) or **N** (No) or **U** (Unsure)

3. **Which of these people has been a sex partner of yours in the last 6 months**: Enter **Y** (Yes) or **N** (No)

4. **What is the gender of each of these people?** Enter **M** Male, **F** female, **TM** transgender male, **TF** transgender female.

5. **What is the age of each of these people?**

6. **What is this person's relationship to you:** Enter **F** (family member), **L** (lover, spouse, girl/boyfriend), **R** (Friend), **C** (Acquaintance/Stranger).

7. **Is this person's Puerto Rican?** Enter **Y** (Yes) **If not specify:_____**

[12] It refers to a conversation that goes beyond the beggary conversation or a hi/bye conversation.

List of network members

Network member #	Network member Identifier (Fake Name.)	IV drug use	Smoke/Snort /Inhale	Sex partner	Gender	Age	Relationship *(Co-workers, dealers, tricks, etc should be categorized as acquaintances unless person considers them a friend)*
1		Y N U	Y N U	Y N	M F TM TF		F L R C
2		Y N U	Y N U	Y N	M F TM TF		F L R C
3		Y N U	Y N U	Y N	M F TM TF		F L R C
4		Y N U	Y N U	Y N	M F TM TF		F L R C
5		Y N U	Y N U	Y N	M F TM TF		F L R C
6		Y N U	Y N U	Y N	M F TM TF		F L R C
7		Y N U	Y N U	Y N	M F TM TF		F L R C
8		Y N U	Y N U	Y N	M F TM TF		F L R C
9		Y N U	Y N U	Y N	M F TM TF		F L R C
10		Y N U	Y N U	Y N	M F TM TF		F L R C
11		Y N U	Y N U	Y N	M F TM TF		F L R C
12		Y N U	Y N U	Y N	M F TM TF		F L R C
13		Y N U	Y N U	Y N	M F TM TF		F L R C
14		Y N U	Y N U	Y N	M F TM TF		F L R C
15		Y N U	Y N U	Y N	M F TM TF		F L R C
16		Y N U	Y N U	Y N	M F TM TF		F L R C
17		Y N U	Y N U	Y N	M F TM TF		F L R C
18		Y N U	Y N U	Y N	M F TM TF		F L R C
19		Y N U	Y N U	Y N	M F TM TF		F L R C
20		Y N U	Y N U	Y N	M F TM TF		F L R C

If the study participant nominates 20 network members, ask them how many additional people they could nominate and enter the number here:

Number of additional network members: _____

3.) <u>Interaction of network members</u>: *Interviewer: Following step 2), transfer the names of all of the network members to the table shown below. For each person listed ask the subject to indicate which of the other individuals on the list that particular person knows.* If the person listed knows other individuals on the list please make a check mark (√) otherwise leave blank.

Identifier of Network Member (Initials/Nickname, etc)	Identifier of Known Relations among Network Member																			
	Person # 1	Person # 2	Person # 3	Person # 4	Person # 5	Person # 6	Person # 7	Person # 8	Person # 9	Person # 10	Person # 11	Person # 12	Person # 13	Person # 14	Person # 15	Person # 16	Person # 17	Person # 18	Person # 19	Person # 20
Person # 1																				
Person # 2																				
Person # 3																				
Person # 4																				
Person # 5																				
Person # 6																				
Person # 7																				
Person # 8																				
Person # 9																				
Person # 10																				
Person # 11																				
Person # 12																				
Person # 13																				
Person # 14																				
Person # 15																				
Person # 16																				
Person # 17																				
Person # 18																				
Person # 19																				
Person # 20																				

4.) <u>Choose members</u>: *Interviewer: Now transfer the names of all injection drug users onto the next part of the questionnaire shown below. If there are more than 5 IDU on the list place them, to a maximum of 5, on the questionnaire in the order the study participant placed them on the network member list.*

<u>Network questions re each contact</u>:
Interviewer: List the 5 network members chosen [remember never use these people's name only nicknames or the initials] as per the above instructions and assign a code to each contact as follows (this information will be used by data entry to identify each contact of a given study participant.

a) List the initials of the contacts chosen from the list under "initials/first name"
b) Enter the subject code from page 1 of the questionnaire on each of the "subject code" lines.
c) Assign a contact code (1 through 5) after the dash

Initial/identifier	Subject code		Contact code (1-5)
_____	_____	—	_____
_____	_____	—	_____
_____	_____	—	_____
_____	_____	—	_____
_____	_____	—	_____

Transfer the "initial/identifier" to a separate sheet of paper so you and the study participant can refer to it.

<u>Example shown below:</u>

Initial/identifier	Subject code		Contact code (1-5)
John	121	—	1
AJ	121	—	2
_____	_____	—	_____
_____	_____	—	_____
_____	_____	—	_____

For the following sections, check the appropriate boxes unless full answer is requested

CONTACT DEMOGRAPHICS

CD1. What is [person]'s relationship to you? ***This is partially a repeat from the initial network member list, but more detailed types of relationships are listed here, so the participant must be asked the question again for the 5 chosen network members.***

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Friend					
1 2 Spouse					
2 Girl/Boyfriend, lover					
3 Ex-lover					
4 Ex-spouse					
5 Mother					
6Father					
7 Brother					
8 Sister					
9 Son					
10 Daughter					
11 Cousin					
12 In-laws					
13 Niece					
14 Nephew					
15 Uncle					
16 Aunt					
17 Other relative					
18 Acquaintance					
19 Stranger					
20 Dealer					
21 Trick					
22. Injecting Partner					
23 Other, specify below					
55 Unsure					
99 Refused to answer					

If "other" is selected above, specify what "other" means in the box below.

Network Member #	Other, specify
1	
2	
3	
4	
5	

CD2. How long have you known [person]?

Network Member #	
1	
2	
3	
4	
5	

CD3. What is the highest level of education [person] has completed?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Graduated grade 12					
1 In grade school now (Grade _____)					
2 Dropped out before grade 12 (grade_____)					
3 Trade school					
4 University					
5 College					
6 Other, specify below					
55 Unsure					
66 Not applicable					
99 Refused to answer					

If "other" is selected above, specify what "other" means in the box below.

Network Member #	Other, specify
1	
2	
3	
4	
5	

CD4. Over the last year what was [person's] main source of income?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Regular work (full, part time or contract)					
1 Welfare, EI, pension or other government support					
2 Money from family/friends					
3 Sex trade/prostitution					
4 Dealing or doing drug runs					
5 Panhandling					
6 Stealing					
7 Boosting					
8 Other					
55 Unsure					
66 Not applicable					
99 Refused to answer					

CD5. What part of the city do they **live in**? Use the first 3 digits of their postal code (preferred) or neighborhood name, if you know it. (**If they live outside of city, ask for name of town or reserve**).

Network Member #	**Postal Code (1st three digits only) or Neighbourhood name**	**Unsure**	**Not app.**	**Refused to answer**
1				
2				
3				
4				
5				

CONTACT INJECTION DRUG RISK

CDR1. To the best of your knowledge, in the past month, how often did [person] shoot up?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Not at all					
1 Once in a while, not every week					
2 Regularly, once or twice a week					
3 Regularly, three or more times per week					
4 Every day					
55 Unsure					
66 Not Applicable					

If "Every Day" is selected above, specify approximately "how many times per day" means in the box below.

Network Member #	Approximately "how many times per day"
1	
2	
3	
4	
5	

CDR2. Approximately, how long have they been injecting drugs? (Record as day, month or year and specify which {d, m or y})

Network Member #	Day, month or year
1	
2	
3	
4	
5	

CDR3. In the past month, how many times have you and [person] combined or pooled money so that you had enough money to buy drugs or injecting equipment?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 0 times, never					
1. 1 time					
2. 2-4 times					
3. 5-9 times					
4. 10-24 times					
5. 25-49 times					
6. 50-99 times					
7. 100 times or more					
55 Unsure					
66 Not applicable					
99 Refused to answer					

CDR4. In the past month, how often have you injected with a needle after [person] used it first?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Never					
1 Occasionally					
2 Sometimes					
3 Usually					
4 Always					
55 Unsure					
66 Not Applicable					
99 Refused to answer					

CDR5. In the past month, how often has [person] injected with a needle after you used it first?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Never					
1 Occasionally					
2 Sometimes					
3 Usually					
4 Always					
55 Unsure					
66 Not Applicable					
99 Refused to answer					

CDR6. In the past month, how often have you used [person's]cooker, rinse water, or cotton after they had already used them?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Never					
1 Occasionally					
2 Sometimes					
3 Usually					
4 Always					
55 Unsure					
66 Not Applicable					
Refused to answer					

CDR7. In the past month, how often did you inject drugs after [person] mixed your drugs in a syringe that they had already injected with?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Never					
1 Occasionally					
2 Sometimes					
3 Usually					
4 Always					
55 Unsure					
66 Not Applicable					
99. Refused to answer					

CDR8 To the best of your knowledge, in the past month, how often has [person] had share needles/syringe with someone besides you?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Never					
1 Occasionally					
2 Sometimes					
3 Usually					
4 Always					
55 Unsure					
66 Not Applicable					
Refused to answer					

CDR9 To the best of your knowledge, in the past month, how often has [person] had done sex work or trade sex for drugs?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Never					
1 Occasionally					
2 Sometimes					
3 Usually					
4 Always					
55 Unsure					
66 Not Applicable					
Refused to answer					

INTIMACY

INT1. How close are you to [person]?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Very distant					
1 Distant					
2 Somewhat close					
3 Close					
4 Very close					
55 Unsure					
66 Not applicable					
Refused to answer					

INT2. How frequently would you say you have contact with [person]?

	Network Member #				
	1	**2**	**3**	**4**	**5**
0 Daily (5 or more times per week)					
2. 2-4 times per week					
3. Once a week					
4. 1-3 times per month					
5. Less than once per month					
55 Unsure					
66 Not applicable					
99 Refused to answer					

INT3. If you needed to borrow $25, would [person] lend or give it to you if they had the money?

Network Member #

	1	2	3	4	5
0 No					
1 Yes					
55 Unsure					
66 Not applicable					
Refused to answer					

INT4. Would you ask [person] for advice or help about health problems like infections, AIDS, or hepatitis C?

Network Member #

	1	2	3	4	5
0 No					
1 Yes					
55 Unsure					
66 Not applicable					
Refused to answer					

INT5. Would you talk to [person] about things that are very personal and private?

Network Member #

	1	2	3	4	5
0 No					
1 Yes					
55 Unsure					
66 Not applicable					
Refused to answer					

INT6. If I had an emergency this [Person] would be there for me.

Network Member #

	1	2	3	4	5
No					
Yes					
Unsure					
Refused to answer					

INT7. If I ask this [Person] would do anything for me if it is legal.

Network Member #

	1	2	3	4	5
No					
Yes					
Unsure					
Refused to answer					

INT8. If I ask this [Person] would do anything for me even if it is not legal.

Network Member #

	1	2	3	4	5
No					
Yes					
Unsure					
Refused to answer					

INT9. If I ask this [Person] would obtain drugs for me.

Network Member #

	1	2	3	4	5
No					
Yes					
Unsure					
Refused to answer					

INT9. If I ask this [Person] would obtain needles or other equipment for me.

Network Member #

	1	2	3	4	5
No					
Yes					
Unsure					
Refused to answer					