

**An Examination of Individual and Social Network Factors that
Influence Needle Sharing Behaviour among Winnipeg Injection Drug Users**

By

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**A Thesis Submitted to the Faculty of Graduate Studies in Partial Fulfillment
of the Requirements for the Degree of**

Master of Science

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Abstract

The sharing of needles among injection drug users (IDUs) is a common route of Human Immunodeficiency Virus and Hepatitis C Virus transmission. Through the increased utilization of social network analysis, researchers have been able to examine how the interpersonal relationships of IDUs affect injection risk behaviour. This study involves a secondary analysis of data from a cross-sectional study of 156 IDUs from Winnipeg, Manitoba titled “Social Network Analysis of Injection Drug Users”. Multiple logistic regression analysis was used to assess the individual and the social network characteristics associated with needle sharing among the IDUs. Generalized Estimating Equations analysis was used to determine the injecting dyad characteristics which influence needle sharing behaviour between the IDUs and their injection drug using network members. The results revealed five key thematic findings that were significantly associated with needle sharing: (1) types of drug use, (2) socio-demographic status, (3) injecting in semi-public locations, (4) intimacy, and (5) social influence. The findings from this study suggest that comprehensive prevention approaches that target individuals and their network relationships may be necessary for sustainable reductions in needle sharing among IDUs.

Acknowledgements

First, I would like to express my gratitude to my Master's Thesis supervisor Dr. John Wylie for his guidance and scientific mentorship. I would also like to thank the other members of my M.Sc. supervisory committee, Dr. Lawrence Elliott and Dr. Maureen Heaman for their thorough and constructive reviews of my research project.

Many thanks to members of the department of Community Health Sciences: Ms. Mary Cheang at the Biostatistical Consulting Unit for her advice pertaining to issues of statistical analyses; Ms. Theresa Kennedy for her kindness, and efficiency and assistance with administrative issues.

I am grateful to the Western Regional Training Centre for Health Services Research for their financial support.

Special thanks to Ms. Arlene Elliott who kind-heartedly took her time to assist me in choosing this research project.

Lots of thanks to my mother Augusta Oduma-Ugoalah, my siblings, and the rest of my family for their support and encouragement.

Finally, and most importantly, I would like to thank my husband Dr. Olawale Sulaiman. His constant love, patience, and understanding provided the inspiration to complete this thesis.

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Chapter 1

Introduction and Study Objectives

1.0 Introduction

The injection of drugs with a contaminated needle has become the most common mode of hepatitis C virus (HCV) transmission in Canada, and is also the second most common route of HIV transmission in the country (Public Health Agency of Canada [PHAC], 2001; PHAC, 2004; Zou, Tepper, & Giulivi, 2001). In fact, over 50% of heterosexual persons infected with AIDS are believed to have become infected through the use of a contaminated needle during injection drug use (IDU) (PHAC, 2004). Statistics alone are quite effective in providing general descriptions of HIV/AIDS and HCV incidence and prevalence rates. However, they fail to comprehensively capture the devastating personal and societal impacts of IDU and its associated risk behaviours.

Indeed, the social breakdown associated with IDU has far-reaching implications. Homelessness, poverty, crime, workplace disruption, family dysfunction, and addiction are just some of the deleterious effects of IDU on society. At the same time however, a history of child abuse, family dysfunction, parental substance misuse, mental health problems, a lack of education, poverty, and homelessness are all social determinants that put people at risk for IDU (Fischer, et al., 2005; Ompad, et al., 2005; Wiebe, 1997).

The Public Health Agency of Canada (2003) identifies twelve key determinants of health for all Canadians. These determinants include income and social status, social support networks, education and literacy,

employment/working conditions, social environments, physical environments, personal health practices and coping skills, healthy child development, biology and genetic endowment, health services, gender, and culture. The twelve determinants are fundamental requirements for optimal health. Sadly, many studies have shown that an absence or deficit of some of these determinants in homes and communities may subsequently lead to unfortunate personal and social consequences such as IDU (Freeman, Collier, & Parillo, 2002; Freeman, Parillo, Collier, & Rusek, 2001; Parillo, Freeman, Collier, & Young, 2001).

Injection drug use has long been recognized as both an individual and group related activity (Zule, Vogtsberger, & Desmond, 1997). Despite this understanding, most of the efforts pertaining to prevention, treatment, and intervention for IDU have tended to focus on individual more so than social factors (Lovell, 2002). Although many of these individual-focused efforts (e.g., needle exchange programs) have had a considerably positive impact on reduction of harm related to IDU, based on disease statistics and other information which pertain to risk behaviours associated with IDU, these efforts are clearly not enough.

For many years now, researchers have established a clear link between the sharing of needles and other injection equipment (e.g., water, cotton filters) and HIV/AIDS and HCV transmission (Koester, Booth, & Wiebel, 1990; Thorpe et al., 2002). While the act of needle sharing (i.e. injecting with a previously used syringe) has proven to present a very high risk for the spread of these bloodborne pathogens (BBPs), many injection drug users (IDUs) continue to engage in this

risk behaviour (Hawkins, Latkin, Mandel, & Oziemkowska, 1999; Wang, Siegal, Falck, & Carlson, 1998). Despite a widespread awareness among IDUs about the risks associated with the sharing of needles, IDUs who inject with used needles seldom take adequate steps to sterilize the needles (Beaudoin, 2004; Jamner, Corby, & Wolitski, 1996). Furthermore, a number of studies have indicated that even with the availability of needle exchange programs and other facilities that provide clean needles at no financial cost, this risk behaviour persists (Ksobiech, 2003; Strathdee, Patrick, Currie, et al., 1997; van Ameijden, van den Hoek, & Coutinho, 1994). These findings suggest that there are several factors, individual and/or social, that influence an IDU's decision to inject with a used needle. Indeed, these factors warrant an in-depth investigation.

In the past several years, researchers involved in IDU studies have started to examine the social networks of individuals to help explain the patterns of disease spread and the risk behaviours that promote the transmission of diseases within groups (Latkin et al., 1995; Montgomery et al., 2002). A burgeoning interest in the application of social network theory to BBP transmission has subsequently led to several studies which have demonstrated that patterns of HIV and HCV transmission among IDUs can more accurately be determined and addressed by investigating the social networks of IDUs (Aitken et al., 2004; Needle et al., 1998).

1.1 Study Purpose and Objectives

While many international studies have assessed both individual and social network factors associated with risk behaviours such as needle sharing among

IDUs, few Canadian studies have been conducted in this field. Given this obvious dearth in data, more Canadian research in this area is needed in order to provide a better understanding of the risks associated with certain types of IDU networks.

Hence, the purpose of my thesis research is to elucidate the individual factors and the social network factors that influence needle sharing behaviour among Winnipeg IDUs. Within the scope of this purpose are three objectives:

1. To examine the individual characteristics of IDUs who engage in needle sharing.
2. To examine the social network characteristics of IDUs who engage in needle sharing.
3. To examine the injecting dyad characteristics that influence needle sharing behaviour between IDUs and their injection drug using network members.

This study uses a quantitative approach to explore the dynamics surrounding needle sharing among IDUs in Winnipeg. The findings derived from my thesis research will provide policy makers, program developers, and service providers with a comprehensive description of individual and network risk factors associated with needle sharing, thereby enabling them to better address this issue. While I understand that needle sharing may never be completely eradicated, my hope is that the harms associated with it will be significantly reduced through the development of health and social services that target individuals and networks that are most at risk.

Chapter 2

Background and Literature Review

This chapter provides an overview of some of the pertinent topics related to IDU and focuses particularly on issues pertaining to needle sharing behaviour among IDUs.

2.0 Bloodborne Pathogens Associated with Injection Drug Use

Over the past several years, infectious disease transmission has become a common topic in health care. This has resulted in diverse challenges for professionals who work in this field. The BBPs discussed in this section, HIV/AIDS and HCV, are the pathogens most commonly associated with the risky use of contaminated injection equipment. As many as 40% of IDUs are in a sexual relationship with a person who does not use injection drugs (Nadeau, 1994). This is a major concern as these pathogens (HIV/AIDS more so than HCV) can be transmitted through sexual fluids (PHAC, 2002; PHAC, 2004).

2.0.1 Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome

There are three main modes of HIV transmission: sexual, intravenous, and mother-to-child (PHAC, 2004). Intravenous transmission can occur through needle sharing during IDU, tattooing, or body piercing (Health Canada, 2001a). Transmissibility begins early after the onset of HIV infection and extends throughout life; it is believed however, that infectivity is high during the initial period after infection and subsequently increases with rising immune deficiency,

the presence of clinical symptoms, and the presence of sexually transmitted infections (STIs) (PHAC, 2004).

Among IDUs, the risk for contracting HIV is higher in females than it is in males (Health Canada, 2004b; Spittal et al., 2002). According to Health Canada (2003), positive HIV test results among adult females that could be attributed to IDU peaked at 48.5% in 1999, but declined to approximately 35% in 2001-2002. The proportion of adult male HIV positive reports that were attributed to IDU remained stable at 23% between 1999 and 2001, and actually dropped to nearly 20% in 2002 (Health Canada, 2003).

Health Canada (2003) asserts that there is a higher proportion of older HIV positive IDUs than there are younger HIV positive IDUs. In 2001-2002 27.1% of HIV positive IDUs were in the 40 to 49 age group, and 25.8% of HIV positive IDUs were in the 30 to 39 age group (Health Canada, 2003). However, results from several recent studies suggest that younger IDUs are at an increased risk for HIV infection now than they were in the past (Health Canada, 2004a; Health Canada, 2004b; Miller et al., 2001; Roy et al., 2003).

Nearly 40 million people were estimated to be living with HIV globally in 2004 (Joint United Nations Programme on HIV/AIDS [UNAIDS], 2004). In 2004, approximately five million people were estimated to have acquired HIV, and three million lives were believed to have been claimed by AIDS (UNAIDS, 2004). At the end of 2002, it was estimated that 56,000 people in Canada were living with HIV (Health Canada, 2004b). When compared to the 49,800 estimate in 1999 (Geduld, Gatali, Remis, & Archibald, 2003), this represents an increase of

approximately 12%. Of the total Canadian HIV cases in 2002, men who have sex with men (MSM) (58% of total) and IDU (20% of total) were the two most common exposure categories (Health Canada, 2004a). The number of new HIV cases in Manitoba between 1999 and 2003 rose by 52.8% (Manitoba Health, 2005b). During that time the majority of all new cases among males and females occurred within the 20 to 39 age category, with a particular increase in the number of female cases between the ages 20 and 49 (Manitoba Health, 2003).

HIV has been legally notifiable to public health officials in all Canadian provinces and territories since May 2003, but is not yet notifiable at the national level (PHAC, 2004). In Manitoba, HIV first became reportable in 1985 (Manitoba Health, 2005b). At that time the majority of individuals infected with HIV were MSM (PHAC, 2004). Men who have sex with men comprised the bulk of HIV and AIDS cases for several years, but by the early to mid-1990s there was a shift towards increased transmission among IDUs (PHAC, 2004). In fact, approximately 34% of the total new HIV infections that occurred in Canada in 1999 were among IDUs (PHAC, 2004). Over the past several years, IDU as an exposure category for HIV has risen quite substantially (Manitoba Health, 2003). In Winnipeg, HIV prevalence among IDUs increased from 2.3% in 1986 to 12.6% in 1998 (Manitoba Health, 1999).

Aboriginal persons are overrepresented in IDU populations (Craib et al., 2003; Health Canada, 2004b; PHAC, 2004) with a higher proportion of Aboriginal HIV and AIDS cases attributable to IDU than in non-Aboriginal populations (Geduld et al., 2002). In 2004, Aboriginals represented 27% of all

new positive HIV cases in Manitoba (Manitoba Health, 2005a), and heterosexual activity with person(s) at increased risk for HIV was the predominant mode of transmission. Between 1998 and 2003, females represented 44.6% of all the positive HIV test reports among Aboriginal people in Canada (PHAC, 2004). In contrast to the non-Aboriginal population, Aboriginal females make up a comparatively larger part of Aboriginal HIV and AIDS cases (PHAC, 2004). Furthermore, the PHAC indicates that youth made up 31.4% of positive HIV test reports among Aboriginal people from 1998 to 2003, which is a higher rate than that of non-Aboriginal persons.

2.0.2 Hepatitis C Virus

The Hepatitis C virus was first identified in 1989 (Choo, Kuo, Overby, Bradley, & Houghton, 1989), and since that time it has been estimated that three to four million persons have been infected globally each year (World Health Organization, 2000). Approximately 60 to 70% of newly infected persons are asymptomatic, and it is estimated that 80% of persons who test positive for HCV progress to chronic and persistent infection (American Academy of Pediatrics [AAP], 2000; Health Canada, 2002; Zou, Tepper, & El Saadny, 2000).

The primary mode of HCV transmission is through infected blood, and HCV is 10 to 15 times more likely than HIV to be transmitted by this route (Heintges & Wands, 1997). Injection drug users, especially those sharing needles with others, are subsequently at greatest risk for HCV infection. Some estimates among this group are as high as 60 to 90% seroprevalance (AAP, 2000). Although sexual contact and mother-to-child transmission are two other scientifically

proven routes of HCV transmission, they both play a relatively smaller role in the transmission of HCV than HIV (AAP, 2000; Canadian Liver Foundation, 2000; Gully & Tepper, 1997).

In 1992, a restricted form of national reporting for HCV began in Canada. However, it was not until 1999 that HCV became reportable in all provinces and territories (Laboratory Centre for Disease Control, 1999). Between 1999 and 2003, with the exception of 2001, there has been a steady decline in the number of newly reported cases (Manitoba Health, 2005b). Forty to forty-nine year old males currently account for nearly 25% of all HCV cases in Manitoba, while among females, 30 to 39 year olds have the highest rates of infection (Manitoba Health, 2005b). Manitoba Health (2005b) further asserts that within the Aboriginal population, females account for nearly half of all cases, whereas in the general population males comprise greater than 60% of all HCV cases. The rate of new infections among the Aboriginal population has been dropping considerably over the years, and in fact in 2003 Aboriginal persons accounted for only 8% of all new HCV cases in Manitoba (Manitoba Health, 2005b).

2.0.3 Human Immunodeficiency Virus and Hepatitis C Virus Co-Infection

Among high risk groups such as MSM and IDUs, co-infections of HIV and HCV are likely (Waldrep, Summers, & Chiliade, 2000). Unfortunately, co-infection modifies the course of disease development, may lead to increased mortality and co-morbidity, and may also reduce the efficacy of treatments or increase the possibility of adverse effects from treatment (Sasadeusz, 2001). It is estimated that 11,914 people are co-infected in Canada, with IDUs accounting for

more than 70% of all cases, and 15% of all cases occurring among MSM who are IDUs (Remis, 2001). Co-infections are believed to be generally high among the Aboriginal population (Alberta Health and Wellness, 2003; Remis, 2001).

2.1 Injection Drug Use

In Canada, the use of injection drugs is a significant public health issue. In many communities, problems attributed to IDU have reached staggering levels, and the majority of deaths and hospitalizations due to drug misuse are attributable to IDU (Manitoba Health, 1999; Wild et al., 2003; Wood et al., 2005). As the rates of IDU have continued to increase, the devastating consequences of addiction and IDU on socially and economically disadvantaged groups such as prisoners, street youth, and homeless people have become more evident (Craib et al., 2003; Kerr et al., 2005).

The social and public health impacts of IDU in Canada are far-reaching and complex. At present, there are no Canadian estimates of the economic costs solely attributable to IDU. However, based on lost productivity due to morbidity and premature death, and health care costs for treating infections caused by injection drugs one can assume that the costs associated with IDU are substantial (Albert & Williams, 1998; Millar, 1998; Single, Robson, Xie, & Rehm, 1998).

Persons who inject drugs are often dependent users with lifestyles that tend to marginalize them from mainstream society, thus making it very difficult to obtain information pertaining to rates and patterns of IDU (Millar, 1998). The illegal nature and the negative societal view of IDU further complicate this issue. As a result of this, national estimates of the extent of IDU in Canada have been

difficult to establish (Health Canada, 2001a). It is estimated however, that there are 125,000 IDUs in Canada, with approximately one-third of whom are female (Single, 2000). Cocaine and heroin are the most commonly injected illicit drugs in Canada (Auditor General of Canada, 2001). The use of cocaine poses a very significant risk for infectious disease, as people who inject this drug often inject as many as 20 times a day (Canadian HIV/AIDS Legal Network, 2005).

Injection drug use and its associated risk behaviours and health and social problems are particularly prevalent in some marginalized and vulnerable populations in Canada. These populations include inmates in correctional facilities, street youth, women, Aboriginal persons, men who have sex with men, and sex trade workers (Health Canada, 2001b).

2.1.1 Inmates

There is a high incidence of IDU and related bloodborne disease among inmates in prisons (Calzavara, Myers, Milson, Schlossberg, & Burchell, 1997; Correctional Services Canada, 1999). While this in itself is a cause for concern, an additional problem is that large numbers of inmates subsequently leave the prison system and enter the general community at a revolving pace. This thereby increases the likelihood that BBPs will spread within the prison setting and society at large (Canadian HIV/AIDS Legal Network, 2005). Moreover, nearly 30% of inmates interviewed in a study conducted by Hankins et al. (1995) indicated that they had engaged in IDU while incarcerated over the past 12 months, and 64% of these individuals reported sharing needles due to an inaccessibility to clean syringes. As there is an overrepresentation of Aboriginal

people in correctional facilities, the problems of IDU among Aboriginal people and inmates have become interrelated (Canadian HIV/AIDS Legal Network, 2005). Furthermore, recent surveys indicate that Aboriginal inmates are more likely to inject drugs than non-Aboriginal inmates (Correctional Service Canada, 1996; Rothon, Strathdee, Cook, & Cornelisse, 1997; Statistics Canada, 2005).

2.1.2 Street Youth

Street youth are children and adolescents who have become socially dislocated from their mainstream counterparts and who experience periodic or chronic homelessness (Hagan & McCarthy, 1997; Roy et al., 2004). It is widely believed that physical, emotional, and/or sexual abuse is a main contributing factor to this lifestyle (Kufeldt & Nimmo, 1987; Noell, Rohde, Seeley, & Ochs, 2001; Whitbeck, Hoyt, & Ackley 1997). Furthermore, street youth are at high risk for a variety of physical and mental health problems (DeMatteo, 1999). Rates of IDU are particularly high among the street youth population (Ochnio, Patrick, Ho, Talling, & Dobson, 2001; Roy et al., 2000), and the likelihood of HIV infection is related to unemployment and engaging in prostitution (Martinez et al., 1998; Weber, Boivin, Blais, Hayley, & Roy, 2002). Researchers have shown that among street youth who inject drugs, needle sharing and unsafe sexual practices are common (Clatts, Davis, Sotheran, & Atilasoy, 1998; Roy et. al., 2003).

2.1.3 Women

Women, though less likely to engage in IDU than men, represent a vulnerable population in many ways (Health Canada, 2001b). Physiologically, women are more susceptible to the transmission of STIs (Health Canada, 1998).

In addition to this, many researchers have noted that female IDUs often have less power in their relationships with men, thereby making it more difficult for them to negotiate safer sex practices (Amaro, 1995; Gillis, 1999; Gollub, Rey, Obadia, & Moatti, 1998).

2.1.4 Aboriginal Persons

The extent of IDU among Aboriginal people is not known, however some studies have found significantly higher rates of drug misuse among this population (Gfellner & Hundelby, 1995; Health Canada, 2001a; Manitoba Health, 1999). According to Single, Van Truong, Adlaf, and Ialomiteanu (1999), Aboriginal Canadians have many social disadvantages frequently associated with drug misuse. These include poverty, low education, unstable family structure, physical abuse, and poor social support networks. Discrimination, the after-effects of residential schools, barriers to health care, and the lack of culturally sensitive or appropriate services have either precipitated or exacerbated these social disadvantages (Canadian HIV/AIDS Legal Network, 1999).

The Canadian HIV/AIDS Legal Network further contends that the cumulative effect of this is that Aboriginal people tend to have a shorter life expectancy, and therefore Aboriginal communities tend to have more young people than other communities. In addition to this, substance abuse has proven to be a major factor underlying the high rate of death from accidents and suicide among Aboriginal persons (Single et al., 1999). In some studies that have reported the ethnicity of clients in needle exchange or drug treatment programs, the proportion of Aboriginal clients have ranged from nearly 30% to 64% at these

facilities (Saskatchewan Alcohol and Drug Abuse Commission, 1993; Strathdee et al., 1997). Injection drug use is one of the main modes of HIV transmission in the Aboriginal community (Health Canada, 2001b). In fact, 58.3% of all AIDS cases among Aboriginals in 2003 were attributed to IDU; this is a drastic increase from 1993 wherein only 10.9% of AIDS cases among this population were due to IDU (PHAC, 2004). These national trends in HIV/AIDS and IDU among Aboriginal Canadians are also reflected in provincial data (Craib et al., 2002; Craib et al., 2003; Guenter, Fonseca, Nielsen, Wheeler, & Pim, 2000; Findlater et al., 2000).

2.1.5 Men Who Have Sex with Men

Men who have sex with men who misuse drugs may be at particular risk for HIV and other infections, as being under the influence of a substance can sometimes lead to engaging in unsafe sexual practices such as unprotected anal sex (Health Canada, 2001b). Several studies have discovered a high rate of unprotected sex in conjunction with drug use, and an apparent preference for having sex when under the influence of drugs (Des Jarlais, 1997; Jackson et al., 2002; Rhodes et. al., 1999). More troubling however, is that there is evidence that indicates that MSM who use illicit drugs are more likely to engage in risky sexual practices with non-regular sexual partners than with their steady partners (Seage et al., 1998). Overall, MSM who are also self-identified IDUs is the population at highest risk for HIV/AIDS infection in Canada (Health Canada, 2001a).

Nevertheless, it is important to note that IDUs, regardless of their sexual orientation, are more likely to engage in unsafe sexual practices and have a high

prevalence of STIs (Poulin et al., 2001; Ross, Gold, Wodak, & Miller, 1991; Ross, Hwang, Zack, Bull, & Williams, 2002). Factors contributing to a high risk of STIs include exchange of sex for drugs, high rates of commercial sex work, high lifetime number of sexual partners and partner change, and high lifetime prevalence of STIs (Bradshaw, Pierce, Tabrizi, Fairley, & Garland, 2005; Van den Hoek, 1997). Bradshaw et al. suggest that drug use may make IDUs less aware or concerned about STIs, may increase the threshold for attending health services, and standard STI control programs generally do not reach IDUs.

2.1.6 Sex Trade Workers

People who inject drugs and engage in unsafe sexual practices represent a link by which HIV can spread from IDUs to people who do not use injection drugs (Health Canada, 2001b). Male and female sex workers are a high risk population due to the fact that their work involves a large number of sexual contacts with a high number of people who are potentially infected with communicable diseases. A study of Vancouver street youth concluded that although male sex workers were no more likely to engage in risky sexual behaviour than other MSM, they were at a higher risk of HIV infection because of the frequency that they engage in sex and IDU, and because they often have unstable living conditions (Miller et al., 1997). Female sex trade workers are at higher risk of HIV infection than other females because they are often pressured to agree to unsafe sex oftentimes in order to support a drug habit (Health Canada, 2001a).

2.1.7 Polydrug Use

Polydrug use is a particularly high risk behaviour among IDUs. Several studies have noted that cumulative multiple drug use is associated with poorer physical health, greater likelihood of addiction, and other social and mental health problems (Bachman & Peralta, 2002; Kendall, Sherman, & Bigelow, 1995; Leri, Bruneau, & Stewart, 2003; Schensul, Convey, & Burkholder, 2005; Wang, Collins, DiClemente, Wingood, & Kohler, 1997). In fact, some studies have identified polydrug use as an independent predictor of needle sharing and drug overdose (Powis et al., 1999; Strathdee, Patrick, Archibald, et al., 1997). Further to this, a study completed in France demonstrated that 85% of attendees at a needle exchange program were polydrug users (Valenciano, Emmanuelli, & Lert, 2001). Little research that pertains to the direct consequences of polydrug use on an IDU has been conducted. However, it is quite clear from the studies that have been conducted that this area merits further exploration by researchers.

2.1.8 Recent Manitoba Research

In 1998, the Winnipeg Injection Drug Epidemiology (WIDE) study gathered extensive information about the individual risk behaviours of IDUs (Manitoba Health, 1999). In the study, 608 self-identified IDUs participated in an in-depth interview, and those who provided consent were tested for HIV. WIDE researchers found that while most participants made efforts to reduce the risk of BBP transmission during injection, a significant number of participants continued to engage in risky behaviours such as injecting with a used needle (42% of participants). Of the participants who reported that they had cleaned a used needle

prior to injecting with it, 56% stated that they used only water to do so. More troubling however, is the study discovered that the HIV prevalence rate among Winnipeg IDUs had increased remarkably within just a few years; during the period of 1986-1990, the HIV seroprevalance among IDUs was estimated to be 2.3%, but by 1998 the estimated seroprevalance had risen to 12.6%.

Participants who reported a history of needle sharing, cocaine as their most frequently injected drug, and a history of being in the sex-trade all had the highest rates of HIV infection. However, the highest HIV rates were found to occur among male participants between the ages of 25 and 29 and males who reported ever having engaged in sex with other men. In addition to this, a significant proportion of participants reported that they never used a condom with a regular sex partner (60% stated “never”) or a casual partner (30% stated “never”). Cocaine (reported by 59.6% of participants) far surpassed heroin (reported by 9.3% of participants) as the injection drug of choice.

While there was a nearly equal proportion of males and females in this study, 55% and 45%, respectively, on average, female participants were younger than their male counterparts and had most recently begun using injection drugs. Finally, Aboriginal persons were disproportionately represented in the WIDE study with 65.8% of participants self-identifying as Aboriginal. Among the Aboriginal participants in this study, the proportion of males:females was nearly 2:1, whereas the ratio of males:females in the non-Aboriginal group was approximately 1:1.

Although the WIDE study provided a good general description of the IDU population in Winnipeg, it did not investigate the various types of IDU networks that exist in the city.

In 1999, 320 Winnipeg street youth between the ages of 14 and 24, were interviewed as part of a national study titled, the Enhanced Surveillance of Sexually Transmitted Diseases among Canadian Street-Involved Youth Study. Beaudoin (2004) describes the findings of phase two of the Winnipeg component of this study in a report titled, “Results from Phase II of the Enhanced Surveillance of Sexually Transmitted Diseases among Winnipeg Street-Involved Youth Study”. According to Beaudoin, the objectives of the study were to gain a better understanding of STI incidence among street youth, and to ascertain the behavioural and social impacts that place them at risk for infection; therefore, some of the findings of the study pertained to the use of injection drugs among youth in Winnipeg.

While only 7% of participants reported injecting drugs in the previous two months, 21% of these participants reported injecting with a used needle. In addition to this, participants who reported a high rate of alcohol consumption were more likely to frequently inject with used needles, and less likely to use condoms when having sex. Interestingly, the study found that the lower a participant’s perception of risk for contracting a STI, the more likely they were to not inject with a used needle. Finally, when compared to their non-Aboriginal counterparts, Aboriginal participants reported less use of injection drugs and less instances of injecting with used syringes.

2.2 Social Network Theory

Social network analysis is both a theoretical and methodological approach. In terms of theory, social network analysis extends and complements traditional social science by focusing on the causes and consequences of relations between people and among sets of people rather than on the features of individuals (Wellman & Berkowitz, 1988). In terms of method, social network analysis focuses on the measurement of relationships between people (Duck, 1993).

According to Scott (2000), social network analysis is based on an assumption of the importance of relationships among interacting units. The social network perspective encompasses theories, models, and applications that are expressed in terms of relational concepts or processes (Wasserman & Faust, 1994). Network analysis stems from post-World War II developments in British social anthropology wherein a great deal of attention was given to cultural systems of normative rights and duties that prescribe proper behaviour within bounded groups (e.g., tribes, villages, and work units) (Wellman & Berkowitz, 1988).

By the 1950s, anthropologists shifted attention away from cultural systems toward structural systems of concrete ties and networks and began developing social network concepts more systematically (Wellman & Berkowitz, 1988). With the advent of computers in the 1970s, the study of social networks began to advance as an interdisciplinary specialty (Scott, 2000). Today, social network analysis has found important applications in organizational behaviour, inter-

organizational relations, the diffusion of information, social support, and the spread of communicable diseases (Scott, 2000).

According to Wasserman and Faust (1994), a social network is a group of individuals connected by some form of social relationship such as friendship, kinship, or business association. Scott (2000) asserts that the unit of analysis in network analysis is not the individual, but an entity consisting of a collection of individuals and the linkages among them. Scott further states that network methods focus on dyads (two individuals and their relationship), triads (three individuals and their relationships), or larger systems (subgroups of individuals, or entire networks). There exist two distinct types of social network analysis: sociometric and egocentric network analysis (Wellman & Berkowitz, 1988).

2.2.1 Sociometric Network Analysis

Sociometric network analysis arose from sociology and involves the quantification of relationships between people within a defined group (e.g. the residents of a town) (Wasserman & Faust, 1994). By representing relationships as numbers, various mathematical and statistical analyses can be applied.

Sociometric network analysis is based on the premise that members of the same group would interact more with each other than a randomly selected group of similar size would (Maguire, 1983). According to Maguire, the objective is to measure the structural patterns of those interactions and determine how those patterns explain certain outcomes.

A matrix with rows and columns representing the members of the group being studied, and each cell of the matrix containing a measurement of some tie

between those members is the basis for sociometric network analysis (Wasserman & Faust, 1994). Most sociometric network data is derived by asking people about their interactions (Scott, 2000). When groups are small (i.e. between 20 and 150 people) a researcher can list the members' names and ask each person how well they know each group member (e.g., on a scale of 0 to 5), or how often they interact with each group member (e.g., once a week, once a month, or never) (Wasserman & Faust, 1994).

In large groups (i.e. more than 150 people) it is not possible for members to accurately comment on each group member; therefore a researcher may ask participants to provide the names of five or ten people in the group with whom they exchange a particular resource or with whom they feel close (Wasserman & Faust, 2000). Through the use of these methods, a member-by-member matrix can be formed, in which each cell represents the strength of relationship between members of the group (Breiger, 1991).

2.2.2 Egocentric Network Analysis

The roots of egocentric network approach can be traced to anthropology (Boissevain, 1979). This type of network is comprised of the people that a person knows (e.g., spouses, children, friends, work colleagues, classmates) (Wellman & Berkowitz, 1988). From this perspective, each person has their own network of relationships that transcends many groups and contributes to their behaviours and attitudes (Barnes, 1972). As its focus is on the networks of individuals, the egocentric network approach has been more prone to studies of community than the sociometric network approach (Wasserman & Faust, 1994).

Typically, egocentric network analysis does not focus on network structure or pure models of behaviour (Scott, 2000). Rather, its strength is in capturing the diversity of the social environment through the application of standard survey sampling techniques which allow for results to be generalized (Wellman & Berkowitz, 1988). A list of a person's network members, and sometimes the relationship among all pairs of those members, is often what is derived from a standard survey used for egocentric network research (Wasserman & Faust, 1994).

Researchers involved in egocentric network research must rely solely on a participant's description of their relationships with network members, as researchers do not interview each participant's network members (Scott, 2000). These researchers often have participants indicate how they know each of the network members, ask respondents to rank the strength of their relationship with each network member (e.g., on a scale of 1 to 5), and ask questions which pertain to demographic information about each network member (Wasserman & Faust, 1994).

Most analyses of egocentric network data summarize the composition of the network as a set of variables that become attributes of the respondent (e.g., percentage of their network that are family; percentage of their network from which they can borrow money) (Jones, Conway, & Steward, 2001). Egocentric network analysis has mostly been used in research on estimates of personal network size and has been very effective in research on the size of hard-to-count populations (e.g., homeless persons, IDUs) (Wasserman & Faust, 1994).

2.2.3 Risk-Potential Networks

According to Friedman and Aral (2001), a risk-potential network is a pattern of risk-potential linkages among a group of people, wherein a risk-potential linkage is a tie between two people that can spread infection if an infectious agent is present. Friedman and Aral believe that there are basic risk-potential linkages for BBPs and STIs. For example, a risk linkage for BBPs is injecting drugs together, whereas for STIs a risk linkage is engaging in sexual intercourse together. Both behaviours must not necessarily involve meaningful risk of HIV transmission (e.g., two people injecting with completely separate equipment and drug mixtures); however Friedman and Aral assert that it can often be useful to think of sex and IDU as general risk linkages.

Most risk-potential networks are social linkages; however risk can occur without social interaction (e.g., injecting drugs with a used syringe found in an alley) (Friedman & Aral, 2001). Sociometric risk-potential networks can spread infections through a community (e.g., from IDUs to non-IDUs) (Bell, Lee, Yang, & Heath, 2001). Egocentric risk-potential networks are the proximate potential sources of infections, therefore the effects of larger-scale networks on individuals occur in part through their egocentric networks (Bell et al., 2001). Essentially, egocentric networks may mediate sociometric network effects on an individual (Wasserman & Faust, 1994).

When assessing the impacts of social networks on disease transmission, it is practical to incorporate the concept of risk-potential network analysis. Several social network researchers have approached the field of sexual networks and the

spread of STIs by deriving their data from contact tracing (Cabral, 2003; De, Singh, Wong, Yacoub, & Jolly, 2004; Rothenberg et al, 1998; Wylie & Jolly, 2001). According to Friedman (1996), contact tracing involves the identification of sexual partners by an index case who presents at a medical facility with a STI. The sexual partners are contacted for testing and treatment, and in turn the partners of the partners are then identified and contacted; the pattern continues until all potentially infected partners are identified and treated. Indeed, many researchers have proven that the application of this network approach has been valuable in providing information that may help control the transmission of STIs (Jolly & Wylie, 2001; Rothenberg, Baldwin, Trotter, & Muth, 2001; Wylie, Cabral, & Jolly, 2005).

2.2.4 The Role of Social Networks in Infectious Disease Transmission

A highly cited paper by Jolly, Muth, Wylie, and Potterat (2001) compared the network data produced via contact tracing procedures for people infected with chlamydia in two North American cities: Winnipeg, Manitoba and Colorado Springs, Colorado. In both cities, there was comparable variation in network size; however, despite a higher number of contacts in Colorado Springs, larger networks were identified in Winnipeg. Another interesting finding in this study was that in both cities, male cases and contacts were older than their female counterparts.

Although social network analysis has only recently been applied to research on infectious disease transmission, there have been many studies conducted on BBP transmission and the networks of IDUs. An early paper by Klovdahl (1985)

discussed the potential usefulness of a network approach in evaluating the spread of AIDS and other infectious diseases, and also discussed how this approach could be applied to develop strategies to limit the spread of infectious diseases through personal relationships.

While a number of studies have identified a general linkage between HIV or STI prevalence and network configuration, Rothenberg et al. (2001) believe that a comprehensive hypothesis on the specific linkage of behaviour, networks, and transmission has yet to emerge. Nevertheless, many researchers have proven that social networks have the ability to spread both positive and negative messages, norms, social support, and influence through a community (Montoya, 1998; Zapka, Stoddard, & McCusker, 1993).

A longitudinal study that examined the effects of illicit drug use in a social network on individual heroin and cocaine use found that illicit drug use by members of the social network was a strong predictor of continuing heroin and/or cocaine use by 69% of study participants (Schroeder et al., 2001). Another study by Valente and Vlahov (2001) found that 78.3% of study participants that reported using a syringe after someone else, also reported sharing with people who they considered to be close friends. These participants who reported sharing used syringes were far less likely to share syringes with people whom they did not consider to be close friends. This concept of selective risk taking by IDUs in their social networks was also present in the results of studies conducted by Thorpe, Bailey, Huo, Monterosso, and Ouellet (2001), and Wang et al. (1998).

A study by Curry and Latkin (2003) which in part looked at gender differences and social network correlates of arrest among IDUs in Baltimore, Maryland found that for females, having a higher number of females in their networks was significantly associated with a lower frequency of arrests; for males, having a higher number of females in their networks was not associated with less arrests. For females, having at least one heroin injector in their personal network was associated with an increased frequency of arrest, whereas for males the direction of the association was opposite.

A study by Gollub et al. (1998) examined how risk-taking behaviours differed among female and male IDUs. Some of the significant findings in this study are: women were more likely than men to report non-use of condoms with a main partner (31% vs. 12%); women were more likely than men to have injected with a partner at last injection (39% vs. 12%); and women were less likely than men to sterilize used needles prior to using them for injection (4% vs. 16%). The results of this study along with the previous results described by Curry and Latkin (2003) point to a need for more research on the impact of gender on social network composition.

Suh, Mandell, Latkin, and Kim (1997) examined the social network characteristics of IDU HIV-risk behaviours among IDUs in Baltimore, Maryland and found that a substantial proportion of drug sharing network members also provided social support often because of family and sexual partner relationships. Furthermore, IDUs with larger drug networks that also provided social support were more likely to share needles with network members, whereas IDUs with

larger drug networks that did not provide social support were more likely to inject in commercial settings (e.g., shooting galleries). The researchers' explanation for this finding is that needle sharing is often seen as an act of close social bonding, therefore IDUs might be concerned that they would lose social support from network members if they chose to not share needles.

A study by Latkin et al. (1995) demonstrated a positive impact of social supports on a social network. Study participants who had reported having a partner (i.e. spouse, lover, or sexual partner) reported a reduced frequency of injection. The authors propose that this may be attributed to positive emotional support, the presence of a daily routine, or less time spent with other drug using peers.

A study conducted by Hoffmann, Su, and Pach (1997) examined changes in the social networks of IDUs in Chicago, Illinois and Washington, District of Columbia. The findings showed significant movement of network members over time and also indicated that frequent movement of members into a network significantly predicted a higher likelihood of risky injection practices over time. The authors suggest that IDUs in more chaotic networks often move around to different groups and are very willing to accept new members into their networks with the hope that a new source of money or drugs will be available. Hoffman, et al. further state that this results in a continuous increase or uncertain fluctuation in risk behaviours.

Latkin, Forman, Knowlton, and Sherman (2003) examined the effect of norms on the social networks of disadvantaged drug users. They found that

having a greater number of network members with whom one can talk about health matters is significantly associated with having a higher proportion of friends who talk about and encourage condom use. Furthermore, they found that participants who reported larger financial support networks were also more likely to report that a large number of their friends use condoms. Conversely, IDUs were more likely than non-IDUs to report that none or few of their friends used condoms. A study by Jamner et al. (1996) also found that norms play an important role in harm reduction behaviours among IDUs. Their research found that both frequency of bleaching needles and intention to bleach needles was significantly associated with perceived social norm.

The data used for my thesis research is from the first study of social networks of IDUs ever conducted in Manitoba, which was completed in 2001. Clearly, there is a need for more research to be done in this field, as previous evidence has demonstrated that the information that it will provide is important.

2.3 Summary

This review of the literature has demonstrated a direct link between infectious disease transmission and the social network characteristics of IDUs. While the individual characteristics of IDUs play an important role in the types of risk behaviours that they engage in, these characteristics should not be examined in isolation of an IDU's personal network. Issues of stigma and discrimination are some of the factors that precipitate risk behaviours such as needle sharing. Furthermore, needle sharing poses a major public health concern not only for IDUs but for non-IDUs as well. Most of the studies on the effects of social

networks on needle sharing have not been conducted in Canada; this makes it difficult to extrapolate findings to Winnipeg IDUs. Therefore, it is imperative that the features of the social networks of Winnipeg IDUs be examined.

Chapter 3

Research Design and Methodology

The data analyzed in my Master's thesis is from an earlier study by Wylie, Jolly, Elliott, Heaman, and Dawood (2002). This previous study is titled, Social Network Analysis of Injection Drug Users (SNAIDU). I will first briefly describe the SNAIDU research methodology prior to discussing the methods employed in my thesis research, which consists of secondary analysis of this data. For a more comprehensive description of the methodology used for SNAIDU, refer to the report by Wylie et al. (2002) titled, "The Winnipeg Social Network Injection Drug Use Study: Summary of Results".

3.0 Methodology for Social Network Analysis of Injection Drug Users

The methodology described in this section is derived from the aforementioned report by Wylie et al. (2002).

3.0.1 Research Design

The SNAIDU study used both a quantitative and qualitative research design. The quantitative component involved the administration of a cross-sectional questionnaire that collected individual related information and egocentric network information, and also consisted of a laboratory based molecular analysis of HCV positive blood samples obtained from participants. For the molecular analysis, the blood samples were not collected from study participants at the time of the study. Rather, the researchers relied on previously collected blood samples available at the Cadham Provincial Laboratory (CPL) in Manitoba. These blood samples had originally been used to diagnose the HCV

status of the study participants, and all testing was done through routine Manitoba public health procedures. In Manitoba, all of the testing of blood for HCV is conducted at CPL, and the blood samples that are tested are maintained at the laboratory for an extended period of time. Therefore, the molecular analysis for SNAIDU could only be performed if a study participant chose to provide researchers with his or her name so that researchers could retrieve their previously collected blood sample from CPL. The qualitative component was comprised of various interviews and focus group discussions. Since my thesis research involves the use of only the quantitative questionnaire data from SNAIDU, I will not discuss the methodology used for the molecular analysis, nor will I discuss the methodology used for the qualitative component of SNAIDU.

3.0.2 Study Participants

SNAIDU researchers had initially planned to have participants in the study that both self-identified as having used injection drugs within the previous 12 months and tested positive for HCV. As part of this plan, Winnipeg Regional Health Authority public health nurses (PHNs) who received laboratory confirmed HCV positive case information contacted the newly diagnosed HCV positive individuals for the purposes of conducting contact tracing and providing information and support. During this initial contact, the PHN informed these individuals about the SNAIDU study and asked each individual if he or she had engaged in injection drug use within the previous 12 months; individuals who responded affirmatively to this question were referred to the study. The researchers had expected to recruit 155 HCV positive IDUs through the

implementation of this approach; however very few individuals admitted to the use of injection drugs within the previous 12 months. The PHNs were therefore unable to refer a sufficient number of individuals to the study.

Hence, a new recruitment strategy that involved extensive advertising and a greater involvement by the study nurse was implemented. The study nurse (who has a considerable amount of experience working with members of the target population) was responsible for placing recruitment posters in community clinics, walk-in clinics, drop-in centres, and other locations that she knew were frequented by potential study participants. An advertisement about the study was also placed in a free weekly information sheet prepared for members of the SNAIDU study target population.

This novel recruitment approach proved to be more successful than the previous method, as it resulted in the recruitment of 156 study participants between the ages of 16 and 53. Participant enrolment and questionnaire administration by the study nurse commenced in the winter of 2000 and ended in the summer of 2001. Each participant received a \$20 cash honorarium for their involvement in the study. All participants self-identified as having used injection drugs within the previous 12 months, and 133 participants reported being HCV positive; the remaining participants were either not asked about their HCV status, were unsure about their HCV status, or reported being HCV negative. Of the 156 participants, one chose to not provide information about his or her social network. A total of 1,542 network members were identified by the 155 study participants who did provide information about their social networks.

3.0.3 Instrumentation

The study nurse used a standard egocentric questionnaire for all study participants (see the Appendix for the questionnaire). The questionnaire consisted of an individual-focused section, and a section pertaining to each participant's egocentric social network. The individual-focused section asked the study participants questions to ascertain information about individual demographics and individual drug use behaviour. The social network section collected information about every person that each participant identified as having more than casual contact with in the previous 30 days (i.e. close personal contacts). These contacts included friends, relatives, lovers, spouses, or any individuals whom the participants perceived that they were close to. Each study participant was limited to naming a maximum of 20 contacts or *network members*.

When transferring a contact's name to a list of network members, the study nurse was careful to ensure that name was not duplicated on the list (i.e. a contact name being added to a list of network members more than once). Study participants were asked to provide demographic information, social influence information, injection drug risk information, and sexual contact information about each contact identified on their list of network members. Participants were not required to disclose their own names or the names of their network members to the study nurse. According to Wylie et al. (2002), few participants did provide personal nominal information as the majority of participants chose to not take part in the in the molecular aspect of the study.

3.0.4 Data Analysis Procedures

Wylie et al. (2002) identified six objectives of the SNAIDU study; they are as follows:

1. Describe the particular context of the social support received from the network.
2. Explore the influence of the IDU's social network on his/her risk and risk reduction behaviours related to transmission of HCV and HIV.
3. Understand the meaning of the drug culture of IDUs, including the rules and rituals related to drug use and related health and social beliefs.
4. Explore interventions/strategies that IDUs and people working with IDUs perceive as having the potential to reduce risk behaviours.
5. Explore the characteristics of the various distinct social networks for IDUs in Winnipeg.
6. Characterize the genotypic diversity of HCV isolates infecting IDUs in Winnipeg and correlate that information with social data. (p. 2)

In order to address these objectives, descriptive statistical analyses and univariate statistical analyses, which included chi-square tests and Fischer's exact tests, were conducted on the data.

3.1 Methodology for Thesis Research

My thesis research is based on the previously collected SNAIDU data.

3.1.1 Research Design

The research conducted for this study is a secondary analysis of the cross-sectional quantitative egocentric questionnaire data collected by SNAIDU.

Secondary analysis involves the utilization of existing data collected for the purposes of a prior study, in order to pursue a research interest which is distinct from that of the original work (Thorne, 1990). According to Szabo and Strang (1997), this form of analysis is efficient and allows for researchers to extend the scope of their study considerably.

This study involves a quantitative examination of the previously collected individual and network data with the specific goal of answering a question that was not directly addressed in the SNAIDU research: “What are the individual and social network characteristics that influence needle sharing behaviour among Winnipeg IDUs?” I employ a correlational research design to determine these factors. “Correlational studies examine relationships among variables. The examination can occur at several levels. The researcher can seek to describe a relationship, predict relationships among variables, or test the relationships proposed by a theoretical proposition” (Burns & Grove, 2001, p. 256). This method permits a researcher to analyze the relationships among a large number of variables in a single study (Spector, 1981).

3.1.2 Study Participants

The data elicited from all 156 SNAIDU participants is used in this study. Refer to section 3.0.2 of this chapter for a detailed description of the study participants.

3.1.3 Instrumentation

The individual and network related questions answered by SNAIDU participants are available in the Appendix.

3.1.4 Data Analysis Procedures

The data was analyzed to address my research purpose and objectives. Prior to beginning data analysis, I first assessed the data set for errors that may have been made during data entry. This process, often referred to as ‘data cleaning’, ensured that the data set used for my research was suitable for statistical analyses. The original SNAIDU data set was entered into Microsoft Excel statistical software by the SNAIDU researchers. However, I had decided that it would be most efficient for me to use Stata statistical software (version 8) to conduct all of my statistical analyses, so I transferred the entire SNAIDU data set from Microsoft Excel to Stata. In addition to this, I coded the questionnaire data by assigning numerical values to each of the categorical responses provided on the questionnaire (e.g., A=0, B=1).

Some continuous variables (e.g., age) were recoded as categorical variables. The dependent variable used in all of the various components of my statistical analyses is a categorical binary outcome of “yes” and “no” coded as 1 and 0, respectively. If a response of “unsure” was provided as an answer to a question on the questionnaire, then this response was excluded from statistical analyses. An alpha level of .10 (i.e. $p < .10$) was used for all statistical tests. The significance level was set at $p < .10$ because when compared to previously conducted studies, the sample size used in this study is small. Additionally, this study is exploratory in nature, therefore in order to generate appropriate hypotheses a less stringent alpha level was required.

The first two objectives of my study were (a) to examine the individual characteristics of IDUs who engage in needle sharing, and (b) to examine the social network characteristics of IDUs who engage in needle sharing. Descriptive statistical analyses were first conducted to provide a description and summary of the individual data and the network data. I then conducted univariate logistic regression analyses to assess the association between individual related variables and needle sharing, and network related variables and needle sharing. Finally, variables that were significant in the univariate analyses were entered in multiple logistic regression models (that controlled for potential confounding variables) to test for significant associations between individual related variables and needle sharing, and network related variables and needle sharing. Pearson's goodness-of-fit test was conducted on each final multivariate model, and incremental tests for significance were used to assess effects of interaction terms.

Needle sharing behaviour by study participants was the dependent variable used to assess the first two study objectives. This variable measures whether or not a study participant has ever engaged in needle sharing. In terms of determining the individual factors associated with needle sharing, the independent variables were based on the personal characteristics of the study participants as provided on the completed study questionnaires. The independent variables that were used to ascertain the network factors associated with needle sharing were derived by condensing each participant's social network data (e.g., presence of a network member who has ever injected drugs with a used needle).

The final objective of my research was to examine the injecting dyad characteristics that influence needle sharing behaviour between IDUs and their injection drug using network members. This objective was achieved by examining the information that the participants provided about each of their injection drug using network members. Each relationship between study participants and individual social network members who injected drugs was treated as a unit of analysis and therefore assessed as a dyad. The dependent variable used to address this objective was based on the following question: “Have you ever injected with a syringe after this person injected with it first?” The independent variables were derived by analyzing each participant’s response to network related questions about each injection drug using network member (e.g., the highest level of education attained by the network member).

In terms of statistical analyses performed for the third objective, univariate and multivariate generalized estimating equations (GEE) analyses were used to determine the significant variables. Using the variables that were significant in the univariate analyses, multivariate GEE analyses (that controlled for potential confounding variables) were then conducted to determine which variables were significantly associated with needle sharing within a dyad. GEE is useful for analyzing categorical data that are correlated in clusters (e.g., repeated measures studies) and have categorical or continuous responses (Liang & Zeger, 1986; Williamson, Lin, & Barnhart, 2003). As the observations within a cluster are often positively correlated, this correlation must be taken into account when analyzing clustered studies for proper inference and valid hypothesis testing

(Williamson et al., 2003). As my study was clustered on the study participant, the GEE analyses adjusted the variance within and between the clusters of network members who comprise a single egocentric network (Liang & Zeger, 1986). In traditional logistic regression models, the assumption of independent observations is violated because the models do not account for the clusters of network data. A standard goodness-of-fit test has yet to be established for GEE models, and assessment of interaction terms cannot be performed using GEE (Horton et al., 1999; Williamson et al., 2003).

3.2 Study Limitations

While there are many advantages to conducting secondary data analysis, there remain some disadvantages that may contribute to the reliability and validity of study results. Although SNAIDU is a well conducted study that is clearly documented in a report, simply reading the report was not a substitute for my direct experience in collecting the data. Even though I had the opportunity to discuss some aspects of the SNAIDU methodology with the original researchers, I was sometimes left to make assumptions about the variables that could be appropriately aggregated into indexes. Perhaps more importantly, because I did not personally collect the data, I am not aware of all of the problems that may have occurred in the original data collection. Furthermore, the original study was conducted in 2000 to 2001; hence, some of the drug use trends and characteristics of IDU networks in Winnipeg may have changed since the time when the study was conducted. Moreover, nearly all of the study participants reported being HCV positive, and Aboriginals were disproportionately overrepresented in the study

sample; thus, the results of this study may not be generalizable to all Winnipeg IDUs. The study had a small sample size; however, based on “the rule of 10” (Hosmer & Lemeshow, 1989), which is used to calculate whether a sample size is adequate, the sample had sufficient power for the statistical tests conducted.

Another issue is that the validity of the self-reported SNAIDU data is subject to social desirability bias (Simoni & Cooperman, 2000). This means that study participants may have provided what they deemed to be socially acceptable responses to certain questions on the questionnaire. As the data in this study were cross-sectional, it limits our ability to predict needle sharing behaviour from individual and social network characteristics. Additionally, the dependent variables used in this study assess “ever shared needles” and may therefore not be capturing current needle sharing activity by study participants and network members. It is also worth mentioning that this is a hypotheses-generating rather than a hypotheses-testing study. As the network analysis was egocentric in nature, the reliability of the responses pertaining to network characteristics is governed solely by the accuracy of the information provided by the participants who were interviewed for SNAIDU. However, social network studies have demonstrated that respondents are accurate in recalling those with whom they typically interact (Romney & Faust, 1982; Romney & Weller, 1984). Finally, the study participants were volunteers who agreed to be in the study for an economic incentive, therefore, this may bias the data to reflect IDUs of lower socio-economic status.

3.3 Ethical Considerations

Prior to beginning this thesis study, formal ethics approval from the University of Manitoba, Bannatyne Campus, Research Ethics Board was obtained. The SNAIDU study also received formal ethics approval from the University of Manitoba, Bannatyne Campus, Research Ethics Board before it was conducted. All of the SNAIDU participants volunteered to be in the study and were provided with information about the study purpose, objectives, and methodology. All study participants were required to sign an informed consent form and advised of their right to withdraw from the study at any time without penalty. Each participant was assigned a unique identification number which was also indicated on their completed questionnaire. Hence, the study participants and their identified network members are assured anonymity. All completed SNAIDU questionnaires and consent forms are in a secure location and locked in separate filing cabinets. These documents will be destroyed in 2008, seven years after SNAIDU was completed.

Chapter 4

Results

This chapter provides a summary of the results from the statistical analyses conducted for this study. The results are reported through the provision of tables and written descriptions.

4.0 Individual Related Characteristics

Responses to the individual or *study participant* related section of the questionnaire were provided by 156 study participants. While many study participants provided responses to all of the questions in this section of the questionnaire, several participants did not provide a response to each of the individual related questions. Therefore, some of the variables contained a low number of observations relative to the total number of study participants; consequently, these variables were excluded from statistical analyses (e.g., variables that contained only 15 observations).

4.0.1 Demographics

There was nearly an equal percentage of males and females involved in this study (49% [n = 76] and 47% [n = 74], respectively), with only 4% (n = 6) of study participants who identified themselves as “transgender male”, that is biologically male, but emotionally and psychologically feel that they belong to the female gender. As shown in Table 1, the majority of study participants were either born in Winnipeg (40%) or elsewhere in Manitoba (37%), and were of Aboriginal ethnicity (66%). In terms of age distribution and education level, 39% of the study

participants were in the age group of 30 to 39, and 62% of study participants cited grade 12 as the highest level of education completed (see Table 1).

4.0.2 Income and Housing/Accommodation

Forty-four percent of study participants indicated social welfare as their primary source of income in the previous year, and 49% of study participants stated that they had between one to three sources of income in the previous year (see Table 2). Prostitution was identified as a source of income in the previous year by 35% (n = 55) of study participants. As shown in Table 2, 40% of study participants reported their average annual income in the previous year as being between \$5000 and \$20,000. Most study participants stated that they currently lived at their own personal residence (48%) (see Table 2).

The majority of study participants had lived at their current residence for an average length of less than one month to three months (43%) (Table 2); of the study participants who reported living at their current residence for less than 12 months, 29% (n = 45) stated that they had lived at one other residence in the previous year, 56% (n = 87) stated that they had lived at two different residences within the previous year, and 15% (n = 23) stated that they had lived at between three and seven different residences in the previous year. Of the study participants who stated that they lived in Winnipeg, 22% (n = 34) and 25% (n = 39), respectively, reported that they currently resided in the North End and the Central neighbourhoods of the city.

Table 1

Distribution of the Study Participants' Demographic Characteristics (N = 156)

Variable	Number of observations n (%)
Age group	
16-19	9 (6)
20-29	43 (28)
30-39	60 (38)
40+	44 (28)
Ethnic group	
Aboriginal ^a	103 (67)
Caucasian	48 (31)
Other	3 (2)
Birthplace	
Winnipeg	62 (40)
Other Manitoba	57 (37)
Outside of Manitoba ^b	35 (23)
Highest level of education completed	
Grade 6	5 (3)
Grade 9	36 (23)
Grade 12	93 (60)
Post-secondary school	20 (13)
Other	1 (1)

Note. Variables that do not have a total of 156 observations are the result of some study participants not providing responses to all questions.

^aAboriginal is defined as either First Nations (Treaty and non-Treaty), Métis, or Inuit. ^bOutside of Manitoba refers to any place, either within or outside of Canada, that is not located in Manitoba.

Table 2

*Distribution of the Study Participants' Income and Housing/Accommodation**Characteristics (N = 156)*

Variable	Number of observations n (%)
Primary source of income	
Social welfare	68 (49)
Occasional employment	6 (4)
Regular employment	15 (11)
Illegal source ^a	39 (28)
Other	11 (8)
Number of income sources	
1-3	76 (49)
4-6	66 (42)
7-10	14 (9)
Average annual income	
< \$5000	13 (12)
\$5000-\$20,000	63 (56)
\$20,000-\$40,000	21 (19)
\$40,000+	15 (13)
Current place of residence	
Family member's home	29 (19)
Own personal residence	75 (48)
Friend's home	12 (8)
Other	40 (25)
Length of time at current place of residence	
< 1 month	34 (22)
1-3 months	33 (22)
3-6 months	29 (19)
6-12 months	17 (11)
12 months+	40 (26)

Note. The information pertaining to income is based on the previous year. Variables that do not have a total of 156 observations are the result of some study participants not providing responses to all questions.

^aIllegal source is defined as either prostitution, stealing, or dealing drugs or doing drug runs (i.e. purchasing drugs for other people).

4.0.3 Drug Use Behaviour

The majority of study participants had started injecting drugs between the ages of 10 and 19 (55%) (see Table 3). As presented in Table 3, nearly half of the study participants had injected drugs within the previous week (47%). Few study participants reported ever buying drugs for someone else (7%, n = 11), ever giving syringes to someone else (11%, n = 17), or having ever sold drugs (24%, n = 37). Many study participants reported having ever sold syringes (62%, n = 98) and having ever been paid to help someone inject drugs (47%, n = 73). Marijuana was the most commonly identified preferred non-injection drug by study participants (31%, n = 49), while only 12% of study participants (n = 18) identified ecstasy as their preferred non-injection drug. Cocaine was both the injection drug preferred by the majority of study participants (60%, n = 94) and the drug most frequently injected by study participants (62%) (see Table 3). Seventy-one percent (n = 111) of study participants reported that they had injected at their friend's home in the previous year, 67% (n = 105) reported injecting at their own home in the previous year, and 48% (n = 75) indicated that they had injected in a hotel in the previous year.

4.0.4 Injection Risk Behaviour

Nearly 60% of study participants stated that they had injected with a needle that someone else had previously used (see Table 4), and 61% (n = 95) of study participants reported that they had used a previously utilized cooker (i.e. an implement used to liquefy the drug prior to injection), rinse water, or cotton (i.e. an item used to strain the liquefied drug solution prior to injection). Most of the

study participants that reported injecting with a used needle indicated that they usually cleaned the needle before using it (78%, n = 122), and of those who provided information about what they cleaned their previously used needles with, 38% (n = 59) reported using bleach. The majority of study participants that reported having ever injected with a used needle indicated that they had done so over a year before (44%) (see Table 4), and 77% (n = 71) of study participants who reported having ever shared needles stated that they rarely injected with a needle that someone else had already used.

Table 3

Distribution of the Study Participants' Injection Drug Use Characteristics (N =

156)

Variable	Number of observations n (%)
Age at first injection	
10-19	85 (54)
20-29	53 (34)
30-39	11 (7)
40+	7 (5)
Last time injected	
In the previous week	74 (48)
In the previous month	21 (14)
In the previous six months	36 (23)
Greater than six months ago	24 (15)
Most frequently injected drug	
Cocaine	96 (62)
Talwin and Ritalin	26 (17)
Other	32 (21)

Note. Variables that do not have a total of 156 observations are the result of some study participants not providing responses to all questions.

Table 4

Distribution of the Study Participants' Injection Drug Risk Behaviour

Variable	Number of observations n (%)
Ever injected with a used needle^a	
Yes	92 (67)
No	45 (33)
Last time injected with a used needle^b	
< 1 week	7 (8)
1 week-1 month	9 (10)
1 month-6 months	21 (23)
6 months-12 months	15 (16)
1 year+	40 (43)

^an = 137. Nineteen study participants did not provide a response to this question.

^bn = 92. These are the responses from the study participants who responded *yes* to ever injecting with a used needle

Table 5

Logistic Regression Models of Individual Characteristics that Predict Needle Sharing Behaviour among Study Participants (N = 137)

Variable^a	Have shared needles (N = 92)	Have not shared needles (N = 45)	Unadjusted OR (95% CI)^b	p	Adjusted OR (95% CI)^c	p
	N (%)	N (%)				
Cocaine as most frequently injected drug	62 (67)	20 (44)	2.55 (1.21, 5.38)	.014	4.03 (1.61,10.11)	.003
Age						
≤ 19	3 (3)	4 (9)				
20-29	20 (22)	19 (42)	1.40 (.28, 7.12)	.682	–	–
30-39	43 (47)	12 (27)	4.78 (.94, 24.34)	.060	3.81 (1.22, 11.87)	.021
40 and older	26 (28)	10 (22)	3.47 (.66, 18.33)	.143	3.23 (.96, 10.93)	.060
Social welfare as a source of income ^d	81 (88)	34 (76)	2.38 (.94, 6.02)	.066	.26 (.06, 1.12)	.070

Variable ^a	Have shared needles (N = 92) N (%)	Have not shared needles (N = 45) N (%)	Unadjusted OR (95% CI) ^b	p	Adjusted OR (95% CI) ^c	p
Ever used ecstasy ^{d, e}	7 (8)	8 (18)	.38 (.13, 1.13)	.081	.28 (.07, 1.13)	.074
Ever sold drugs	15 (16)	17 (38)	.32 (.14, .73)	.006	–	–
Ever paid to inject someone else	35 (38)	26 (58)	.45 (.22, .93)	.031	–	–
Ever used acid ^{d, e}	16 (17)	16 (36)	.38 (.17, .86)	.020	–	–
Ever used PCP (phencyclidine) ^{d, e}	2 (2)	5 (5)	.18 (.03, .96)	.044	–	–
Ever used mushrooms ^{d, e}	20 (22)	17 (38)	.46 (.21, 1.0)	.049	–	–

Variable ^a	Have shared needles (N = 92) N (%)	Have not shared needles (N = 45) N (%)	Unadjusted OR (95% CI) ^b	p	Adjusted OR (95% CI) ^c	p
Ever injected at a friend's place of residence ^d	69 (75)	27 (60)	2.00 (.93, 4.28)	.074	–	–
Cocaine as preferred injection drug	49 (53)	18 (40)	2.04 (.90, 4.62)	.086	–	–

Note. Of the 156 total study participants, 19 did not provide a response as to whether or not they had ever engaged in needle sharing. Dashes indicate that the variable was not significant in the multiple logistic regression analyses.

^aWith the exception of “age”, all independent variables are coded as yes/no, with the reference category “no”. For age, the reference category is ≤ 19. ^bUnivariate logistic regression. ^cMultiple logistic regression. ^dEvent has taken place in the previous year. ^eDrug used via non-injection route.

4.1 Individual Characteristics Significantly Associated with Needle Sharing

Eleven study participant related variables that were significant in the univariate logistic regression analyses were entered into a backward stepwise multivariate logistic regression analysis (see Table 5). These variables included: (a) age, (b) social welfare as an income source in the previous year, (c) ever sold drugs, (d) ever paid to inject someone with drugs, (e) ever used acid in the previous year (via non-injection), (f) ever used ecstasy in the previous year (via non-injection), (g) ever used phencyclidine (PCP) in the previous year (via non-injection), (h) ever used mushrooms in the previous year (via non-injection), (i) ever injected at a friend's place of residence in the previous year, (j) cocaine as the preferred injection drug, and (k) cocaine as the most frequently injected drug. In the final model, four of the 11 variables were statistically significant in the multiple logistic regression analyses. Of these four variables, two were found to have a significant negative relationship with needle sharing: (a) social welfare as an income source in the previous year (OR = .26; 95% CI = 0.06, 1.12; $p = .070$), and (b) ever used ecstasy in the previous year (via non-injection) (OR = .28; 95% CI = 0.07, 1.13; $p = .074$). Two of the significant variables were found to be positively associated with needle sharing: (a) cocaine as the most frequently injected drug (OR = 4.03; 95% CI = 1.61, 10.11; $p = .003$), and (b) age: 30-39 (OR = 3.81; 95% CI = 1.22, 11.87; $p = .021$); 40 and older (OR = 3.23; 95% CI = .96, 10.93; $p = .060$). Main effects and interaction terms between each of the four significant variables and needle sharing were entered into the model incrementally. None of the interaction terms proved to be statistically significant.

The p value from the Pearson goodness-of-fit test for the final model was not significant ($p = .14$). This therefore indicates that the final multiple logistic regression model presented in Table 5 is adequate.

4.2 Network Related Characteristics

A total of 1,542 network members were identified by the 155 study participants who answered the network related section of the SNAIDU questionnaire. Each network ranged in size from one to twenty members, and the majority of study participants had a network that consisted of between six and ten members (48%, $n = 75$). Fifty-eight percent ($n = 886$) of the network members were identified as being current or former IDUs, 20% ($n = 307$) of network members were identified as being current or past sex partners, and 65% ($n = 1,002$) of network members were identified by the study participants as people who could provide them with social support (e.g., people that the study participants could go to for advice about a personal problem). Every study participant did not provide a response to each of the network member related questions in the questionnaire. Hence, the variables that consisted of a low number of observations relative to the total number of network members were excluded from statistical analyses (e.g., variables that contained only 15 observations).

4.2.1 Demographics

Fifty-three percent of network members ($n = 817$) were identified as being male, 44% ($n = 679$) of network members were identified as being female, 2% ($n = 31$) of network members were identified as being transgender male, and 1% ($n = 15$) of network members were identified as being transgender female.

= 15) of the network members were identified as being transgender female. The majority of network members were in the age groups of 20 to 29 (18%) and 30 to 39 (19%), and 59% of network members were identified as being of Aboriginal ethnicity (see Table 6).

4.2.2 Types of Relationships that Study Participants have with Network

Members

Most of the network members were identified by the study participants as being a friend or an acquaintance (27%) (see Table 7). In addition to this, most of the study participant and network member relationships had lasted between one to fifteen years (35%), and 24% of the network members had daily contact with study participants (see Table 7). As shown in Table 7, the majority of the network members and the study participants had met each other through mutual friends (23%).

4.2.3 Income and Housing/Accommodation

The majority of network members were identified as deriving their primary source of income from welfare/social assistance (18%) (see Table 8). Most network members resided at their own personal residences (37%) (see Table 8).

Table 6

Distribution of the Network Members' Demographic Characteristics (N = 1,542)

Variable	Number of observations n (%)
Age group	
< 19	54 (6)
20-29	272 (31)
30-39	294 (33)
40-49	186 (21)
50-59	53 (6)
60+	30 (3)
Ethnic group	
Aboriginal ^a	527 (59)
Caucasian	352 (39)
Other	19 (2)
Highest level of education completed	
Grade 6	39 (8)
Grade 9	102 (22)
Grade 12	246 (54)
Post-secondary school	72 (16)

Note. Variables that do not have a total of 1,542 observations are the result of some study participants not providing responses to all questions pertaining to their identified network members.

^aAboriginal is defined as either First Nations (Treaty and non-Treaty), Métis, or Inuit.

Table 7

*Distribution of the Types of Relationships that Network Members have with Study**Participants (N = 1,542)*

Variable	Number of observations n (%)
Relationship of network member to study participant	
Relative	154 (17)
Current or former lover	88 (10)
Current or former spouse	42 (5)
Friend or acquaintance	491 (54)
Other	128 (14)
Duration of relationship with study participant	
< 1 year	138 (16)
1-15 years	538 (61)
16-30 years	135 (15)
30 years+	72 (8)
Frequency of contact with study participant	
Daily	367 (41)
2-5 times per week	68 (8)
One time per week	235 (26)
1-2 times per month	172 (19)
Less than one time per month	58 (6)
How network member met study participant	
On the streets	155 (18)
Through mutual friends	348 (39)
Through a relative	167 (19)
At a bar	60 (7)
Other	154 (17)

Note. Variables that do not have a total of 1,542 observations are the result of some study participants not providing responses to all questions pertaining to their identified network members.

Table 8

*Distribution of the Network Members' Income and Housing/Accommodation**Characteristics (N = 1,542)*

Variable	Number of observations n (%)
Primary source of income in previous year	
Full-time employment	223 (26)
Welfare/social assistance	285 (33)
Sex trade	81 (10)
Drug dealing	95 (11)
Other	171 (20)
Current place of residence	
Own personal residence	578 (70)
Hotel	40 (5)
Friend's home	45 (6)
Rooming/boarding home	64 (8)
Other	88 (11)

Note. Variables that do not have a total of 1,542 observations are the result of some study participants not providing responses to all questions pertaining to their identified network members.

4.2.4 Sexual and Drug Related Behaviour Encouraged by Network Members

Twenty-nine percent (n = 447) of network members were identified as having discussed HIV/AIDS or HCV with study participants. Few of the network members had encouraged a study participant to inject drugs (16%, n = 247) or encouraged a study participant to stop injecting drugs (15%, n = 231). Furthermore, few network members had shown a study participant how to inject drugs (17%, n = 262). A high percentage of network members had not encouraged a study participant to switch to a non-injection route of using drugs (42%, n = 641) and had not encouraged a study participant to enter drug treatment (38%, n = 583). Nearly one quarter of the network members had not encouraged a study participant to use condoms (24%, n = 370).

4.2.5 Sexual Risk Behaviour

No transgender network members were identified as sexual contacts. Of the 307 network members identified as sexual contacts, 51% (n = 158) had a sexual relationship with a study participant that had lasted 1 to 15 years, 23% (n = 70) of the sexual relationships had lasted less than one year, and only 6% (n = 17) of the sexual relationships had lasted for 16 years or longer. Only 32% (n = 98) of the sexual contacts had engaged in vaginal sex with a study participant in the previous month, and of these contacts, nearly an equal proportion had used a condom all of the time (44%, n = 43) or never (45%, n = 44) during vaginal sex.

Twenty-one percent (n = 66) of sexual contacts had engaged in oral sex with a study participant in the previous month, and of these contacts 53% (n = 35) had never used a condom when a study participant performed oral sex on them.

Only 6% (n = 17) of sexual contacts had engaged in anal sex with a study participant in the previous month. Four percent (n = 11) of sexual contacts had engaged in other forms of sexual contact that may have caused tissue damage (e.g., sadomasochism), and 18% (n = 54) had exchanged drugs for sex with a study participant.

4.2.6 Injection Drug Use Patterns

Thirty-nine percent (n = 601) of network members were identified as having been present in the same room with a study participant when the study participant had injected drugs. Twenty-seven percent of the 886 network members identified as IDUs had last injected within the previous week (see Table 9). The majority of injection drug using network members had injected drugs at their own personal residence in the previous year (31%, n = 276), and 20% (n = 177) of injection drug using network members had injected drugs at a study participant's place of residence in the previous year. Nearly half (49%, n = 436) of the injection drug using network members had ever combined/pooled money with a study participant for the purpose of purchasing drugs.

Five hundred and ten (58%) of the injection drug using network members were identified as having ever injected drugs with a study participant, and the average length of time that most of these network members had been injecting with a study participant was between one and five years (49%); most had last injected drugs with a study participant less than one year before (68%) (see Table 9). Most of the network members who had injected with a study participant had injected with the study participant at the study participant's personal residence

(51%, n = 258) or at a friend's personal residence (46%, n = 232) in the previous year.

4.2.7 Injection Risk Behaviour

Few of the injection drug using network members had ever had a study participant inject with their syringe after they had first injected with it (12%, n = 104). Sixteen percent (n = 142) of injection drug using network members had ever injected with a previously used needle, and of these network members most were reported to have cleaned their needle none of the time (42%, n = 60) or some of the time (29%, n = 41) when they did engage in needle sharing.

Table 9

Distribution of the Network Members' Injection Drug Use Patterns (N = 886)

Variable	Number of observations n (%)
Last time injected	
Within the previous week	237 (46)
1 week ago to 1 month ago	111 (21)
1 month ago to 6 months ago	77 (15)
6 months ago to 1 year ago	41 (8)
Greater than 1 year ago	52 (10)
Length of time that network member has been injecting with study participant	
< 1 year	131 (26)
1-5 years	252 (49)
6-10 years	72 (14)
11-20 years	40 (8)
20 years+	15 (3)
Last time that network member injected with study participant	
< 1 year ago	348 (74)
1-5 years ago	113 (24)
6 years ago or greater	9 (2)

Note. These observations are based on the 886 network members that were identified by study participants as being IDUs. Variables that do not have a total of 886 observations are the result of some study participants not providing responses to all questions pertaining to their identified network members.

4.3 Network Characteristics Significantly Associated with Needle Sharing

Two network related variables were statistically significant in the univariate logistic regression analyses, and were thus entered into a backward stepwise multiple logistic regression analysis (see Table 10). These variables are: (a) presence of a network with an average age of 30 or above, and (b) presence of a network member who has ever injected with a used needle. Both of these variables remained statistically significant in the final model, and were found to be positively associated with needle sharing. Main effects and interaction terms between each of the two significant variables and needle sharing were entered into the model incrementally. None of the interaction terms were shown to be statistically significant. The *p* value from the Pearson goodness-of-fit test for the final model was not significant ($p = .23$). This therefore indicates that the final multiple logistic regression model presented in Table 10 is adequate.

Table 10

*Logistic Regression Models of Network Characteristics that Predict Needle**Sharing Behaviour among Study Participants (N = 137)*

Variable	Have shared needles (N = 92)	Have not shared needles (N = 45)	Unadjusted OR (95% CI)^b	p	Adjusted OR (95% CI)^c	p
	N (%)	N (%)				
Presence of a network with an average age (of members) of 30 or older	75 (82)	26 (58)	3.43 (1.54, 7.63)	.003	4.78 (1.91, 11.99)	.001
Presence of a network member that has ever injected with a used needle	48 (52)	13 (29)	2.91 (1.34, 6.34)	.007	4.01 (1.68, 9.57)	.002

Note. Of the 156 total study participants, 19 did not provide a response as to whether or not they had ever engaged in needle sharing.

^aAll independent variables are coded as yes/no, with the reference category “no”.

^bUnivariate logistic regression. ^cMultiple logistic regression.

4.4 Individual and Network Characteristics Significantly Associated with Needle Sharing

Both of the final models from the study participant related multivariate analyses and the network related multivariate analyses were combined to create a full model containing both study participant and network variables that are significantly associated with needle sharing. All of the six statistically significant variables from the final study participant and network related multiple logistic regression models were entered into a final combined backward stepwise multiple logistic regression analyses (see Table 11). These variables include: (a) age of study participant, (b) use of ecstasy (via non-injection) in the previous year by a study participant, (c) cocaine as the drug most frequently injected by a study participant, (d) social welfare as an income source in the previous year for a study participant, (e) presence of a network with an average age of 30 or above, and (f) presence of a network member who has ever injected with a used needle.

Three variables were found to be statistically significant in the multiple logistic regression analyses, and were all found to be positively associated with needle sharing. These variables are: (a) cocaine as the drug most frequently injected by a study participant, (b) age of study participant, and (c) presence of a network member who has ever injected with a used needle. Main effects and interaction terms between each of the three significant variables and needle sharing were entered into the model incrementally. None of the interaction terms were shown to be statistically significant. The *p* value from the Pearson goodness

of fit test for the final model was not significant ($p = .45$). This therefore indicates that the final multiple logistic regression model presented in Table 11 is adequate.

Table 11

*Multiple Logistic Regression Model of Individual and Network Characteristics**that Together Predict Needle Sharing Behaviour among Study Participants**(N = 137)*

Variable ^a	Have shared needles (N = 92)	Have not shared needles (N = 45)	OR (95% CI)	p
	N (%)	N (%)		
Cocaine as most frequently injected drug	62 (67)	20 (44)	3.10 (1.27, 7.55)	.013
Age				
≤ 19	3 (3)	4 (9)		
30-39	43 (47)	12 (27)	5.07 (1.84, 13.95)	.002
40+	26 (28)	10 (22)	6.03 (1.90, 19.12)	.002
Presence of a network member that has ever injected with a used needle	48 (52)	13 (29)	4.92 (1.90, 12.76)	.001

Note. Of the 156 total study participants, 19 did not provide a response as to whether or not they had ever engaged in needle sharing. This model is the result of combining the individual and network variables that were significant in their respective multiple logistic regression analyses.

^aWith the exception of “age”, all independent variables are coded as yes/no, with the reference category “no”. For age, the reference category is “≤ 19”.

4.5 Network Member Characteristics Significantly Associated with Needle Sharing between Study Participants and their Injection Drug Using Network Members

Twenty-five variables that were significant in the univariate GEE analyses were entered into the multivariate GEE analyses (see Table 12). These variables include: (a) the network member being the study participant's sex partner, (b) the network member being someone who provides the study participant with social support, (c) the age of the network member, (d) the type of relationship that the network member has with the study participant (e.g., friend, relative), (e) the length of time that study participant and network member have known each other, (f) frequency that network member and study participant have contact with each other, (g) the network member having ever been present in the same room when the study participant injects, (h) how often network member is present in the same room when the study participant injects, (i) the study participant and network member having ever discussed HIV/AIDS or HCV with each other, (j) the network member having ever helped or encouraged study participant to stop injecting drugs, (k) the network member having ever shown study participant how to inject drugs, (l) the network member having ever encouraged the study participant to enter drug treatment, (m) the network member having ever encouraged the study participant to use condoms, (n) the network member having ever encouraged the study participant to not use condoms, (o) the network member having injected in a vehicle in the previous year, (p) the network member having injected in a place identified as 'other' in the previous year, (q) the study

participant and network member having ever combined money together to buy drugs or injecting equipment, (r) the network member having ever injected drugs with the study participant, (s) the study participant and network member having injected together at the study participant's personal residence in the previous year, (t) the study participant and network member having injected together at a friend's personal residence in the previous year, (u) the study participant and network member having injected together at a rooming/boarding house in the previous year, (v) the study participant and network member having injected together in a vehicle in the previous year, (w) the study participant and network member having injected together in a jail/prison in the previous year, (x) the length of time that the study participant and network member have been injecting with each other, and (y) the network member having ever encouraged the study participant to inject drugs.

Eight of the 25 variables were statistically significant in the forward stepwise multivariate GEE analyses: (a) the type of relationship that the network member has with the study participant (e.g., friend, relative), (b) the study participant and network member having injected together at a rooming/boarding house in the previous year, (c) the study participant and network member having injected together in a vehicle in the previous year, (d) the study participant and network member having injected together in a jail/prison in the previous year, (e) the length of time that the study participant and network member have been injecting together, (f) the network member having injected in a place identified as 'other' in the previous year, (g) how often network member is present in the same

room when the study participant injects, and (h) the length of time that study participant and network member have known each other. All of the eight statistically significant variables in the final multivariate GEE model were positively associated with needle sharing activity between study participants and their injection drug using network members.

4.6 Summary

The individual related statistical analyses, the non-dyadic network related statistical analyses, and the dyadic network related statistical analyses each provided a variety of characteristics significantly associated with needle sharing behaviour among Winnipeg IDUs. While the individual related analyses yielded a wide array of variables significantly associated with needle sharing, the results of the non-dyadic network related analyses were quite limited. Most notable, however, is that the dyadic network related analyses provided a multitude of characteristics significantly associated with needle sharing behaviour between Winnipeg IDUs and their injection drug using network members. These findings are discussed in-depth in chapter 5 of this thesis.

Table 12

Generalized Estimating Equations Models of Network Characteristics that Predict Needle Sharing Behaviour between Study Participants and their Injection Drug Using Network Members (N = 524)

Variable ^a	Have shared needles with a study participant (N = 104)	Have not shared needles with a study participant (N = 420)	Unadjusted OR (95% CI) ^b	p	Adjusted OR (95% CI) ^c	p
	N (%)	N (%)				
Relationship of network member to study participant ^d						
Relative	17 (16)	69 (16)				
Friend	46 (44)	232 (55)	1.00 (.90, 1.10)	.866	1.09 (.96, 1.23)	.207
Spouse or lover ^e	36 (35)	50 (13)	1.28 (1.14, 1.42)	.000	1.33 (1.16, 1.53)	.000
Other	5 (5)	69 (16)	.88 (.78, .99)	.035	.99 (.85, 1.14)	.847
Network member has injected with study participant in a jail/prison ^f	4 (4)	1 (< 1)	1.73 (1.24, 2.40)	.001	1.53 (1.13, 2.10)	.007
Network member has injected with study participant in a rooming/boarding house ^f	7 (7)	9 (2)	1.31 (1.08, 1.60)	.006	1.33 (1.07, 1.64)	.009

Variable ^a	Have shared needles with a study participant (N = 104)	Have not shared needles with a study participant (N = 420)	Unadjusted OR (95% CI) ^b	p	Adjusted OR (95% CI) ^c	p
	N (%)	N (%)				
Network member has injected with study participant in a vehicle ^f	8 (2)	8 (2)	1.35 (1.11, 1.64)	.002	1.26 (1.02, 1.56)	.029
Network member has injected in a location identified as “other” ^f	4 (3)	12 (3)	1.23 (.97, 1.56)	.091	1.28 (1.01, 1.63)	.039
Network member is present in the same room when study participant injects drugs ^g						
Some of the time	45 (43)	266 (63)				
Most of the time	32 (31)	103 (25)	1.15 (1.06, 1.26)	.001	1.10 (1.01, 1.19)	.028
All of the time	27 (26)	51 (12)	1.24 (1.12, 1.38)	.000	1.13 (1.02, 1.25)	.018

Variable ^a	Have shared needles with a study participant (N = 104) N (%)	Have not shared needles with a study participant (N = 420) N (%)	Unadjusted OR (95% CI) ^b	p	Adjusted OR (95% CI) ^c	p
Length of time that network member has injected with study participant ^h						
< 1 year	24 (24)	108 (26)				
1-5 years	42 (40)	218 (52)	1.04 (.95, 1.14)	.421	1.00 (.91, 1.10)	.959
6-10 years	20 (19)	52 (12)	1.21 (1.07, 1.38)	.002	1.13 (.99, 1.28)	.074
11 years or more	18 (17)	42 (10)	1.25 (1.08, 1.43)	.002	1.11 (.95, 1.28)	.180
Length of time that network member and study participant have known each other ^h						
< 1 year	9 (9)	61 (15)				
1-15 years	63 (61)	267 (64)	1.12 (1.01, 1.24)	.037	1.02 (.90, 1.15)	.774
16-30 years	17 (16)	65 (15)	1.16 (1.02, 1.31)	.027	1.06 (.90, 1.24)	.478
31 years+	15 (14)	27 (6)	1.28 (1.10, 1.50)	.002	1.30 (1.05, 1.60)	.015
Network member has had sex with study participant	46 (44)	91 (22)	1.22 (1.14, 1.32)	.000	—	—

Variable ^a	Have shared needles with a study participant (N = 104)	Have not shared needles with a study participant (N = 420)	Unadjusted OR (95% CI) ^b	p	Adjusted OR (95% CI) ^c	p
	N (%)	N (%)				
Network member provides study participant with social support ⁱ	85 (82)	260 (62)	1.82 (1.10, 1.28)	.000	—	—
Age of network member ^j	104 (100)	420 (100)	1.00 (.99, 1.01)	.073	—	—
Frequency that network member and study participant have contact with each other ^k						
2-7 times per week	67 (64)	193 (46)				
Once per week	20 (19)	121 (29)	.91 (.84, .99)	.020	—	—
1-2 times per month	12 (12)	78 (19)	.88 (.80, .97)	.007	—	—
Less than one time per month	5 (5)	28 (6)	.91 (.79, 1.05)	.203	—	—

Variable^a	Have shared needles with a study participant (N = 104)	Have not shared needles with a study participant (N = 420)	Unadjusted OR (95% CI)^b	p	Adjusted OR (95% CI)^c	p
	N (%)	N (%)				
Network member has been present in the same room when study participant has injected	104 (100)	378 (90)	1.21 (1.07, 1.37)	.003	—	—
Network member has spoken with study participant about HIV/AIDS or HCV	68 (65)	184 (44)	1.19 (1.11, 1.27)	.000	—	—
Network member has helped or encouraged study participant to stop injecting	47 (45)	141 (34)	1.10 (1.03, 1.18)	.005	—	—
Network member has shown study participant how to inject	71 (68)	166 (40)	1.20 (1.12, 1.29)	.000	—	—

Variable ^a	Have shared needles with a study participant (N = 104)	Have not shared needles with a study participant (N = 420)	Unadjusted OR (95% CI) ^b	p	Adjusted OR (95% CI) ^c	p
	N (%)	N (%)				
Network member has helped or encouraged the study participant to inject	55 (53)	155 (37)	1.09 (1.02, 1.71)	.017	–	–
Network member has encouraged study participant to enter treatment	60 (58)	122 (29)	1.13 (1.05, 1.22)	.001	–	–
Network member has encouraged study participant to use condoms	51 (49)	149 (35)	1.11 (1.03, 1.19)	.004	–	–
Network member has encouraged study participant to not use condoms	13 (13)	25 (6)	1.13 (.99, 1.29)	.063	–	–
Network member has injected in a vehicle	9 (9)	18 (4)	1.17 (1.00, 1.36)	.044	–	–

Variable ^a	Have shared needles with a study participant (N = 104)	Have not shared needles with a study participant (N = 420)	Unadjusted OR (95% CI) ^b	p	Adjusted OR (95% CI) ^c	p
	N (%)	N (%)				
Network member has combined money with study participant to purchase drugs or injecting equipment	96 (92)	301 (72)	1.21 (1.11, 1.31)	.000	–	–
Network member has injected drugs with study participant ^l	102 (98)	378 (90)	1.17 (1.01, 1.36)	.040	–	–
Network member has injected with study participant at study participant's personal residence ^f	64 (62)	179 (43)	1.11 (1.04, 1.20)	.002	–	–
Network member has injected with study participant at a friend's place of residence ^f	51 (49)	168 (40)	1.07 (1.00, 1.15)	.049	–	–

Note. Of the 886 network members who were identified by the study participants as being injection drug users, information as to whether or not they had ever shared needles with a study participant was not provided for 362. Dashes indicate that the variable was not significant in the multivariate analyses.

^aWith the exceptions of “relationship of network member to study participant”, “network member is present in the same room when study participant injects drugs”, “length of time that network member has injected with study participant”, “length of time that network member and study participant have known each other”, “age”, and “frequency that network member and study participant have contact with each other”, all independent variables are coded as yes/no, with the reference category “no”. ^bUnivariate generalized estimating equations (GEE). ^cMultivariate GEE. ^dReference category is “relative”. ^eCurrent or past relationship. ^fEvent has taken place in the previous year. ^gReference category is “some of the time”. ^hReference category is “< 1 year”. ⁱSocial support is defined as providing advice with a personal problem or providing a favour when needed (e.g., lending money). ^jFor every one unit increase in age, the odds for needle sharing behaviour between a study participant and network member increases by the odds ratio. ^kReference category is “2-7 times per week”. ^lThis means that the study participant and network member have injected together at the same location.

Chapter 5

Discussion

The purpose of this study was to determine the individual and the social network characteristics that influence needle sharing among Winnipeg IDUs. The findings suggest that there is a range of factors associated with this behaviour. While the logistic regression analyses provided valuable information pertaining to individual and network characteristics that are significantly related to needle sharing, the use of GEE allowed for an examination of injecting dyad characteristics within an IDU's social network that are significantly linked to needle sharing within a dyad. However, as was mentioned in chapter 3 of this thesis, this study was exploratory in nature in that it was hypotheses-generating rather than hypotheses-testing. Therefore, while I provide some potential implications for policy and practice in this chapter, it is important to bear in mind that the study findings need to be verified in future larger studies of IDUs.

Five themes emerged from the study findings: types of drug use; socio-demographic status; injecting in semi-public locations; intimacy; and social influence. In this final chapter, I attempt to ascribe meaning to these key findings, discuss their potential implications for policy and practice, and comment on the future directions that I believe should be taken.

5.0 Types of Drug Use

For study participants, cocaine as the most frequently injected drug was positively associated with needle sharing, and ecstasy use (via non-injection) was negatively associated with needle sharing among IDUs. Other researchers have

established frequent cocaine injection as a risk factor for needle sharing (Dunn & Larenjeira, 2000; Santibanez et al., 2005; Wood et al., 2002). In this study, even after controlling both for individual and network variables, cocaine as the most frequently injected drug remained a significant factor for needle sharing behaviour. While cocaine can also be inhaled (i.e. as crack-cocaine), and ingested orally or intranasally, its effects via these routes are not felt as quickly as when the drug is used intravenously. A rapid (i.e. 30 to 45 seconds) stimulation or “high” that lasts approximately 15 minutes is generally experienced when cocaine is injected (McCoy & Inciardi, 1995). A result of this short-lasting high is that cocaine injectors tend to need to inject more frequently, often four to five times an hour, resulting in binge injecting that may last several days (Auerbach, Wypijewska, & Brodie, 1994; Canadian HIV/AIDS Legal Network, 2005; Friedman, Des Jarlais, & Sterk, 1990).

Studies have shown that while cocaine injectors typically begin binges with their own injecting equipment, they often end up needing to borrow another person’s needle to inject with, as the frequency of use results in their own needles becoming dulled and clogged quite quickly (Des Jarlais, Friedman, Sotheran, & Stoneburner, 1988). Furthermore, during these binges an IDU may become confused about whose injection equipment belongs to whom and use whatever injection paraphernalia are available. The frequent injections may also result in the damage of easily accessible veins, such as those in the arms and legs, thereby requiring an IDU to have someone else inject them; in a situation like this, the decision of what needle is used for injecting is likely left to the person who is doing the injecting. Additionally, in an attempt to avoid the sickness experienced with cocaine withdrawal, an IDU may

want to inject the drug as soon as it has been acquired, without taking the necessary precautions to ensure that a clean needle is being used.

Before a reasonable reduction in needle sharing can occur among frequent cocaine injectors, it is imperative that policy and program developers recognize that this group may require some interventions unique from those of non-frequent injectors. The availability of twenty-four hour access, secure, cost-free, and easily accessible locations that provide sterile needles may help in reducing needle sharing by providing these individuals with a feasible alternative. One such harm reduction measure that has been tested in various European and Australian cities is a no cost syringe vending machine (Dodding & Gaughwin, 1995; Obadia, Feroni, Perrin, Vlahov, & Moatti, 1999). These are similar to soda vending machines in that they accept used syringes and mechanically provide sterile syringes in exchange. In one program introduced in Marseille, France, the machines regularly attracted a segment of the IDU population that was not reached via needle exchange programs or pharmacy sales after only one year in operation (Obadia, Feroni, Perrin, Vlahov, & Moatti, 1999).

An unexpected finding of this study was that ecstasy use (via non-injection) in the previous year acted as a protective factor against needle sharing. This finding departs from the notion of polydrug use being positively associated with needle sharing (Powis et al., 1999; Strathdee et al., 1997). Ecstasy (3-4 methylenedioxymethamphetamine) use became widespread internationally in the 1990s (Novoa, Ompad, Wu, Vlahov, & Galea, 2005). It is a drug that is often associated with dance music clubs and “rave” movements. Although there has been

increased interest in the use of this drug in recent years, little is known about concurrent ecstasy use and IDU. Furthermore, few clinical and epidemiologic studies have focused specifically on the issue of ecstasy use in relation to other drug use (Degenhardt, Barker, & Topp, 2004; Gross, Barrett, Shestowsky, & Pihl, 2002). In addition to this, most of the studies on ecstasy users conducted in North America have focused on specific subpopulations, such as college students and club and rave attendees (Fendrich, Wislar, Johnson, & Hubbell, 2003; Gross et al., 2002). Clearly, further research is necessary in order to gain a better understanding of the relationship between ecstasy, IDU, and needle sharing.

5.1 Socio-Demographic Status

Age and social welfare use are factors that were both shown to be significantly associated with needle sharing. While a higher age among study participants and a higher average age of network members were positively associated with this behaviour, social welfare as a study participant's income source in the previous year was shown to be inversely related to needle sharing. Study participants who belonged to the age categories of 30 to 39 or 40 to 49 were significantly more likely to have engaged in needle sharing than study participants who belonged to younger age categories. These higher age categories remained significant even after adjusting for individual and network variables. This finding is consistent with the results from previous research (Butterfield et al., 2003; Goodroad, 2003; Osher et al., 2003). Two potential explanations for this study finding are harm reduction messages and services may not be reaching older injectors as well as they are reaching younger

injectors, and some older IDUs may not perceive themselves to be at risk for contracting BBPs.

The American National Institute on Aging asserts that healthcare workers and educators have neglected the middle-age and older population in terms of HIV/AIDS education and prevention, and that older people are less likely than younger people to talk about their sex lives or drug use with their health care providers (National Institutes of Health, 1994). Thus, policy and program developers must ensure that injection risk-reduction messages and interventions are geared towards the entire age spectrum of IDUs.

In this study, when only network characteristics were adjusted for in the logistic regression analyses, study participants whose social networks consisted mostly of individuals who were 30 years of age or older were significantly more likely to have engaged in needle sharing than study participants that had social networks which did not mostly consist of individuals 30 years of age or older. However, when this variable was entered into a logistic regression model that controlled both for network *and* individual characteristics, it did not remain significant as the IDUs' ages were highly correlated with the ages of their social network members. Previous research has reported an association between having an older IDU network and needle sharing behaviour (Friedman, Neaigus, & Des Jarlais, 1995); however, there is nothing in the literature that indicates an association between an older social network and needle sharing. Hence, this study finding may simply be a reflection of IDUs' social networks being comprised of individuals who

are of their own similar age group. Additional research is needed in order to confirm this hypothesis.

Remarkably in this study, having social welfare as an income source in the previous year acted as a protective factor against needle sharing. This finding departs from previous research which has established that a lower socioeconomic status is significantly positively associated with needle sharing (Mandell, Vlahov, Latkin, Oziemkowska, & Cohn, 1994; Strathdee et al., 1997). A need to receive social welfare is an indicator of low socioeconomic status; hence, it is unclear as to exactly why this factor was inversely associated with needle sharing in this study. A possible explanation however, is that through their linkages with social workers, individuals who receive social welfare may become aware of existing harm reduction related community resources, such as needle exchange programs, and may thus be more inclined to access them. This hypothesis warrants further investigation by researchers.

5.2 Injecting in Semi-Public Locations

With the exception of “other”, a jail/prison, rooming/boarding house, and a vehicle are each semi-public injecting locations that were significantly associated with needle sharing between study participants and their injection drug using network members. In previous research, injecting in semi-public locations has been found to be a risk factor for needle sharing (Latkin, Mandell, Vlahov, Oziemkowska, & Celentano, 1996). Additionally, semi-public injecting locations have also been found to often be situated in unsafe locations (Darke, Kaye, & Ross, 2001). Koester,

Glanz, and Baron (2005) determined that injecting in unsafe rather than safe locations increased the likelihood of needle sharing among IDUs.

The consumption of illicit drugs is prohibited in all Canadian correctional facilities. The fact remains however, that these items are being used by many incarcerated inmates on a daily basis (Riley, 1998). A recent study conducted at six Ontario correctional centres found that 32% of the inmates who reported injecting in prisons reported injecting with used needles (Canadian HIV/AIDS Legal Network, 2004). Inmates who are discovered to be in possession of contraband items, such as illicit drugs, often face harsh penalties from prison authorities. This may lead inmates to experience a sense of urgency when injecting in jails/prisons, thereby contributing to the likelihood of their injecting with whatever needle happens to be readily available. Sharing needles with a fellow inmate is also a way of establishing trust and a bond with another inmate, which may sometimes be essential for survival (physical or otherwise) within jail/prison walls. Unfortunately, needle sharing between inmates is borne from necessity. Although some harm reduction initiatives such as bleach, condoms, and prison tattoo parlours are currently available in Canadian correctional facilities, clean needles have not been made available for inmates. As a result of this, one needle is often shared between several inmates within a facility (Lior et al., 1998). This lack of clean needle availability has resulted in inmates fashioning needles from crude objects such as ball point pens, tape, and old parts of syringes, which are virtually impossible to sterilize with bleach.

In a report which examined prison needle exchange programs in six European countries, the Canadian HIV/AIDS Legal Network (2004) found that the programs

reduced the sharing of dirty syringes and home-made injection equipment among inmates, which in turn reduced the spread of disease, and also reduced the number of drug overdoses among inmates. Moreover, the report did not find any evidence to indicate that such programs increased drug use or endangered prison staff, who feared these syringes could be used as weapons. Additionally, a position paper on prison needle exchanges written by the Ontario Medical Association (2004) stated, “There is nothing in the international evidence that demonstrates that syringe exchange programs are incompatible with Canadian prison environments. The implementation of [other harm reduction programs in Canadian prisons] has proved trouble free, despite initial concerns in some quarters that they would ‘send the wrong message’, or lead to increases in violence and vandalism” (p. 14). The majority of inmates who are currently incarcerated will someday re-enter the general population. Therefore, a reduction in needle sharing activity in jails/prisons may have a positive impact on the health of society at large. More effort is clearly required on the part of policy developers to move forward the issue of clean needle availability in correctional facilities.

Rooming/Boarding homes generally provide housing for single people who often through economic or other disadvantage may find it difficult to access other private rental housing. These accommodations are often at full capacity and afford tenants with limited privacy. Facing a lack of personal resources, IDUs who live in these buildings may share needles out of necessity. Fearing eviction if they are discovered to be in possession of drugs by building administrators or other tenants, an IDU who lives at such a location may prefer to inject their drugs soon after they

have been purchased. In the absence of clean needles, this may necessitate the use of whatever needle happens to be readily available or offered to them by another injection drug using building tenant at the time of injection. It may therefore be important for policy and program developers to create harm reduction initiatives that target IDUs who live and/or inject in rooming/boarding houses.

Injecting in a vehicle is a particularly risky activity, as there is a heightened potential of being discovered by law enforcement officers or passers-by. This may lead the IDUs who inject in this location to experience a sense of urgency when injecting. Although clean syringes are exempt from paraphernalia charges under Canadian legislation, fearing arrest, IDUs are often hesitant to carry their own needles (Riley, 1998). This is a somewhat legitimate fear because the Canadian Controlled Drugs and Substances Act (1996) states that "a reference to a controlled substance includes a reference to [...] any thing that contains or has on it a controlled substance and that is used or intended or designed for use [...] in introducing the substance into the human body" (section 2(2)b). This means that IDUs found to be in possession of syringes with a detectable amount of an illicit substance may face criminal charges under this Act. This certainly serves to increase concerns around carrying used syringes to needle exchanges. In order to effectively reduce the rates of needle sharing in vehicles, a policy which allows individuals to carry needles on their person and in their vehicles without the threat of arrest may need to be considered.

Interestingly, "other" was an injecting location that was significantly associated with needle sharing between study participants and their injection drug using network members. As there was no accompanying information used to identify

these locations that were branded as other, it is difficult to provide an explanation for this study finding. However, several other locations such as parks, stairwells, and public restrooms that the literature (Klee & Morris, 1995; Latkin et al., 1996) has indicated are common public and semi-public injecting locations for IDUs were not provided as response options on the SNAIDU questionnaire. Hence, I suspect that these locations referred to as other may primarily consist of public and semi-public injecting locations. Future research questionnaires that examine this topic must provide respondents with comprehensive response options that are reflective of current IDU behaviour.

5.3 Intimacy

In this study, the type of relationship that a study participant has with a network member, the length of time that a study participant and a network member have known each other or injected with each other, and how often a network member is present in the same room when the study participant injects were each significantly associated with needle sharing between study participants and their injection drug using network members. Each of these factors indicates a certain level of intimacy or closeness within the dyadic relationships. Researchers have long established the important role that intimacy plays in one's decision to share needles with another person (Stein, Charuvasta, & Anderson, 2003; Valente & Vlahov, 2001). In fact, a study conducted by Hunter, Donoghoe, Stimson, Rhodes, and Chalmers (1995) found that most needle sharers restricted sharing to sexual partners and close friends.

A network member identified as a study participant's current or past spouse or lover was significantly more likely to have shared needles with the study

participant. Undoubtedly in these relationships, a certain level of trust, comfort, and sometimes dependency (e.g., emotional, financial) has been developed. As a result of an established trust and comfort level, an IDU may willingly share needles with this type of network member, and may also believe that they are not at any risk for contracting HIV/AIDS, or HCV from this person. A potential consequence of an IDU being dependent (financial or otherwise) on this type of network member is that fear and a sense of obligation may become the driving forces behind their decision to share needles with them.

Certainly, one partner may interpret the other's refusal to share needles as an implication that either they or the other person is infected with a BBP. Facing violence, and/or emotional and physical alienation as potential outcomes for refusing to needle share, for some IDUs, agreeing to share needles is the safer alternative. Furthermore, needle sharing in these relationships may occur out of necessity. For example, if one partner has been able to acquire enough drugs for the both of them, but they only have one clean needle, needle sharing becomes inevitable. It is imperative that needle sharing interventions target IDU pairs who are lovers or spouses. Before a significant reduction in needle sharing can occur within these types of relationships, each individual must be provided with realistic alternatives and understand how they will benefit from this change in behaviour.

A study participant and a network member who have known each other for more than 31 years were significantly more likely to have shared needles with each other. Additionally, study participants and network members who have injected with each other for a length of six to ten years were also significantly more likely to have

shared needles with each other. Indeed, a particular bond and/or trust has been established in relationships that demonstrate longevity. Thus, IDU pairs in these relationships may feel comfortable to share needles with each other. A potential implication of these study findings is that HIV/AIDS and HCV prevention programs may need to target injecting dyads that consist of people who are in long term relationships. Wu and Hart (2002) suggest that people who are in stable relationships may improve each other's health by monitoring health behaviours. Furthermore, the Canadian Health Network (2002) contends that two of the many roles of personal relationships are to provide guidance and advice, and to provide access to new and/or different information. Therefore, unless *both* individuals find it beneficial to discontinue needle sharing, and unless reasonable options are made available, it will be very difficult for any lasting changes to occur. Clearly, further research with larger sample sizes is necessary in order to discern exactly what event(s) is taking place within injecting relationships that exhibit longevity and stability.

Network members who were reported to be present in the same room most of the time or all of the time when a study participant injected were significantly more likely to have engaged in needle sharing with the study participant. Certainly, an IDU who so frequently injects in the presence of another person has a pre-existing level of trust and comfort with that person. In addition to these two factors, a further explanation may apply to this particular study finding. An IDU who has a certain person present most or all of the time when they inject may be dependent on this person for drugs and/or physical protection from other IDUs who may threaten to forcefully take away his or her drug supply.

Indeed, this daily interaction, which is primarily based on IDU, would very likely facilitate a transition to needle sharing. IDUs that prefer to have another person present when they inject may benefit from using a supervised injection site (SIS) for their injections. These facilities are controlled health care settings where drug users inject drugs under the supervision of clinical staff, and receive health care, counselling, and referral to health and social services (Kimber, Dolan, van Beek, Hedrich, & Zurhold, 2003). Evidence from the only Canadian SIS, which is located in Vancouver, British Columbia, and various SISs in Europe suggest that these injection facilities effectively engage marginalized and at-risk IDUs (De Jong & Wever, 1999; Dolan et al., 2000; Wood et al., 2004). It may be valuable for policy and program developers in Manitoba to consider the potential benefits of establishing SISs in the province.

5.4 Social Influence

Study participants who had an individual in their social network who had ever engaged in needle sharing were significantly more likely to themselves have also engaged in needle sharing. Even after adjusting both for individual and network variables, this factor remained significant. This finding is consistent with previously conducted research such as that by Hawkins et al. (1999) which found that IDUs who reported observing more peer protective HIV related behaviour were also more likely to report lower frequencies of HIV risk behaviour (e.g., unclean needle sharing) and increased frequencies of HIV protective behaviour (e.g., always cleaning needles). Hawkins et al. further showed that reports of verbalizations of peer norms about reducing risk were not associated with decreased HIV risk behaviour. Hence, peer

behaviour clearly plays a very important role in one's own behaviour, especially as IDU rituals, habits, and means of survival are often learned and shared within a group. Thus, if a network member, especially one whom an IDU respects and admires, engages in needle sharing, the IDU may believe this to be an acceptable form of behaviour. Although this study finding highlights a negative attribute of social influence, it is important to note that other studies have demonstrated some positive aspects of social influence among IDUs such as emotional and informational support (Grund et al., 1996; Jackson et al., 2002). Indeed, an awareness of both the positive and negative aspects of social influence may enable policy and program developers to create interventions that can address needle sharing through the optimal utilization of peer influence within IDU networks.

5.5 Summary

My examination of the background, behaviours, and social relationships associated with needle sharing among IDUs in Winnipeg offers some insight into their lives, and highlights a number of issues that may be important for policy and program developers to consider when developing HIV/AIDS, HCV, and other health related programs for this population. Using dyads as a unit of analysis rather than viewing the study participants only as individual entities resulted in a clear portrait of the specific network contexts that shape needle sharing behaviour. Moreover, the findings from this study will contribute to the growing body of literature that pertain to individual and network factors that influence needle sharing among IDUs.

Indeed, the use of egocentric network analyses allowed for an exploration of the composition of IDU social networks that would not have been revealed by

deriving only personal information from the study participants. However, I believe that more accurate and ultimately richer information pertaining to needle sharing would be obtained if sociometric network analyses were conducted on the Winnipeg IDU population.

5.6 Future Directions

Solutions to problems as complex as needle sharing are often multidimensional. Nevertheless, to label needle sharing as *the* problem, and to identify a person who is addicted to drugs as simply having a “drug problem” is not entirely accurate. I believe that the so-called drug problem and its related risk behaviours are a manifestation of fundamental problems (e.g., social inequalities) which exist in our society. It is certainly not a coincidence that drug-related harms have the greatest impact in the segments of Canadian society that most experience poverty and a deficiency in social services. As psychologist Bruce Alexander (1998) asserts, “The reason why the old interventions are not accomplishing much and the ‘new’ ideas are unpromising is obvious to many people. Self-destructive drug users are responding in a tragic, but understandable way to lives that were hopelessly and cruelly dislocated before their ‘drug problem’ began” (p. 28).

The issue of needle sharing cannot be separated from the physical, social, and policy environment in which they occur. By supporting the ready access to needles, needle sharing serves a very practical purpose within the IDU subculture. Therefore, needle sharing behaviour will not be modified without substantial efforts. If policy and program developers work *with* IDUs to develop HIV/AIDS and HCV prevention programs, and if they are also aware of the potential impact(s) that IDUs’ social

networks may have on injection risk behaviour, this will result in sustainable prevention programs that are rooted in IDUs' knowledge, expertise, and experiences.

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Appendix

Egocentric Questionnaire

A. DEMOGRAPHICS:

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

Inquire as to whether the person knows if they are HCV positive and record on answer sheet.

A1. What is your date of birth? (dd/mm/yyyy).

A2. What gender do you identify yourself as? (Only ask about gender if necessary to clarify):

- A. Male
- B. Female
- C. Biologically female but transgender
- D. Biologically male, but transgender
- E. Refused to answer

A3. Were you born in Canada?

- A. Yes
- B. No
- C. Unsure
- D. Refused to answer

If yes, what was your place of birth (city, town, or reserve and province)?
If No, what country were you born in?

A4. What is the highest level of education you have completed?

- A. Primary school (to grade 6)
- B. Secondary school (to grade 9)
- C. Secondary school (to grade 12)
- D. Trade school
- E. University
- F. College
- G. Other
- H. Unsure
- I. Refused to answer

A5. Over the last year how did you get money to live on (check all sources and identify main one)?

- A. social welfare
- B. employment insurance
- C. occasional work(small contracts every now and then)
- D. regular work(part or full time)
- E. money from my family
- F. money from friends
- G. prostitution
- H. stealing
- I. dealing or doing drug runs
- J. panhandling
- K. money from a social worker

- L. squeegee
- M. other (specify)
- N. Unsure

A6. Over the last year what was your average annual income?

- A. < \$5000
- B. \$5000-10000
- C. \$10000-20000
- D. \$20000-30000
- E. \$30000-40000
- F. \$40000-50000
- G. \$50000
- H. Unsure
- I. Refused to answer

A7. What ethnic group or family background do you most identify yourself with:

Do not read choices

- A. Caucasian/White
- B. Chinese
- C. Filipino
- D. South-Asian (e.g. Indian, Pakistani)
- E. Other Asian (e.g. Vietnamese, Japanese)
- F. Latin American, specify country
- G. Middle Eastern, specify
- H. Black-African
- I. Black-Caribbean
- J. Other black, specify
- K. First Nations (treaty)
- L. First Nations (non-treaty)
- M. Metis
- N. Inuit
- O. Other, specify
- P. Unsure
- Q. Refused to answer

A8. What type of residence do you currently live in?

- A. Empty House
- B. Hostel/Shelter
- C. Hotel
- D. At family member's house or apartment
- E. At your own house or apartment
- F. At a friend's house house or apartment
- G. Shooting gallery
- H. Rooming/ boarding house
- I. Recovery house/treatment centre
- J. On the street
- K. Vehicle (trailer, van, car)
- L. Other (specify)
- M. Unsure
- N. Refused to answer

A9. How long have you lived at this residence?

- A. A few days
- B. Less than 1 month
- C. 1 month to 3 months
- D. 3 months to 6 months
- E. 6 months to 12 months
- F. more than a year
- G. Unsure
- H. Refused to answer

A10. What part of the city do you live in?
(neighborhood, block, postal code, or intersection.)

A11. If subject has lived at current address less than 12 months ask them to name all types of residence they have lived in over the last year.

In the past 12 months what type of places have you lived in?

- | | |
|-------------------------------------|------------------------------------|
| A. Empty House | I. Vehicle (trailer, van, car) |
| B. Hostel/Shelter | J. Jail or prison (federal) |
| C. Hotel | K. Jail or prison (provincial) |
| D. At your own house or apartment | L. Provincial detention centre |
| E. At a friend's house or apartment | M. Psychiatric institution |
| F. Shooting gallery | N. Recovery house/treatment centre |
| G. Rooming/ boarding house | O. Other (specify) |
| H. On the street | P. Unsure |
| | Q. Refused to answer |

A12. Are you currently a member of a gang?

- A. Yes B. No C. Unsure D. Refused

A13. If yes, what is the name of the gang?

- A. Enter name on answer sheet
B. Unsure
C. Refused to answer

B. INDIVIDUAL DRUG BEHAVIOURS

Read: "Now I would like to ask you about your drug use. All of the answers that you give me are confidential".

B1. The first time you fixed (injected/shot up), how old were you?

- A. Record answer in years.
B. Unsure Probe: "About how old were you?"
C. Refused to answer

B2. Have you ever sold drugs?

- A. Yes B. No C. Unsure D. Refused

B3. Have you ever sold syringes?

- A. Yes B. No C. Unsure D. Refused

B4. Have you ever given syringes to someone else?

- A. Yes B. No C. Unsure D. Refused

B5. Have you ever been paid (money or in kind) by someone to help them inject drugs?

- A. Yes B. No C. Unsure D. Refused

B6. Have you ever bought drugs for someone else?

- A. Yes B. No C. Unsure D. Refused

B7. In the past year, which of the following drugs have you used without injecting?

- | | |
|--------------------------------|----------------------|
| A. Alcohol | J. Ecstasy |
| B. Acid | K. Gasoline/solvents |
| C. Painkillers (e.g. dilaudid) | L. Marijuana |
| D. Amphetamines | M. PCP/Angel dust |
| E. Barbiturates | N. T3's |
| F. Cocaine | O. None |
| G. Crack | P. Other (specify) |
| H. Demerol/morphine/opium | Q. Unsure |
| I. Downers/tranquilizers | R. Refused to answer |

B8. What is your preferred drug (drug of choice) and, if different, preferred injected drug? (**on the answer sheet circle the preferred injected drug**).

- | | |
|-----------------------------------|--|
| A. Heroin and cocaine (speedball) | F. Methadone |
| B. Talwin and Ritalin (speedball) | G. Heroin (dust, horse, junk, smack, downtown) |
| C. Heroin mixed with another drug | H. Pot |
| D. Cocaine (uptown) | I. Other (specify) |
| E. Amphetamines (speed, uppers) | J. Unsure |
| | K. Refused to answer |

B9. What drug do you most frequently inject?

- | | |
|-----------------------------------|--|
| A. Heroin and cocaine (speedball) | E. Amphetamines (speed, uppers) |
| B. Talwin and Ritalin (speedball) | F. Methadone |
| C. Heroin mixed with another drug | G. Heroin (dust, horse, junk, smack, downtown) |
| D. Cocaine (uptown) | H. Other (specify) |
| | I. Unsure |
| | J. Refused to answer |

B10. When was the last time you injected any drug?

- | | |
|--|----------------------|
| A. In the past week | F. Refused to answer |
| B. In the past month | |
| C. In the past 6 months | |
| D. More than 6 months ago (specify a time) | |
| E. Unsure | |

B16. How frequently would you say that you fix with a needle that someone else has already used:

- A. Rarely
- B. Some of the time
- C. Most of the time
- D. All of the time
- E. Used to fix with used needles, but now always use a clean needle

B17. When you use a needle (rig) that someone else has already used, do you usually clean the needle before use?

- A. Yes
- B. No
- C. Refused
- D. Unsure

B18. Have you ever used a cooker, rinse water, or cotton that someone else has already used, or may have already used?

- A. Yes
- B. No
- C. Refused
- D. Unsure

SOCIAL NETWORKS

1.) Network members: We are interested in the relationship between close personal contact and infectious diseases that are transmissible through used syringes, like hepatitis. We would like to ask you some questions about the people you normally associate with. We will not ask you for any information that could be used to identify those individuals and any information you provide to us will be confidential.

First, please think back over the last 30 days about the people with whom you have had more than casual contact. 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. Please use only first names, initials, or some identifier that will make sense to you such as a made up name. Please do not use their last names or any other information that could be used to identify them. The list will be for our use so we can make sure we know which individuals we are talking about. 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: Once names are listed, please ask the participant the following questions and circle the letter by a name for the specific type of interaction the participant has with the network member. Each network member can have more than one letter circled.

1. Please tell me which of the individuals on the list injects drugs or has injected drugs in the past?
2. Which of these individuals are people that you have had sex with?
3. Which of these people could you go to if you needed advice on a personal problem or if you needed to request a favor such as helping you move or lending you money?

3.) Interaction of network members: Transfer the names of the network members to the interaction circle. For each person listed ask the subject to indicate which of the other individuals on the list that particular person knows.

4.) Choose members: Now transfer up to 10 names to the answer guide. Enter them in the order that they appear on the network member list.

If there are more than 10 network members on the list, first choose individuals, to a maximum of 4, that are listed as IDU. Next choose individuals, to a maximum of 3, that are listed as sex partners. Do not duplicate any names (i.e. do not repeat a sex partner name if they are already on the list because of injection drug use). Finally choose individuals listed as providing social support. Choose as many support network members as necessary to bring the number of individuals to 10.

In all cases, choose individuals in the order they appear on the original network members list (if, for example, 6 individuals are listed as IDU choose the first 4 that were named by the subject; the order in many cases will reflect the frequency of contact that the subject has with the network members).

Network questions re: each contact:

Now I will ask you some questions about the contacts that we have listed on the sheet. Please answer each question to the best of your knowledge.

Interviewer: record the answers on the answer sheet.

C. Contact information

C1. What sex is [person]?

- | | |
|----------------------|------------------------|
| A. Male | D. Transgender, female |
| B. Female | E. Unsure |
| C. Transgender, male | F. Refused to answer |

C2. To the best of your knowledge, how old is [person] (enter as years)?

C3. What ethnic group would you identify [person] as?

Do not read choices

- | | |
|--|---------------------------------------|
| A. Caucasian/White | I. Black-Caribbean |
| B. Chinese | J. Other black, specify |
| C. Filipino | K. First Nations (Treaty) |
| D. South-Asian (e.g. Indian, Pakistani) | L. Aboriginal (non-treaty) |
| E. Other Asian (e.g. Vietnamese, Japanese) | M. Aboriginal (treaty status unknown) |
| F. Latin American, specify country | N. Metis |
| G. Middle Eastern, specify: | O. Inuit |
| H. Black-African | P. Other, specify |
| | Q. Unsure |
| | R. Refused to answer |

C4. What is [person]'s relationship to you?

- | | |
|---------------------------|----------------------|
| A. Mother | N. Uncle |
| B. Father | O. Aunt |
| C. Brother | P. Other relative |
| D. Sister | Q. Friend |
| E. Ex-lover | R. Acquaintance |
| F. Spouse | S. Injection buddy |
| G. Girl/Boyfriend (lover) | T. Stranger |
| H. Ex-spouse | U. Dealer |
| I. Son | V. Trick |
| J. Daughter | W. Other |
| K. Cousin | X. Unsure |
| L. In-laws | Y. Refused to answer |
| M. Niece, Nephew | |

- C5. How long have you known this person?
(enter as years or months (**indicate which**); if less than 1 month enter as number of days)
- C6. How frequently would you say you have contact with this person?
- | | |
|------------------------|-----------------------------|
| A. Daily | D. Less than once per month |
| B. Once a week | E. Unsure |
| C. 1-2 times per month | F. Refused to answer |
- C7. How did you meet [person]?
- | | |
|------------------------|----------------------|
| A. Work together | G. Injected together |
| B. School | H. Family member |
| C. Member of same gang | I. Bar |
| D. On the street | J. Other |
| E. Neighbors | K. Unsure |
| F. Mutual friends | L. Refused to answer |
- C8. What is the highest level of education this person has completed?
- | | |
|-----------------------------------|----------------------|
| A. Primary school (to grade 6) | F. College |
| B. Secondary school (to grade 9) | G. Other |
| C. Secondary school (to grade 12) | H. Unsure |
| D. Trade school | I. Refused to answer |
| E. University | |
- C9. Over the last year what was their primary source of income?
- | | |
|------------------------------|---------------------------------|
| A. Full time job | H. Panhandling |
| B. Part time job | I. Money from family or friends |
| C. Welfare/social assistance | J. Dealing |
| D. Sex trade | K. Other |
| E. Unemployment insurance | L. Unsure |
| F. Partner's income | M. Refused to answer |
| G. Illegal sources | |
- C10. What type of residence do they currently live in?
- | | |
|-------------------------------------|------------------------------------|
| A. Empty House | H. Recovery house/treatment centre |
| B. Hostel/Shelter | |
| C. Hotel | I. On the street |
| D. At their own house or apartment | J. Vehicle (trailer, van, car) |
| E. At a friend's house or apartment | K. Other (specify) |
| F. Shooting gallery | L. Unsure |
| G. Rooming/ boarding house | M. Refused to answer |

C11. What part of the city do they live in? (**If they live outside of city, ask for name of town or reserve**).

(Indicate as postal code, intersection, neighborhood or block. Postal code or intersection are the preferred responses)

C12. Is this person a member of any gangs?

A. Yes B. No C. Unsure D. Refused to answer

C13. If yes, what is the name of the gang

Enter name of gang on answer sheet, or enter A for unsure, or B for refused to answer.

C14. When you inject drugs is [person] ever present in the same room?

A. Yes B. No C. Unsure D. Refused

If No, go to question D1.

C15. If yes, would you say [person] is present when you inject drugs:

A. Some of the time D. Unsure
B. Most of the time E. Refused
C. All of the time

D. Social influence

D1. Have you ever talked with [person] about hepatitis, AIDS, or HIV?

A. Yes B. No C. Unsure D. Refused

D2. Has [person] ever helped or encouraged you to inject drugs?

A. Yes B. No C. Unsure D. Refused

If Yes, ask what type of help or encouragement was offered (e.g. helped to inject drugs, gave money for drugs, verbally encouraged).

D3. Has [person] ever helped or encouraged you to stop injecting drugs?

A. Yes B. No C. Unsure D. Refused

If Yes, ask what type of help or encouragement was offered.

D4. Has [person] ever encouraged you to switch to another way of using drugs (snort, oral, smoke)?

A. Yes B. No C. Unsure D. Refused

D5. Has [person] ever shown you how to inject drugs?

A. Yes B. No C. Unsure D. Refused

D6. Has [person] ever encouraged you to enter drug treatment?

A. Yes B. No C. Unsure D. Refused

D7. Has [person] ever encouraged you to use condoms?
A. Yes B. No C. Unsure D. Refused

D8. Has [person] ever encouraged you not to use condoms?
A. Yes B. No C. Unsure D. Refused

E. Contact injection drug risk (ask these questions for those contacts listed as IDU)

E1. To the best of your knowledge, when was the last time [person] injected drugs.

A. Within the past week:

Does [person] inject daily? A1. Yes A2. No A3. Unsure A4. Refused

- B. Between 1 week and 1 month ago
- C. Between 1 month and 6 months ago
- D. Between 6 months and 1 year
- E. More than 1 year ago
- F. Unsure
- G. Refused to answer

E2. Indicate all of the types of places that you know of where this person has injected drugs over the past year

- | | | |
|------------------------------------|-------------------------------------|---------------------------|
| A. Empty House | F. At a friend's house or apartment | J. Vehicle (trailer, car) |
| B. Hostel/Shelter | G. Shooting gallery | K. Jail or prison |
| C. Hotel/bar | H. Rooming/boarding house | L. Other |
| D. At your own house or apartment | I. On the street | M. Unsure |
| E. At their own house or apartment | | N. Refused |

E3. Have you and [person] ever combined or pooled money so that you had enough money to buy drugs or injecting equipment?

- A. Yes B. No C. Unsure D. Refused

E4. Have you ever injected drugs with [person]?

- A. Yes B. No C. Unsure D. Refused

If yes, go to question E5.

If No, go to question E9.

E5. What types of places have you and [person] injected drugs together over the past year (**Ask the individual to provide postal code, nearest intersection, neighborhood, block for each category. Postal code or intersection are preferred. Their most recent injection with the network member in question, at that location, can be used if they have shot up multiple times at different locations for the various categories).**)

- | | | |
|-----------------------------------|-------------------------------------|--------------------------------|
| A. Empty House | E. At a friend's house or apartment | H. On the street |
| B. Hostel/Shelter | F. Shooting gallery | I. Vehicle (trailer, van, car) |
| C. Hotel | G. Rooming/boarding house | J. Jail or prison |
| D. At your own house or apartment | | K. Other |
| | | L. Unsure |
| | | M. Refused |

E6. Have you ever injected with a syringe after this person injected with it first?

- A. Yes B. No C. Unsure D. Refused

E7. When did you first begin injecting drugs with [person]? (Record as date or time span)

E8. When did you last inject drugs with this person?

E9. Has [person] ever fixed with a needle after someone else had already used it?

- A. Yes B. No C. Unsure D. Refused

E10. When [person] fixes with a used needle, would you say they clean the needle:

- | | |
|---------------------|--------------------|
| A. None of the time | D. All of the time |
| B. Some of the time | E. Unsure |
| C. Most of the time | F. Refused |

F. Sexual contacts (ask these questions of contacts listed as sexual partners):

Now I will ask you a few questions about your sexual relationship with your partners. We are interested in this information because of the potential for infections to spread through sexual contact.

F1. How long ago did you begin a sexual relationship with [person]?

F2. How often have you had vaginal sex with [person] in the past 30 days?

If subject did not have vaginal sex with [person] go to question F4.

F3. How often do you use a condom (either male or female condom) when you have vaginal sex with [person]?

- | | | |
|--------------------|-----------|------------|
| A. All of the time | C. Never | E. Refused |
| B. Sometimes | D. Unsure | |

F4. How often have you had oral sex (you going down on them) with [person] in the past 30 days?

If subject did not have oral sex with [person] go to question F6.

F5. How often do you use a condom when you have oral sex with [person]?

F. All of the time

I. Unsure

G. Sometimes

J. Refused

H. Never

F6. How often have you had anal sex with [person] in the past 30 days?

If subject did not have anal sex with [person] go to question F8.

F7. How often do you use a condom when you have anal sex with [person]?

K. All of the time

L. Sometimes

M. Never

N. Unsure

O. Refused

F8. Have you had any other kind of sexual intercourse with [person] that might cause tissue damage (e.g. S&M, bondage)?

A. Yes B. No C. Unsure D. Refused

F9. Have you ever exchanged sex for drugs with [person]?

A. Yes B. No C. Unsure D. Refused

This brings us to the end of the questionnaire. Is there anything else that you would like to add as a comment.

Record as a narrative answer

