THE RELATIONSHIP BETWEEN

HEPATITIS C VIRUS AND INJECTION DRUG USE

IN SASKATOON STREET YOUTH

A Thesis Submitted to the College of

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By

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Abstract

The transmission and prevalence of Hepatitis C Virus (HCV) among those who use injection drugs is a major public health issue. Injection drug use has been identified as the main cause of transmission for HCV in Canada. Street youth are at risk for acquiring HCV due to injection drug use that is often a consequence of living in a street environment. Presently, research on prevalence trends, characteristics, and associated behaviors for injection drug use and HCV in street youth, is limited.

The purposes of this study were to determine prevalence of injection drug use and HCV in Saskatoon street youth, to identify demographic or other factors that may contribute to street youth using injection drugs, and to identify risk factors and other characteristics of street youth associated with HCV. This study utilized data from Phase III of the Enhanced STD Surveillance in Canadian Street Youth Study by Health Canada for those participants recruited from Saskatoon, Canada. Between February and July 2001, 186 Saskatoon street youth participants between the ages 14 and 24 years completed nurse-administered questionnaires and of these, 156 provided blood specimens. Analyses were conducted to compare population characteristics between street youth who have used injection drugs and those who had not. Similarly, population characteristics were analyzed among those street youth who were antibody-HCV positive and those that were antibody HCV negative.

In this study 32.3% of 186 participants had used injection drugs. Significant associations with injection drug use were found for older age (p = 0.01), having sexual partners that use injection drugs (p = 0.01), history of incarceration (p = 0.01), and history of living on the street (p = 0.02). Significant interactions were found for sex trade

work by gender (p < 0.01) and by age (p = 0.03), and for living on the street by age (p = 0.02). A HCV prevalence rate of 9.3% of 156 participants was determined for Saskatoon street youth. Use of Ritalin by injection (p = 0.04) and history of living on the street (p = 0.05) were found to be significant risk factors associated with HCV. The interaction of living on the street by gender was also significantly associated with HCV (p = 0.05).

The relationship identified between HCV and injection drug use in Saskatoon street youth was a history of living on the street. This link between could serve as a valuable marker for use of injection drugs and developing HCV infection in street youth. Nurses are encouraged to seek out street youth social networks to provide health care and messages of health promotion and disease prevention. Strategies that are culturally, socially, and developmentally appropriate are needed to keep these youth off the streets in the first place.

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In closing, I would also like to thank my family for their ongoing encouragement and support. To my husband, Chris, thank you so much for your love, patience and understanding, when I needed to focus on my studies. To my parents, Gilbert and Rosemarie, and my sisters, Chantelle and Sharla, thank you for loving me and encouraging me throughout my life.

Dedication

This work is dedicated to the street youth of Saskatoon. Without their stories this study would not be possible. The efforts in this study were in the hope for change towards a better future for these youth and other youth at-risk.

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List of Abbreviations

The following is a list of commonly used abbreviations:

IDU	Injection Drug Use
HCV	Hepatitis C Virus
STD	Sexually Transmitted Disease
HIV	Human Immunodeficiency Virus
HBV	Hepatitis B Virus
HSV-1	Herpes Simplex Virus 1
HSV-2	Herpes Simplex Virus 2
HTLV	Human T Lymphotropic Virus
OR	Odds Ratio
CI	Confidence Interval
df	degrees of freedom
SD	Standard Deviation
SE	Standard Error
ref	reference group
FET	Fisher's Exact Test
T	T- test
χ	Mean
n	Number in a sub sample
N	Total number in a sample
ß	Beta
χ^2	Computed value of a chi-square test

Chapter 1: Introduction

1.1 Background of the Problem

The transmission and prevalence of Hepatitis C Virus (HCV) among those who use injection drugs is a major public health concern. Injection drug use is a key mode of transmission of HCV, accounting for approximately 70% of all prevalent infections in Canada (Laboratory for Disease Control (LCDC), 1999). National prevalence of HCV in the general public is estimated at 0.8% (Remis, 1998). Between 75 - 85% of people infected with HCV will progress to chronic infection. People with chronic infection remain a source of transmission for HCV and are at risk for chronic liver disease, cirrhosis, and liver cancer (LCDC, 1999). As a result of this infection, it is projected that in the next decade the number of liver failures will increase by 126%, and that the number of hepatocellular carcinomas will increase by 102% (Zou, Tepper, & El Saadany, 2000). Health and social systems may not be prepared to support these increases; thus surveillance, prevention, and control programs for HCV are urgently needed.

It is estimated that 125,000 Canadians use injection drugs (Health Canada, 2001a). People who use injection drugs are a key group in the persistence of HCV. This is due to a high HCV prevalence among populations that use injection drugs, the extreme risk of HCV infection due to highly efficient viral transmission that occurs with sharing of drug paraphernalia, and the initiation into drug-injecting behavior (Wiebe & Reimer, 2000).

Street youth have remained an under served population through out the HCV epidemic. This sub-population has unique characteristics, which place them at greater risk for acquiring the virus (Wiebe & Reimer, 2000). Street youth are often defined as "children and adolescents who become socially dislocated from their mainstream counterparts and who experience periodic or chronic homelessness" (Advisory Committee on Population Health (ACPH), 2001, p. 35). Homelessness is often predisposed by physical, emotional, and/or sexual abuse at home (ACPH, 2001). It is estimated that the street youth population ranges as high as 150,000 in Canada (ACPH, 2001; DeMatteo et al., 1999). Contrary to popular belief, most street youth are not transient but rather come from the local community and surrounding area (Walters, 1999). The use of illicit drugs, including use by injection, is particularly high among street youth (Roy et al., 1998). Sharing of drug paraphernalia and unsafe sexual practices has been noted among street youth who are involved in injection drug use (ACPH, 2001). However, research on prevalence trends, characteristics, and associated behavior for injection drug use and HCV in street youth, is limited (Anderson, Freese, & Pennbridge, 1994; Rouget, Mah, Lang, & Joffres, 1994).

In an effort to understand this marginalized population and fill the surveillance gap concerning street youth, Health Canada- Division of STD Prevention & Control, Bureau of HIV/AIDS, & STD, and TB Centre for Infectious Disease Prevention & Control, initiated a serial sentinel surveillance system in 1998 in multi sites across Canada (2001b). A main objective of this surveillance system was to determine the national prevalence rate and determinants of various STDs and risk behaviors in Canadian street youth (Health Canada, 2001b). As seen in Figure 1-1, Saskatoon has

participated in Phases II, III, and IV of this national, multi-center, cross-sectional surveillance study. Methodology regarding recruitment, inclusion criteria, and laboratory methods has remained consistent throughout the subsequent phases. Questionnaire modifications have varied between these phases, but have captured time trends.

Year	Phase	Sites Included	Health Canada Focus	Study N
1998	I	Vancouver, Ottawa, Halifax	Feasibility study	297
1999	II	Vancouver, Edmonton, Saskatoon, Winnipeg, Toronto, Ottawa, Halifax	Concentration on public exposure of results	1733
2001	III	Edmonton, Saskatoon, Winnipeg, Toronto, Ottawa, Montreal, Halifax	Concentration on Chlamydia and sex trade modeling	1475
2003	IV	Yellowknife, Vancouver, Edmonton, Saskatoon, Winnipeg, Toronto, Ottawa, Halifax	Increase sample size	> 1700 In progress
2005	V	Unknown at this time	Intervention planning	Not determined

Figure 1-1. Enhanced STD surveillance in Canadian street youth study: sites and focus.

1.2 Statement of the Research Problem

Previous surveillance measures by Health Canada has identified Saskatoon as having high rates of HCV in street youth in comparison to other cities involved in the national study (Health Canada, 2003). Little is known about the characteristics of Saskatoon street youth that could contribute to this increased prevalence. In order to have effective local programming for HCV, it is necessary to understand the risks associated with injection drug use and HCV in the target population. To date, local data from the Enhanced STD Surveillance in Canadian Street Youth Phase III Study has not been examined and can provide the important information to determine prevalence of HCV, potential risk behaviors, and determinants of risk behaviors in the street youth population of Saskatoon.

1.3 Relevance and Significance of Research

The information gleaned from this secondary analysis will raise awareness and understanding of HCV and injection drug use in Saskatoon street youth as a public health issue. This data is essential when considering whether or not street youth behaviors are a priority for prevention and control programs in Saskatoon. It is important to recognize that potential interventions need to be responsive to help describe the environment in which the unsafe behavior occurred (Wiebe & Reimer, 2000). The results of this analysis could have profound impact on the nature of future initiatives and intervention programming in community health nursing in Saskatoon.

Chapter 2: Literature Review

2.1. Review of Relevant Research Literature

The term *street youth* surfaced in the literature as early as 1991 (Wang et al.).

Terms such as *high-risk youth or youth at risk*, *homeless youth*, *throwaways* or *runaway*

youth are used interchangeably in the literature to describe street youth. It has been

suggested that street involvement exists on a continuum. At one end of this continuum

are *curbsiders* who engage in the street lifestyle to some extent, but engage in socially

accepted behavior for the most part, circulating between home and the street. At the

other end are *entrenched street youth* that are involved in the dangers of street life and

have no connection to home (Caputo, Weiler, & Anderson, 1997). Much of the literature

about this population has focused on HIV/AIDS (Booth, Zhang, & Kwiatkowski, 1999;

Clatts & Davis, 1999; DeMatteo, 1999; Kipke, Unger, Palmer, & Edgington, 1996; Roy

et al., 2000, 2003; Walters, 1999; Weber, Boivin, Blais, Haley, & Roy, 2002). Other

studies have looked at the following health outcomes with the street youth population

including: sexually transmitted diseases (Anderson, Freese, &Pennbridge, 1994; Haley et

al., 2002; Poulin et al., 2001; Van den Hoek, 1997), substance use (Ginzler, Cochran,

Domenech- Rodriguez, Cauce, & Whitbeck, 2003; Green, Ennett, & Ringwalt, 1997;

McMorris, Tyler, Whitbeck, & Hoyt, 2002), injection drug use (Roy et al., 1998; Roy,

Haley, Leclerc, Cedras & Boivin, 2002), Hepatitis A (Ochnio, Patrick, Ho, Talling, &

Dobson, 2001; Roy et al., 2002), Hepatitis B (Beech, Myers, & Beech, 2003; Roy et al,

1999), depression (Ayerst, 1999; Smart, Adlaf, Walsh, & Zdanowicz, 1994; Smart &

Walsh, 1993), suicide and abuse (Kidd, 2003; Kidd & Kral, 2002; Molnar, Shade, Kral, Booth, & Watters, 1998) Despite similar modes of transmission in HIV and sexually transmitted diseases, little attention has been given to studies focusing on HCV in this population (Beech, Myers, & Beech, 2002).

2.2. Review of Relevant Research

As the risk of acquiring HCV in street youth exceeds that of HIV, a review was conducted to identify health literature related to transmission patterns and prevalence trends for HCV and injection drug use among the street youth population in Canada and the United States. Studies from the United States were reviewed because of similarity to Canadian health care accessibility, public health resources, and health-care seeking behaviors (van Dam, Dallabetta, & Piot, 1999). A summary of research studies examining the prevalence of injection drug use and HCV and predictors of HCV in Street Youth is presented in Table 2-1.

This review revealed five studies specific to street youth in Canada. The first study, conducted in Ottawa in 1993, demonstrated a HCV prevalence of 4% in street youths less than 21 years of age (Slinger et al., 1999). Other studies conducted in Montreal in 1995 - 1996 and in Regina in 2000, found HCV prevalence rates of 12.6% (Roy et al. 2001) and 19.2% (Regina Health District, n.d.) in youth aged 14 - 24 years. Studies conducted in Vancouver from 1996 - 1999 revealed a prevalence of HCV infection of 46% in youth aged 13 - 24 (Miller et al., 2002), and 81.6% in injection drug users 15 - 58 years of age (Patrick et al., 2001). In the Canadian general population, prevalence of HCV infection is 0.8% (Zou, Tepper, & El Saadany, 2000).

Table 2-1

Summary of Research Examining the Prevalence of Injection Drug Use and HCV and Predictors of HCV in Street Youth

Authors	Location	Sample	Prevalence IDU	Prevalence HCV	Predictors of HCV
Beech, Myers, & Beech (2002	Southwest city, USA	- N = 150 - 10 – 23 years	Not reported	22% for HBV or HCV	Lifetime crack use, sexual preference, ↑ of sexual partners, ↑ age, gender (not specified)
Diaz et al. (2001)	New York City, USA	- Lower East Side: N=357 - Harlem: N=200 - 18 – 29 years	100%	Lower East Side: 42% Harlem: 52%	IDU > 3 years, IDU with known HCV person, sharing cotton
Hahn, Page-Shafer, Lum, Ochoa, & Moss (2001)	San Francisco, USA	-N = 308 - < 30 years	100%	45	↑ age, ↑ years injecting, ↑ years in the city, first injected by sex partner, daily IDU, borrowed syringe, improper bleaching of borrowed needle, snorted/smoked drugs in prior year, injected by someone else in prior month
Regina Health District (n.d.)	Regina, Canada	- 14 – 24 years N=52 - > 24 years: N=202 - Overall:	100%	19.2% 53.5% 46.5%	Older age, longer history of IDU, tattooed, borrowed needles/gear while incarcerated, sharing equipment with HCV positive peer, ever attempted suicide, ever abused
Lifson & Halcom (2001)	Minneapolis, USA	- N=201 - 15 – 22 years	15%	25% self-reporting	Not determined
Miller et al. (2002)	Vancouver, Canada	- N = 232 - 13 – 24 years	100%	46%	Aboriginal status, older age, greater # of years with IDU, recent incarceration, sex trade work > 100 sexual partners, previous sexually transmitted disease, IDU>1 x per day of heroin/ cocaine /speedball
Patrick et al. (2001)	Vancouver, Canada	- N=1345 - 15 – 58 years	100%	81.6%	Female gender, cocaine use, IDU daily, frequent attendance at a needle exchange program
Roy et al. (2001)	Montreal, Canada	- N=437 - 14 – 25 years	45.8%	12.6%	IDU, age 18+, crack / cocaine use, more than 1 tattoo
Slinger et al. (1999)	Ottawa, Canada	- N=100 - < 21 years	17%	4%	Not determined
Thorpe, Ouellet, Levy, Williams, & Monterroso (2000)	Ottawa, Canada Chicago, USA	- N=698 - 18 – 30 years - All IDU	100%	27%	Age, duration & frequency of IDU, heavy crack smoking, IDU in a shooting gallery, syringe sharing

Canadian HCV prevalence is comparable to that in the United States with similar populations. Four studies from the United States were relevant for review. A study conducted in Chicago from 1997 - 1999 found a HCV prevalence rate of 27% among injection drug users aged 18 - 30 years (Thorpe, Ouellet, Levy, Williams, & Monterroso, 2000). Similarly, in San Francisco during the same time period, HCV prevalence was 45% in injection drug users less than 30 years of age (Hahn, Page-Shafer, Lum, Ochoa, & Moss, 2001). Diaz et al. (2001) found HCV prevalence of 42% in its lower east side of New York and a prevalence of 52% in Harlem in groups of injection drug users 18-29 years (Diaz et al., 2001). These rates are high in comparison to a study conducted in Boston with an unselected population of adolescents showing a HCV prevalence of 0.1% (Jonas, Robertson, & Middleman, 1997).

From the review of the literature, street youth populations with HCV are likely to be older, use injection drugs, have undergone tattooing, and be female. The majority of study populations were entirely injection drug users. There are limited findings in studies for other factors. Variables of sex trade work, incarceration history, and body piercing were inconsistently assessed within the studies reviewed. For example, Miller et al. 2003 and Patrick et al, 2001 did not address the practices of tattooing and body piercing within their studies. Injection drug use has been consistently identified as the factor most strongly associated with HCV infection in this literature review. Social determinants associated with this high-risk behavior were not specifically explored in any of the studies. A study among street youth in Toronto, not specific to HCV, found drug use (including that by injection) to be symptomatic of family dysfunction and a hazardous street environment (Adalf, Zdanowicz, & Smart, 1996).

Social determinants that include poverty, homelessness, lack of education, family dysfunction, parental substance abuse, mental health problems, and child abuse have been identified as predisposing people for injecting drugs (ACPHA, 2001; Schoener, Hopper, & Pierre, 2002). Although, these findings are reflective of general adult populations, they may not be reflective of street youth populations. It is further noted that social determinants of injection drug use are similar to the antecedents of homelessness or youth moving to the streets. These antecedents include family dysfunction, physical, emotional, and sexual abuse, poor self-image, negative school experiences (Caputo, Weiler, & Anderson, 1997), and the failure of multiple societal structures (Higgitt, Wingert, Ristock, Brown, Ballantyne, Caett et al., 2003). Many of these determinants and antecedents are available for analysis in this study.

2.2.1. Consistencies and Inconsistencies between Studies.

The studies reviewed generally used convenience sampling and were similar in their purpose, design, instruments, and data collection, but findings in relation to prevalence and associated risk behaviors differed between samples. No qualitative studies could be located which examined HCV. Study populations tend to be comprised of male, Caucasian, and older adult injection drug users. There is very little information on the nature of injection drug use and HCV in street youth and females in particular. All studies analyzed in this review used a questionnaire/survey instrument asking for socio-demographic characteristics, sexual behavior, drug use practices, and other similar risk behaviors. Only one study did not include the serum-testing component (Lifson & Halcon, 2001) in the data collection, but instead asked participants if they had been

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tested. In the data by Beech, Myers & Beech (2002) no distinction is made between HCV and Hepatitis B Virus rates.

Studies consistently reported injection drug use as significantly associated with HCV infection. This may be partly explained by the risk behaviors of the cohorts studied who were predominately injection drug users as compared with street youth overall. Findings suggest that the two main drug risk categories in relation to HCV are cocaine injection and crack/cocaine smokers. Cocaine use involves particular risk as cocaine is metabolized very quickly in the body (Wiebe & Reiner, 2000). Thus, people who inject cocaine require frequent injections to maintain the effects of the drug thus increasing the problems associated with obtaining clean drug paraphernalia (McAmmond & Associates, 1997).

All studies had self-reported behavioral data which may be prone to response bias. Although HCV prevalence reported in these studies are comparable with adult studies of HCV, the sampling methods used was snowball sampling which may limit generalizablity of findings to all street youth.

Study sites are reflective of street youth living in large urban centers. Canadian studies were from Montreal, Ottawa, Regina, and Vancouver- indicating there is very little Canadian information on the extent and nature of HCV among street youth in other parts of the country. The samples in the Regina and Vancouver studies were all injection drug users rather than specifically street youth.

2.3. Conceptual Framework of the Relationship between Injection Drug Use

and Hepatitis C Virus

Demographics, high-risk behaviors, and determinants of high-risk behaviors in

Saskatoon's street youth population were examined in order to understand the

relationship between injection drug use and HCV from a local perspective. The

conceptual framework, the *Relationship between Injection Drug Use and HCV*, as seen in

Figure 2-1, was developed to organize characteristics of street youth for data analysis of

the Saskatoon sample. The framework developed was a synthesis of the researcher's

clinical experience and variables identified in the literature review. This overall

framework is based on the model, Sexual Health Practices of Homeless Adolescents,

developed by Rew (2001). Based on Rew's work, three main focuses are identified for

this study of street youth, and injection drug use/HCV. These focuses were: population

characteristics (demographics, high-risk behaviors, and culture of homelessness),

mediating variables (cognitive-perceptual and behavioral factors), and street youth

outcomes. The demographic category included variables of age, gender, and ethnicity.

The high-risk behaviors category of tattooing, body piercing, sex trade history, sexual

behavior, and substance use are documented associated risks for HCV. The category,

culture of homelessness, includes education, income, family dysfunction, abuse, and

interaction with social support systems, mental health status, and a history of living on

the street.

Population Characteristics	Mediating Variables	Street Youth Outcomes

Demographics:
- Age
- Gender
- Ethnicity

High-Risk Behaviors:
- Tattooing
- Body Piercing
- Sexual Behaviour
- Sex Trade
- Substance Abuse

Culture of Homelessness:
- Education
- Income
- Family dysfunction
- Abuse
- Interaction with Social Support Systems
- Mental Health Status
- Homelessness

Cognitive-Perceptual Factors:
- Knowledge
- Social Support
- Perceived risk
- Self-efficacy to use harm reduction

Behavioural Factors:
- Communication
- Help-seeking behaviour

Injection Drug Use Status:
- Negative
- Positive:
  - Sharing Behaviour
  - Choice Drug
  - Frequency of Use

Hepatitis C Virus Status
- Positive
- Negative

(to be developed)

Figure 2-1. Conceptual framework of the relationship between injection drug use and HCV in street youth.

Although separate from this analysis, the framework does identify cognitive-perceptual and behavioral factors (mediating variables) that may be important to examine when planning behavior change and risk reduction interventions for the outcomes of injection drug use or HCV (Rew, Fouladi, & Yockey, 2002). These factors, or modifying variables include: knowledge of HCV, perceived social support, perceived risk of HCV, self efficacy to utilize harm reduction strategies, communication, help-seeking behavior, and coping strategies.

Population characteristics and mediating variables provided valuable insight into the identification of the outcomes of injection drug use and HCV status. The conceptual framework is a useful guide for evaluating risk factors associated with Saskatoon's street youth population. Information about many of the population characteristics noted to be important in street youth populations, outlined by this model, could be obtained from Phase III of the Health Canada database. Mediating variables were not available from this database but would provide useful assessments in future research. Injection drug use behaviors within the street youth culture may be viewed as those practices that reflect the complex interactions of population characteristics and cognitive-perceptual and behavioral factors that may or may not lead to HCV status. An understanding of the injection drug use and HCV relationship is a prerequisite when developing interventions for this vulnerable population.

2.4. Formulation of Research Questions

Based on a review of the literature and available information from Phase III of the Enhanced STD Surveillance in Canadian Street Youth Study, the following questions were examined:

1. ***What is the prevalence of injection drug use and Hepatitis C Virus in Saskatoon street youth?***

Rationale: Limited information is available on the prevalence of HCV and injection drug use in the street youth population. Research on prevalence is needed to understand the scope of the problem in Saskatoon so that the need for intervention may be determined. Further research could confirm trends in the development of HCV infection in newer and younger injection drug users, as HCV prevalence has reached saturation levels among middle-aged, long-term injectors (Thorpe et al, 2000).

2. ***What characteristics are associated with injection drug use in Saskatoon street youth?***

Rationale: A number of individual and social factors often associated with street survival propel youth towards high-risk behaviors including injection drug use. An understanding of these factors is urgently needed to prevent these youth from initiating injection drugs and to identify new users (Wiebe & Reimer, 2000).

3. ***What characteristics are associated with Hepatitis C Virus in Saskatoon street youth?***

Rationale: Injection drug use is currently the most important route of transmission of HCV yet little is known about HCV transmission in Saskatoon street youth. The relative contribution of transmission through other routes involving minor or unapparent exposure

to blood is inconclusive from the literature, particularly for street youth. Prevention and control programs of HCV need to be tailored to local patterns of behavior and characteristics of populations at risk.

<p align="center">*2.5 Definition of Research Variables*</p>

The following operational definitions were used in this study as designated by the Enhanced STD Surveillance in Canadian Street Youth Phase III Study (Health Canada, 2001b).

2.5.1 Definition Of Independent Variable

1. *Street Youth* criteria for participation:

   - 14 to 24 years of age AND

   - able to understand spoken French or English AND

   - able to understand and recognize the purpose of the study AND

   - IN ADDITION, in the last six months,

   - have run away from home or other place of residence for three days or more OR

   - been thrown out of home for three days or more OR

   - been without a fixed address for three days or more

2.5.2. Definitions of Dependent Variables

1. *Hepatitis C Virus (HCV):*

   Serum with antibodies having positive or indeterminate results using a third generation recombinant immunoblot assay (HCV 3.0 RIBA).

2. *Injection Drug Use (IDU)*:

An affirmative response to the question: "In your life, have you ever injected or been injected at least once with drugs in your veins or under your skin (make a fix or to shoot yourself up)?" (See Appendix A, Question 23a).

2.5.3. Definitions of Attribute Variables

1. *Age*:

The date of the interview subtracted by the date of birth of the participant resulting in years within the range of 14 and 24.

2. *Ethnicity*:

An affirmative response to the question: "What ethnic origin do you consider yourself to be?" from the following responses: First Nations, Canadian, Hispanic, African, Chinese, Caribbean, Middle East (See Appendix A, Question 3).

3. *Sex trade work*:

An affirmative response that a sexual act was done in exchange for either food, money, shelter, drugs, and /or material possessions (See Appendix A, Question 30).

4. *Sexual abuse:*

The affirmative response to having unwanted sex (oral, vaginal, or anal) with a person of authority whether force was involved or not (See Appendix A, Question 25). The definition excluded date rape, consensual sex at an early age, or unwanted sex while living on the street (Health Canada, 2001b).

5. *Depression*:

Feeling down, depressed, or hopeless (See Appendix A, Question 34h). Those youth that responded to the question as 'strongly agree' or 'agree' were categorized as being depressed.

6. *Attempted suicide*:

The response of 'strongly agree' or 'agree' to the question "In the past I have attempted to commit suicide" (See Appendix A, Question 35a).

2.6. Assumptions of Study

The following assumptions can be applied to the proposed study:

1. This is a street youth population of adolescents in Saskatoon and therefore findings cannot be generalized to general adolescent populations.

2. The findings are based on street youth found in urban settings and cannot be generalized to rural settings.

Chapter 3: Methodology

3.1 Description of Phase III Primary Study

3.1.1 Research Design and Procedure

An algorithm used for the Saskatoon street youth study is seen in Appendix B. Street youth who had consented to participate in the study were administered a gender specific questionnaire (see Appendix A). This questionnaire preceded the collection of serum for HCV. The questionnaire consisted of questions on demographics, income and level of education, family history, sexual health, lifestyle behaviors, and knowledge of sexually transmitted diseases as mentioned previously. The questionnaire was administered based on gender. Questionnaire information solicited was identical for males and females except for question 40a referring to pregnancy which was asked of females. This variable was not used in the current analysis. A female version of the Enhanced STD Surveillance in Canadian Street Youth Phase III Questionnaire is seen in Appendix A.

Participants in the study were asked to provide a urine sample and two tubes of blood from a single needle-stick poke. Urine was obtained from those consenting youth to test for chlamydia and gonorrhea. Consenting youth had their blood stored and tested for Hepatitis B Virus (HBV), syphilis, Human Immunodeficiency Virus (HIV), Herpes Simplex Virus-1 (HSV - 1), Herpes Simplex - 2 (HSV - 2), Human T Lymphotropic Virus (HTLV) and HCV.

Those participants who did not agree to give a blood sample were only asked to participate in the initial questionnaire. Counselling and referrals were done as required, at the conclusion of the study procedure. Participants were paid an honorarium of $10.00 for participating in the questionnaire and received an additional $10.00 honorarium if they returned for their test results. If youth did return for their results, follow up was initiated as indicated in Appendix B. At no time was any information that could identify study subjects given to Health Canada.

All questionnaires were forwarded to the Division of STD Prevention and Control-Health Canada prior to October 2001. The data was entered and cleaned in Ottawa by Health Canada staff using Microsoft Excel. An electronic data set of Saskatoon's Phase III questionnaire data was returned to Saskatoon in January 2003.

3.1.2 Identification of Research Sample

Health Canada used snowball-sampling methods to recruit Saskatoon street youth as study participants. Youth were asked to inform others within their social networks that the study was being conducted. By using word of mouth as advertisement for the study, recruitment reached youth who may have not intended to participate. Those youth who adopt false identities or who may be on the run from city to city, had an opportunity to hear of the study. Participation in the study was voluntary. Eligibility criteria were designated by Health Canada (See operational definition of street youth on p.15). Youth who did not meet these criteria were excluded from the study (2001b).

3.1.3 Sample Setting

Recruitment was carried out through drop-in centres during day and evening hours. Youth who are on the streets may not necessarily visit the same drop-in centers, so

at least three drop-in centers were approached to participate in the study. See Appendix C for locations of agencies for study recruitment.

3.2 Ethical Considerations

3.2.1 Ethical Approval of Phase III Primary Study

Health Canada required that the Saskatoon site obtain local ethics approval prior to data collection. Ethics approval was obtained on September 7, 1999 from the University of Saskatchewan Advisory Committee on Ethics in Human Experimentation and expired October 1, 2001 as seen in Appendix D.

A research nurse informed study participants about the procedure and purpose of the study in simple, clear language. The consent used in this study is seen in Appendix E. Each participant received written consent and both the study nurse and the participant signed two copies of the consent form. One copy was retained with the questionnaire and one copy was given to the participant. At the end of the initial interview, each participant was given a card with their unique identifier, name and number of the study coordinator, and date to return for their results at their interview site.

Participants were informed that they could withdraw from the study at any time. They were further informed that refusing to participate in the study would not jeopardize use of the drop-in center or other adjunct services at the time of the individual interview or any time in the future. They were also informed that providing laboratory specimens was optional.

All participants were assigned an identification number that was used on all data collection forms. Names linked to identification and consents for participation were

stored in a locked filing cabinet at Idylwyld Health Centre- Public Health Services. These forms were only accessible by the research team.

3.2.2 Ethics Approval for Secondary Analysis

Prior to commencement of this secondary analysis, a research proposal was submitted to the researcher's Thesis Committee at the College of Nursing, University of Saskatchewan and the University of Saskatchewan Behavioral Research Ethics Board for approval. Ethical approval to conduct the present study was received November 18, 2003. A copy of the approval letter from the University of Saskatchewan Behavioral Research Ethics Board is seen in Appendix F. Approval was also obtained from Public Health Services- Saskatoon Health Region for use of their data. The researcher has received electronic confirmation of approval in support of this analysis from Health Canada (S.Shields, personal communication, March 2003; see Appendix G).

<div align="center">

3.3 Measurement Methods

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The measurement instruments used in this secondary analysis included the data set from a nurse-administered questionnaire and one from the laboratory specimen of HCV confirmation.

3.3.1 Questionnaire

An electronic data set of Saskatoon's questionnaire data was made available to the researcher by Public Health Services, Saskatoon Health Region. The data set received by the researcher excluded those results of participants from local detention facilities. Data collected from these detention facilities had not been cleaned and ready for analysis as not all sites in the overall study collected data from detention settings.

Readability and comprehension of the questionnaire was assessed in 1998 in the pilot phase of the overall Canadian study. Validity of data responses were ascertained through the calculation of kappa statistics by Health Canada (2001b). The data collection instrument used for this analysis was a modified version of the questionnaire used in the pilot phase. Kappa statistics and exact modifications to the questionnaire made by Health Canada, were not made available to the researcher.

In order to establish reliability in administering the questionnaire, the study recruited public health nurses experienced in working with street-involved youth as research nurses. Nurses participated in a teleconference prior to data collection to establish consistency in protocol with the questionnaire documentation and laboratory specimen collection.

3.3.2 Laboratory Testing for HCV

In the primary study, youth had their blood stored and tested for antibodies to HCV. Initial HCV screening was conducted with an Ortho HCV 3.0 EIA test. Positive samples were confirmed with a third generation recombinant immunoblot assay (HCV 3.0 RIBA). In a low prevalence population, the RIBA assay has high sensitivity (negative RIBA results mean that the EIA was a false-positive) and high specificity (high positive predictive value, i.e., HCV RNA is detected in $> \sim 80\%$ of RIBA positive samples). If an indeterminate result was obtained on the RIBA assay, then polymerase chain reaction (PCR) testing was used to differentiate between acute versus chronic infection (Health Canada, 2001b). A second data set linking Saskatoon's study identification number with a positive HCV result was requested of Health Canada by the researcher for the purpose of this analysis. This second data set was received in September 2003.

3.4 Sample Size

A main focus of this study was to determine the association between HCV and certain risk behaviors. As available sample size was predetermined, the adequacy of that sample size for this secondary analysis was tested using the following formula (Schlesselman, 1982):

$$n = 2pq(z\alpha + z\beta)^2/(p1-po)^2 \qquad\qquad (3.1)$$

where: $p = p1 + po)/2$

$q = 1-p$

$p1 = poR/[1 + po(R-1)]$

and where:

po   = estimates exposure rate among the comparison group

R   = relative risk

α = level of significance used to detect a difference (risk of a false positive)

β = probability of not detecting a significant difference when there really is a difference

$1-\beta$ = the degree of certainty that if the difference is present, it would be detected

In order to calculate sample size, the risk behavior chosen for HCV was tattooing. The Canadian study by Roy et al. (2001) was used to evaluate this exposure because it was similar in age of participants and the eligibility criteria for participation. Roy et al. found the estimated rate among the non-HCV group for tattooing was 0.528. Therefore, po = 0.528. A relative risk of 2.0 was considered as supporting a clinically meaningful relationship between risk exposure and HCV (Kleinbaum, Kupper, Muller &Nizam,

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1998). Both an $\alpha = 0.05$ and statistical power $(1- \beta)$ of 0.80 were considered as reasonable levels of significance and power to use (Kleinbaum et al., 1998). Therefore, if $\beta = 0.20$, then $z\beta = 0.842$. If $\alpha = 0.05$, then $z\alpha = 1.96$ (Kleinbaum et al). Thus, substituting in equation 3.1:

$$2[(0.6095)(0.3905)][1.96 + 0.842]^2/(0.691 - 0.528)^2 = 140.2$$

an estimated sample of 140 street youth participants is required to identify a two-fold increase in risk of HCV associated with exposures to tattooing, if such a risk existed. The sample size available in this secondary analysis was 186 street youth and therefore was determined to be adequate for the purposes of this analysis.

3.5 Data Management and Analysis

Questionnaire data received from Public Health Services- Saskatoon Health Region was merged with the laboratory tests for HCV using Microsoft Excel. Data was then imported from Excel using the Statistical Package for Social Sciences (SPSS) Data Entry Program for IBM PC microcomputers and verified using random variable case summaries. SPSS Base 11.0 was used to recode missing data and analyze the data. Categorical variables (demographic data and general health characteristics of street youth) were analyzed descriptively using frequency distributions, percentages, cross tabulations, and Chi square tests. The Chi square test was also used to examine associations between categorical variables and the dependent variables, which include injection drug use and HCV status. The independent sample t-test was used to compare means for continuous data in relation to these dependent variables.

Risk factors found to be significant for injection drug use and HCV positive status, at the univariate level, were examined using mulitivariate logistic regression

analysis. Variables with a univariate significance level of $p \leq 0.25$ were considered for entry into the multivariate model. The use of a more traditional level of significance, such as 0.05, often fails to identify variables known to be of importance. This larger significance level allowed suspected variables to become candidates for inclusion in the multivariate model (Hosmer & Lemeshow, 2000). Variables of significance were tested for interaction by both gender and age prior to model building. Multiple logistic regressions, using the *Enter* method, were then used to determine which variables were independently associated with injection drug use and HCV positive status. The *Enter* method allows for the simultaneous examination of clinically relevant and statistically significant variables (Hosmer & Lemeshow, 2000). The level of significance for retention in the final model was set at $\alpha = 0.05$.

Chapter 4: Results

These results contain analysis of Saskatoon data from the Enhanced STD Surveillance in Canada Street Youth Phase III Study conducted between February and July, 2001 by the Division of Sexual Health Promotion and STD Prevention and Control Centre for Infectious Disease Prevention and Control, Health Canada. The conceptual framework of the study, as seen in Figure 2-1 was used to assist in naming population characteristics of street youth in the data analysis of the Saskatoon sample. Figure 4-1 shows the distribution of participants used in this analysis.

4.1 Sample Size

A total of 186 street youth participants were recruited and interviewed for this analysis. From these participants, 83.9% (N = 156) had HCV blood testing. Of the remaining study participants who were not tested for HCV (n = 30), 27 participants did not consent to that component of the study, and three participants were unable to provide a sufficient amount of blood to perform the serologic test.

4.2 Population Characteristics of Saskatoon Street Youth

Population characteristics of street youth were examined overall and by gender.

4.2.1 Demographics

Table 4-1 highlights demographic characteristics of study participants. Data analyses identified 59.7 % (n = 111) youth were male and 40.3% (n = 75) youth were female demonstrating a gender split (male to female) of 1.48 : 1.

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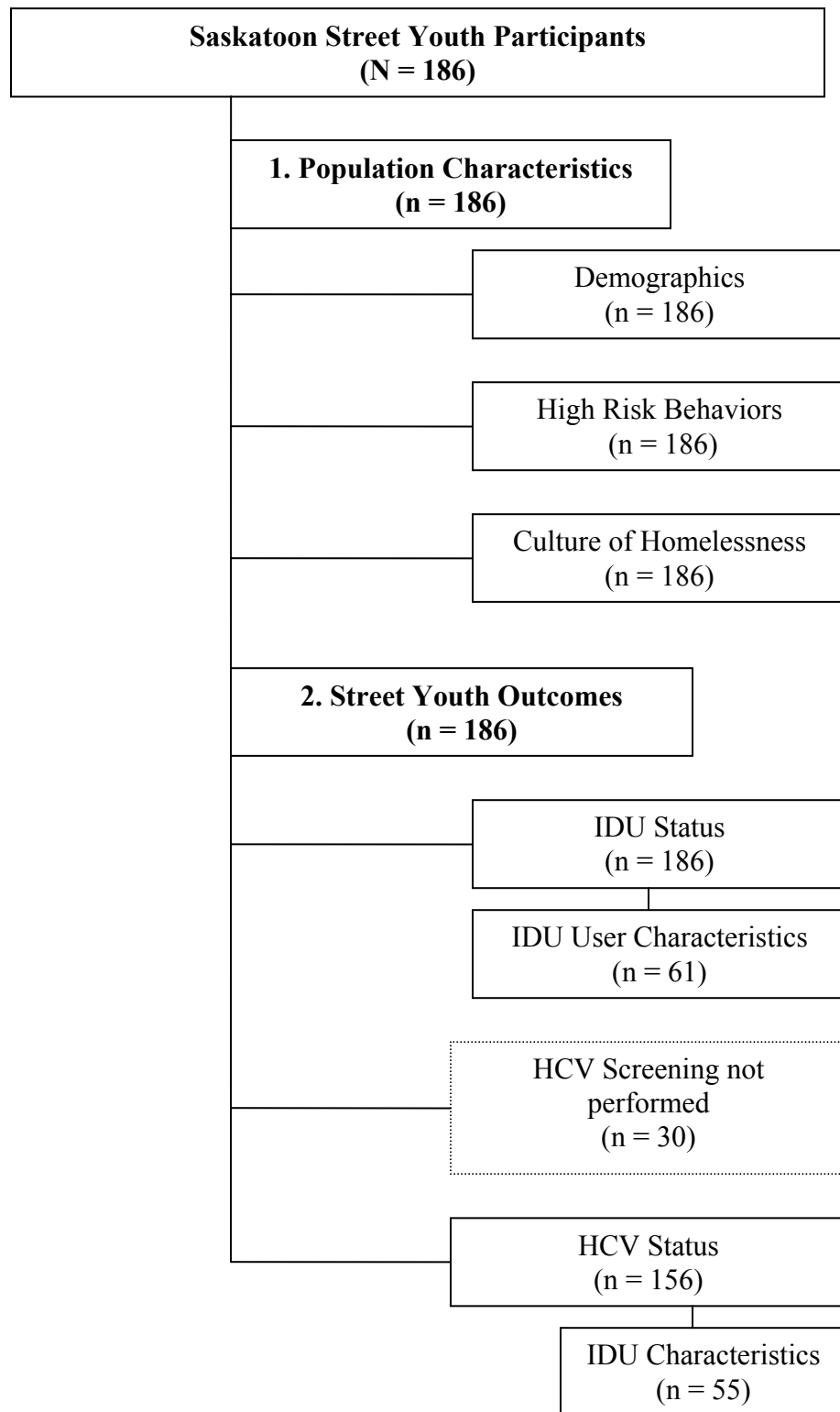
Figure 4-1. Breakdown of major analysis used in study of Saskatoon street youth.

Table 4-1

Demographic Characteristics by Gender in Saskatoon Street Youth Participants

(N = 186)

Variable	Male n = 111	Female n = 75	Total N = 186
Mean age (SD)	17.8 (2.59)	18.0 (2.79)	17.9 (2.67)
Ethnicity			
Aboriginal	94 (84.7)	58 (77.3)	152 (81.7)
Non-Aboriginal	17 (15.3)	17 (22.7)	34 (18.3)

As predetermined by eligibility criteria, study participants were 14 to 24 years of age. The age proportion of street youth in the 14 to 17 age bracket was 50.5 % (n = 94) while those youth in the 18 to 24 age bracket were 49.5 % (n = 92). There was no difference by gender for mean age of subjects.

An overwhelming 81.7% (n = 152) of all participants self-identified themselves as being Aboriginal. Ethnic categories were not read out to the street youth so the possibilities of discrimination from predefined ethnic categories were eliminated. However, the interviewer could classify participants based on their most prominent response. The gender breakdown for Aboriginal street youth was 61.8% male and 38.2% female demonstrating a male to female ratio of 1.6 : 1.

4.2.2 High Risk Behaviors

High risk behaviors examined included tattooing, sexual behavior, sex trade, and substance abuse.

4.2.2.1 Tattoo and body piercing.

Gender differences for tattooing and body piercing are presented in Figure 4-2. Forty-eight percent (48.4%) of participants reported having at least one tattoo and 65.1% reported having ear and/or body piercing. Females were more likely to have ear and/or body piercing ($\chi^2 = 12.35$, df = 1; $p < 0.001$).
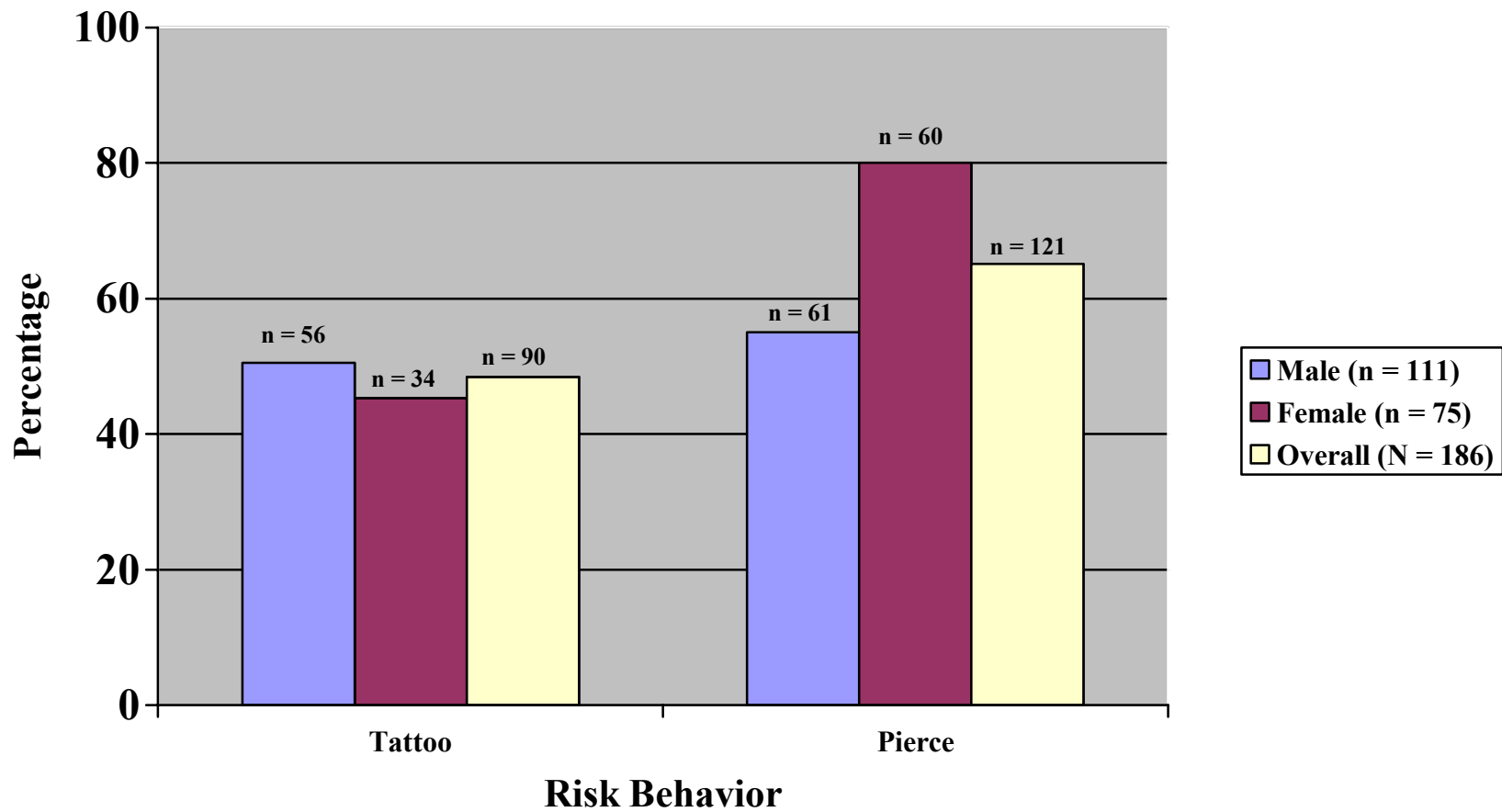
Figure 4-2. Tattoo and pierce behavior by gender in Saskatoon street youth participants (N = 186).

4.2.2.2 Sexual behavior.

The degree of sexual activity varied widely amongst participants. Overall, 91.9% (n = 171) of all participants reported having willing sexual activities (vaginal, anal, or oral) with a mean 19.6 ± 56.49 of lifetime (regular, casual, and sex trade) partners. Male participants reported a mean of 12.4 ± 13.78 lifetime partners while female participants reported 30.3 ± 86.61 such partners (t = 2.142, df = 76.54, p = 0.08).

Of all male participants, 93.7% (n = 104) report being sexually active. All respondents had one or more female sexual partners and two respondents identified one or more male partners. Male participants reported 68% condom use with their most recent sexual experience with a female partner, and 100% condom use with their most recent male partner.

Of all female participants, 89.3% (n = 67) reported being sexually active with one or more male sex partners and 12 females or 17.9% of females identified as having one or more female sex partners. Female participants report 43.3% condom use with their most recent sexual experience with a male partner, and 0% barrier use with their most recent female partner.

4.2.2.3 Sex trade.

Overall, 28% (n = 52) of participants traded sex at least once in their lifetime. Money was identified as the most common item received after having traded sex. The average age for first time in the sex trade was 15.89 years for males (range = 12-20 years), and 14.73 years (range = 10-21 years) for females. More females (63.5%) reported trading sex than males (36.5%), ($\chi^2 = 16.06$, df = 1; p <0.001). Risk behaviors that were significantly associated with reporting sex trade were sexual abuse ($\chi^2 = 22.76$,

df = 1; p < 0.001) and previous use of injection drugs ($\chi2$ = 14.51, df = 1; p < 0.001).

Compared to those not involved in the sex trade, subjects involved in sex trade practices

were more likely to be HCV positive (46.7%), (χ^2 = 2.84, df = 1; p = 0.09).

Characteristics and risk behaviors of participants involved in sex trade activities by

gender are presented in Table 4-2.

4.2.2.4 Substance use.

Substance use was common among this group of street involved youth. The use of

alcohol, tobacco, and non-injection drugs (excluding prescription drugs) by gender is

presented in Figure 4-3. Overall, 40.9% (n = 76) of street youth reported use of alcohol

one or more times a week. Males (45.9%) were more likely to be alcohol users than their

female counterparts (33.3%), ($\chi2$ = 2.95, df = 1; p = 0.09).

Those street youth who reported smoking cigarettes occasionally (n = 25) or

everyday (n = 149) were categorized as cigarette smokers. Overall, 93.5% (n = 174) of

participants reported smoking cigarettes with no significant difference by gender.

Overall, 96.8% (n = 180) of all street youth reported using non-injection drugs at least

once in their lifetime. There is no significant difference by gender for using non-injection

drugs. Marijuana was the most common non-injection drug used, with 80.6% (n = 150) of

participants reporting this use in the three months prior to the interview. The non-

injection use of diverted prescription drugs was reported by only two participants; one

youth reported using valium, the other reported using codeine.

Table 4-2

Characteristics and Behaviors Associated with Participation in Sex Trade Activities by Gender in Saskatoon Street Youth Participants (n = 52)

Variable	Male n = 19	Female n = 33	Total N = 52
Aboriginal ethnicity			
No	5 (26.3)	8 (24.2)	13 (25.0)
Yes	14 (73.7)	25 (75.8)	39 (75.0)
Sexual abuse history[1]			
No	16 (84.2)	14 (42.4)	30 (57.7)
Yes	3 (15.8)	19 (57.6)	22 (42.3)
Use of injection drugs[2]			
No	16 (84.2)	8 (24.2)	24 (46.2)
Yes	3 (15.8)	25 (75.8)	28 (53.8)
HCV positive[3]			
No	10 (100)	26 (78.8)	45 (86.5)
Yes	0 (0.0)	7 (21.2)	7 (13.5)

[1]$p < 0.01$; [2]$p < 0.001$; [3]$p < 0.05$

33
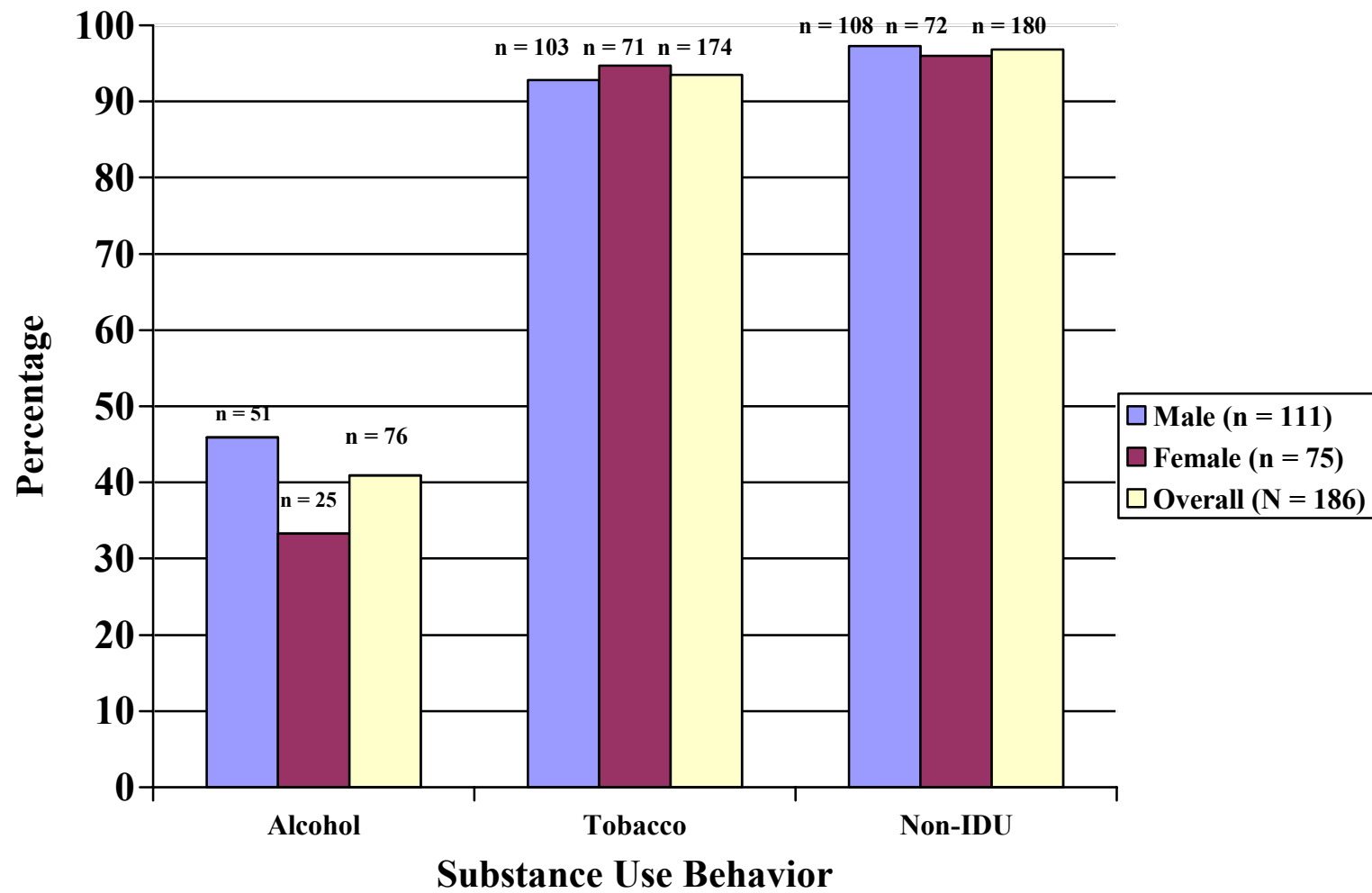
Figure 4-3. Substance use behavior by gender in Saskatoon street youth (N = 186).

4.2.3 Culture of Homelessness

4.2.3.1 Education.

Most street youth had a secondary level of education or were enrolled in secondary school as seen in Table 4-3. Overall, 48.9% of street youth reported they were not currently attending school with no significance by gender. The main reason given by youth for not attending school (33.3%) was that they had either dropped out or had been kicked out of school. Three participants indicated they no longer attended school because they had completed their grade twelve or equivalent.

4.2.3.2 Income.

Participants were asked to report what their principal source of income was in the three months prior to the interview. For 33.3% of youth, money from their family was their main source of income. Another 31.7% indicated they received money from social welfare and 9.1% obtained money from stealing, robbery, or scams.

4.2.3.3 Leaving home.

Participants that reported no longer living with a parent or caregiver (n = 103), or that reported living with them for part of a week but not everyday (n = 3) were categorized as not living with their parents/caregivers. More than half of the participants (57%) reported no longer living with their parents/caregivers of which 39% had not done so for more than one year. Youth reported *arguing with parents* as the main reason for leaving home. Youth who reported arguing as the main reason for leaving home were further questioned as to the topics of argument between themselves and their parents. Of this group, 33.3% reported arguing over *rules being set and broken* and 22.2% identified *their own drug or alcohol use* as the most common topics for argument.

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Table 4-3

Education Status by Gender in Saskatoon Street Youth Participants (N = 186)

Variable	Male n = 111	Female n = 75	Total N = 186
Education Level			
Primary school	19 (17.1)	11 (14.7)	30 (16.1)
Secondary school	90 (81.1)	64 (85.3)	154 (82.8)
Post-secondary	2 (1.8)	0 (0.0)	2 (1.1)
Currently attending school	52 (46.8)	43 (57.3)	95 (51.5)
Not attending school	59 (53.2)	32 (42.7)	91 (48.9)

4.2.3.4 Abuse.

When participants were asked if some form of abuse was a reason for not living with their parents, 15.6% (n = 29) responded that it was. Of those who reported abuse, 41.3% (n = 12) reported physical abuse and 51.7% (n = 15) reported emotional abuse. Females were more likely to report both physical abuse ($\chi^2 = 6.41$, df = 1; p = 0.01) and emotional abuse ($\chi^2 = 4.71$, df = 1; p = 0.03) than males.

Street youth were asked if they have ever experienced sexual abuse. Overall, 19.9% (n = 37) of street youth reported being sexually abused. Approximately 89% of the self-identified Aboriginal street youth reported sexual abuse versus 10.8% of non-Aboriginal street youth. Aboriginal females represented the largest proportion of sexually abused street youth in this sub-population ($\chi^2 = 3.98$, df = 1, p = 0.05) compared to males. See Table 4-4 for sexual abuse by gender in street youth participants.

4.2.3.5 Family dysfunction.

Twenty percent (20.4%) of street youth reported that their family was homeless or living in a shelter at some point while they were growing up. It is noted that two youth refused to answer this question. Overall, 72% of participants reported that their parents were separated or divorced while they were growing up. More female street youth (82.7%) were likely to have separated or divorced parents than males (64.9%) ($\chi^2 = 7.04$, df = 1; p = 0.008).

Participants were questioned as to the injection drug use history of both their father and mother. Overall, 13.4% of street youth identified that their father used injection drugs while 15.1% had mothers who used injection drugs in the past. Parental substance use was not associated with participant's gender.

Table 4-4

Sexual Abuse by Gender in Saskatoon Street Youth Participants (n = 37)

Variables	Male N=9	Female N=28	Total N=37
Aboriginal ethnicity	8 (88.9)	25 (89.3)	33 (89.2)
Non-Aboriginal ethnicity	1 (11.1)	3 (10.7)	4 (10.8)
Non-regular use of alcohol	5 (55.6)	22 (78.6)	27 (73.0)
Regular use of alcohol	4 (44.4)	6 (21.4)	10 (27.0)
Never used non-injection drugs	0 (0)	2 (7.1)	2 (5.5)
Used non-injection drugs	9 (100)	26 (92.9)	35 (94.6)
Never used injection drugs	8 (88.0)	10 (35.7)	18 (48.6)
Used Injection drugs[1]	1 (11.1)	18 (64.3)	19 (51.4)
HCV Negative status	8 (88.9)	22 (78.6)	30 (81.1)
HCV Positive status	1 (11.1)	6 (21.4)	7 (18.9)

[1]$p < 0.01$

In order to gain understanding into the home environment of street youth, participants were asked questions regarding their parent's interaction and behavior while they were growing up. The responses to the questions asked are seen by gender in Figure 4-4. Overall, the following percentages were reported by study participants in reference to parental activities and behaviors in their home environment: 75.3% reported verbal abuse, 53.2% reported hitting or assault, 50.5% reported being arrested or in jail or prison, and 51.1% reported throwing or breaking things in anger. Females were more likely to have parents hit or assault each other ($\chi^2 = 5.860$, df = 1; p = 0.02) and have parents that throw or break things in anger ($\chi^2 = 10.224$, df = 1; p = 0.001).

4.2.3.6 Contact with social support systems.

Youth are often involved with social support systems before leaving their permanent home. Figure 4-5 provides the number of youth who reported having interactions with social support systems. Overall, the following percentages were reported by participants with reference to their interaction with social supports: 67.7% had a social worker, 60.8% had been placed in foster care, and 38.7% had been in at least one group home. Females were more likely than males to have a social worker (74.7% versus 63.1%); ($\chi^2 = 2.56$, df = 1, p = 0.097), and have been placed in foster care (70.7% versus 54.1%), ($\chi^2 = 5.18$, df = 1, p = 0.02).

39
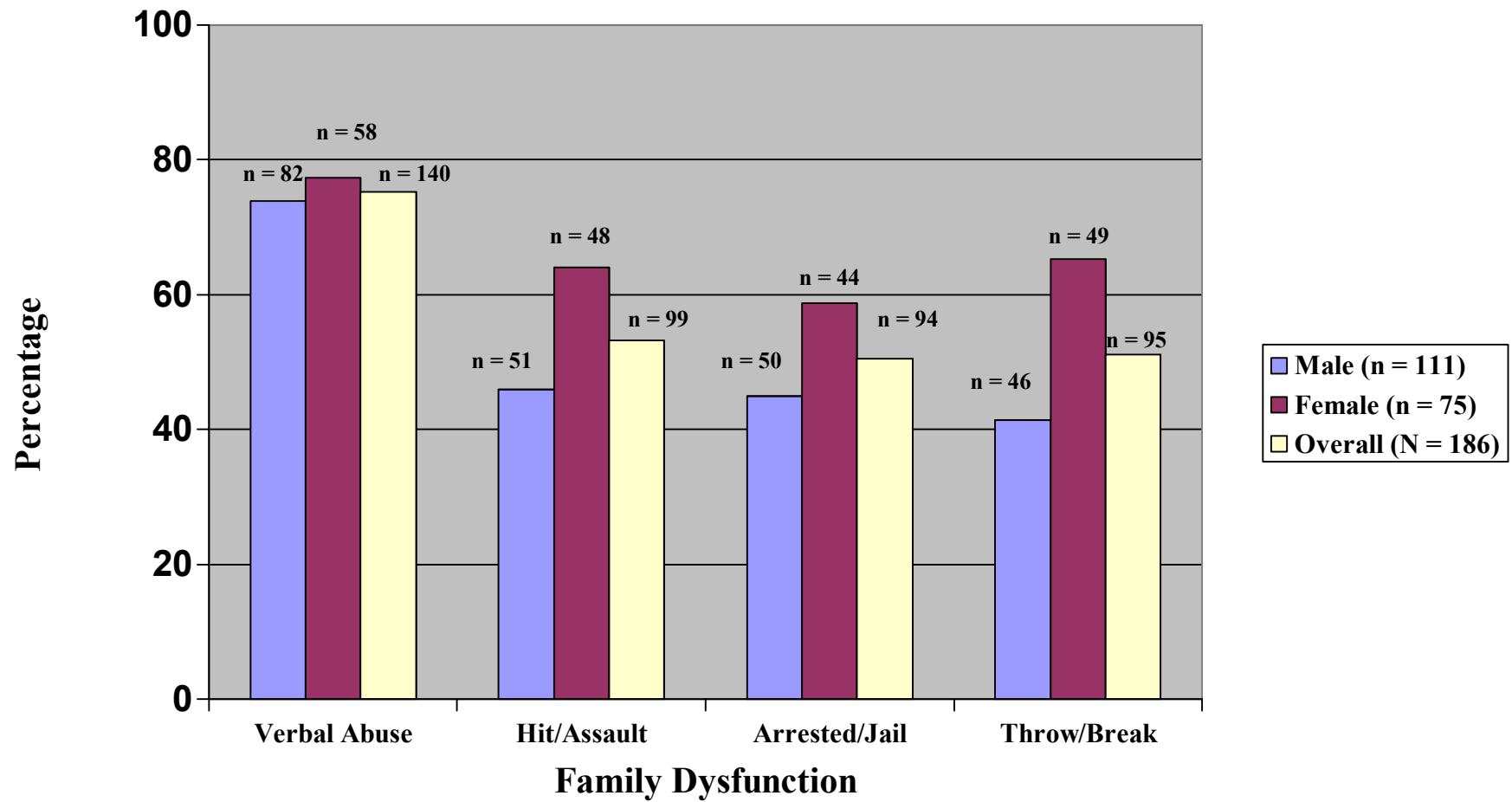
Figure 4-4. Parental interactions and behaviors by gender in Saskatoon street youth participants (N = 186).
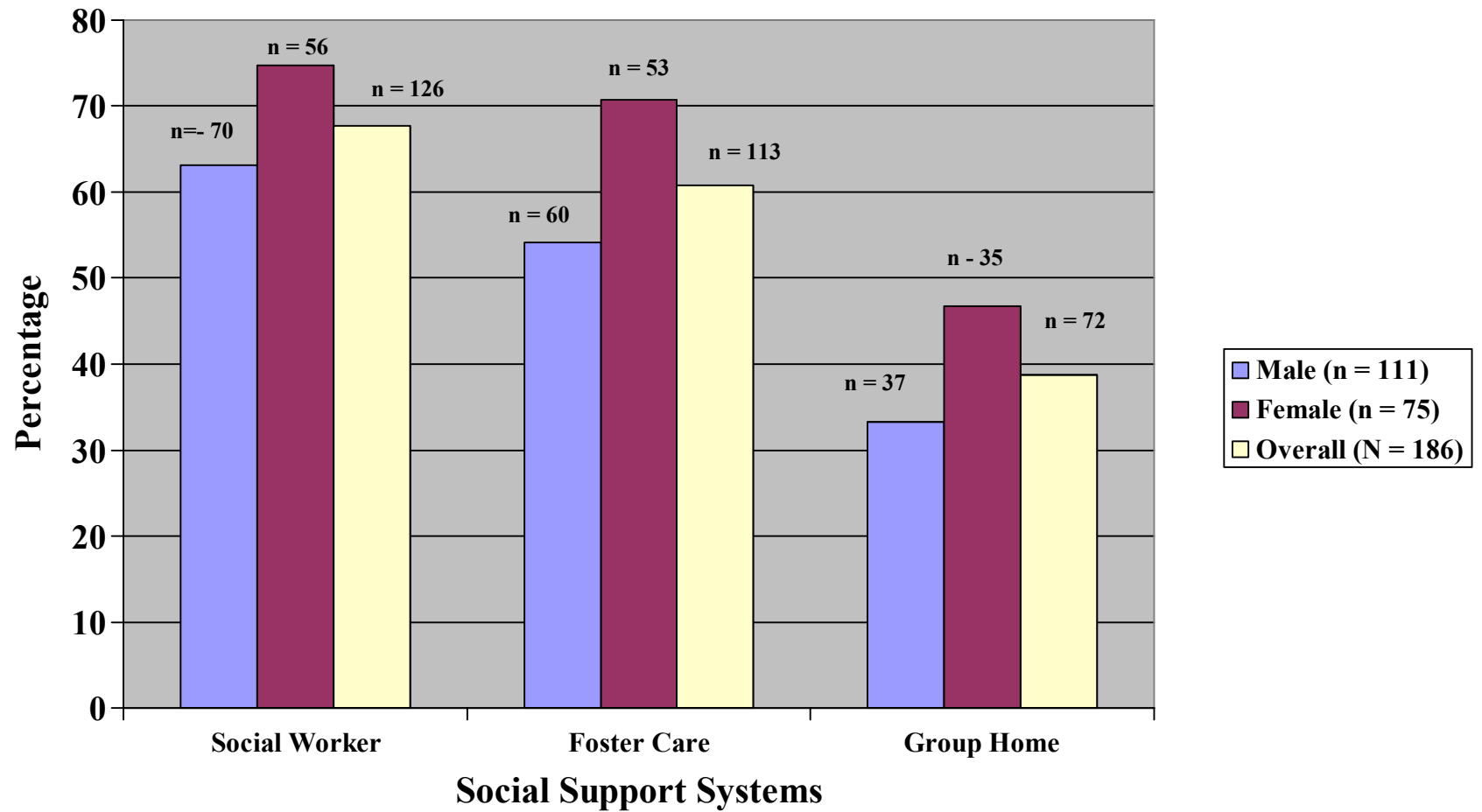
Figure 4-5. Contacts with social support systems by gender in Saskatoon street youth participants (N = 186)

4.2.3.7 Contact with the justice system.

Youth were questioned if they ever had a probation or parole officer. Overall, 56.5% of participants identified they had a probation or parole officer at some point in their life. In addition, 70.4% of participants reported having ever been to a detention facility, youth detention centre, prison, or jail, overnight or longer. Males were significantly more likely to have a probation or parole officer (63.1%), ($\chi^2 = 4.90$, df = 1, p = 0.03) and significantly more likely to have been in detention or jail (80.2%), ($\chi^2 = 12.57$, df = 1, p < 0.001) as seen in Figure 4-6.

4.2.3.8 Mental health status.

When participants were asked about history of depression 31.7% of participants reported being depressed. More females (40%) than males (26.1%) reported current depression ($\chi^2 = 3.98$, df = 1, p = 0.05). Participants were also questioned if they had ever attempted to commit suicide. Overall, 36.6% of participants responded as having attempted to commit suicide. Females were significantly more likely to attempt to commit suicide than males ($\chi^2 = 26.48$, df = 1, p < 0.001). This data is not presented.

4.2.3.9 Homelessness.

When participants were asked if they had ever lived or continue to live on the streets, 33.3% indicated that they had. Having lived on the streets was not significant by gender. In a separate line of questioning, 40.9% (n = 76) of street youth identified that they spent greater than 40 hours a week hanging out on the street. Almost half of this group reported this behavior did not change with Saskatchewan weather. More males (47.7%) were likely to hang out on the street than their female counterparts (30.7%) ($\chi^2 = 5.40$, df = 1; p = 0.02).
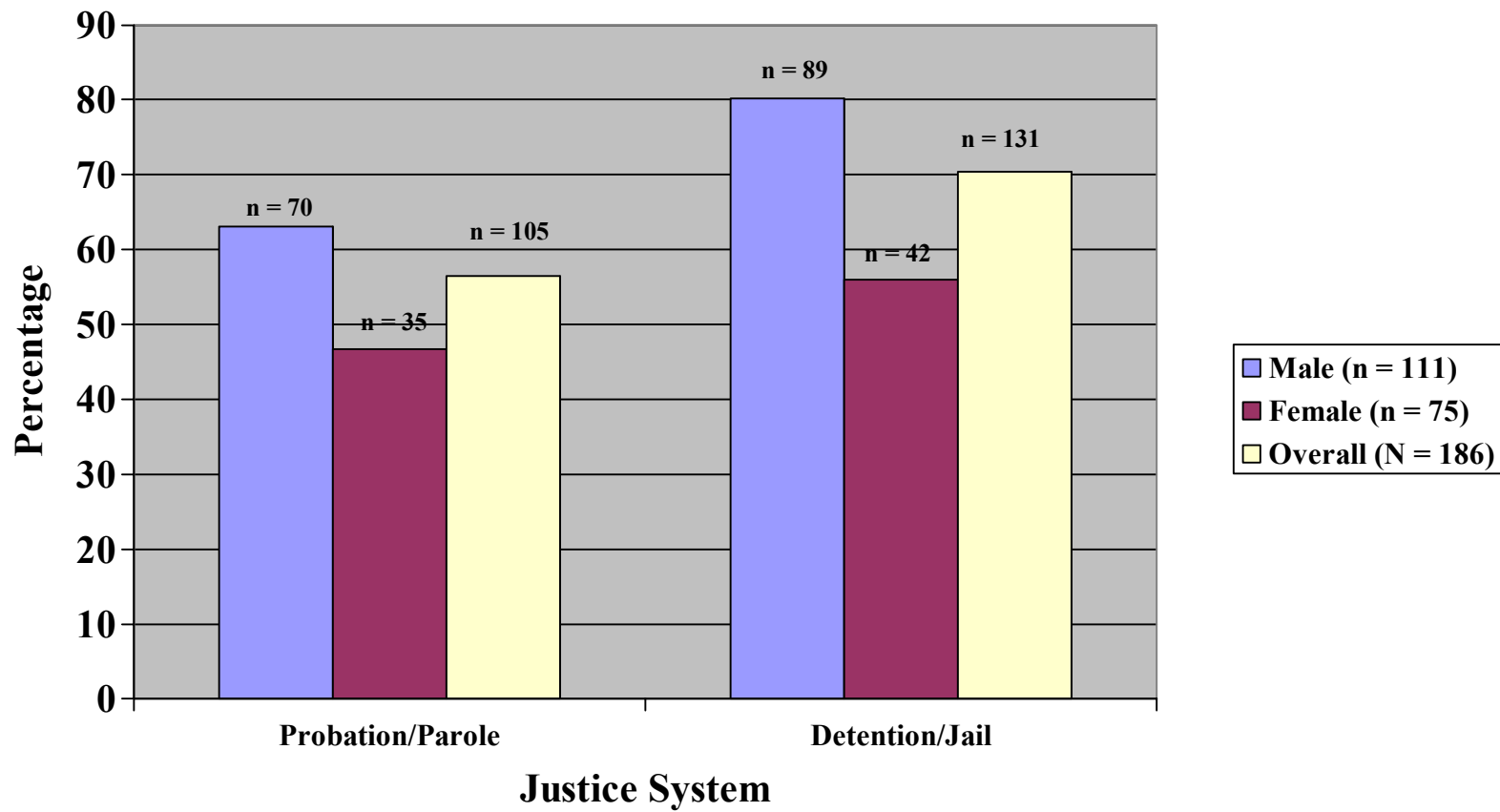
Figure 4-6. Contact with the justice system by gender in Saskatoon street youth participants (N = 186).

Street youth were also questioned as to where they would sleep the night they participated in the interview. Most youth (57%) would sleep at home with parents/siblings/relatives (n = 106), 10.8% (n = 20) would sleep at friends' homes, 15.1% (n = 28) would sleep in their own place. Of the remaining 17.2%, 14.5% (n = 27) reported having to stay in a shelter, hotel, group home, or safe house, and 2.7% (n = 5) stated they didn't know where they were going to sleep that night.

4.3 Results in Relation to Research Questions

4.3.1 Research Question 1

What is the prevalence of injection drug use and Hepatitis C Virus in Saskatoon street youth?

Overall, 32.8% (n = 61) of 186 street youth reported having ever used injection drugs in their lifetime. Overall, 23.1% (n = 43) reported they had injected drugs more than once in their life and 9.7% (n = 18) reported using injection drugs once in their lifetime. There was a trend for more females than males to have used injection drugs at some point in their lives ($\chi^2 = 2.96$, df = 1, p = 0.09). See Figure 4-7a and Figure 4-7b for overall injection drug use findings and prevalence of injection drug use by age and gender. There were no significant associations for injection drug use by age and gender.
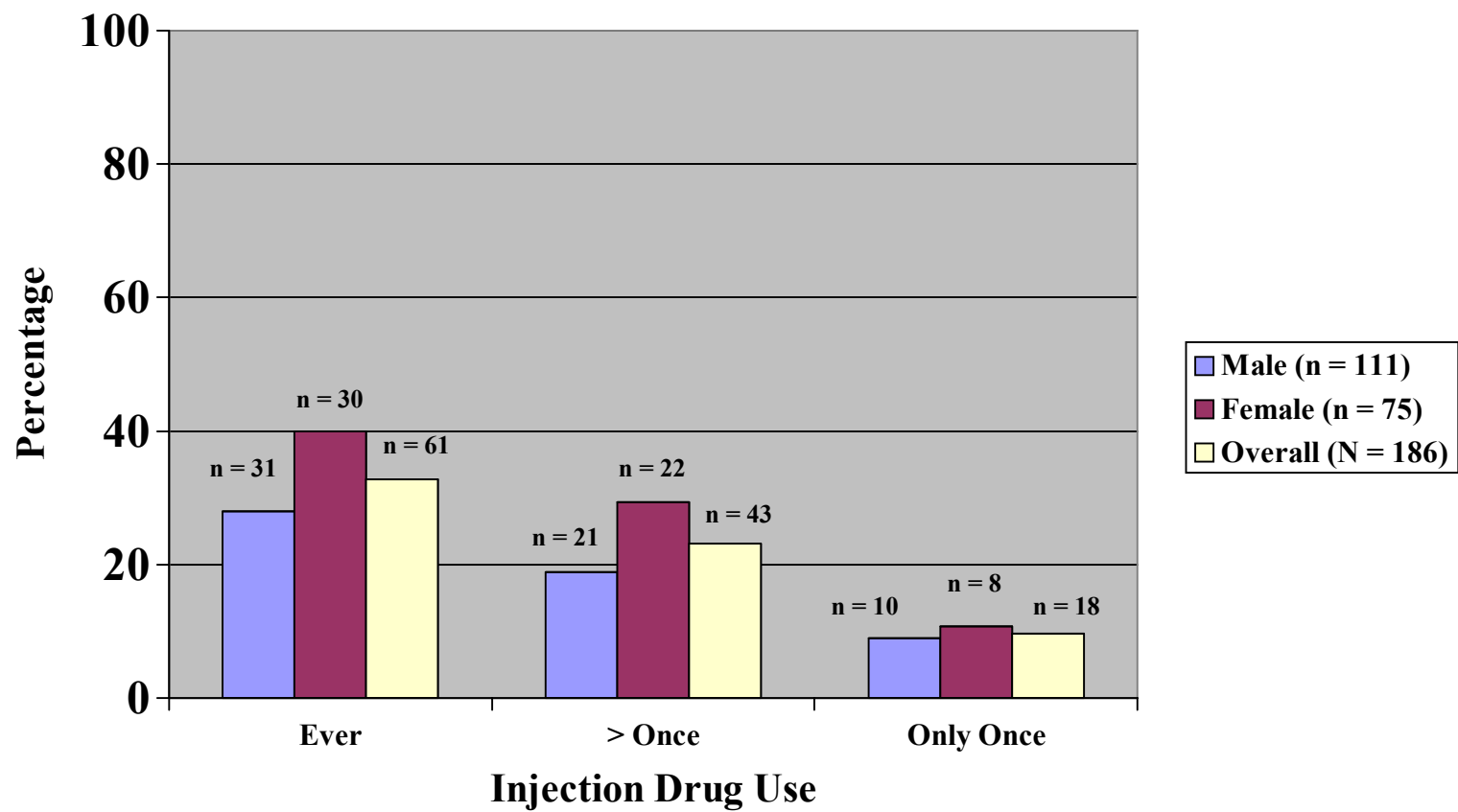
Figure 4-7a. Injection drug use by gender in Saskatoon street youth participants (N = 186).
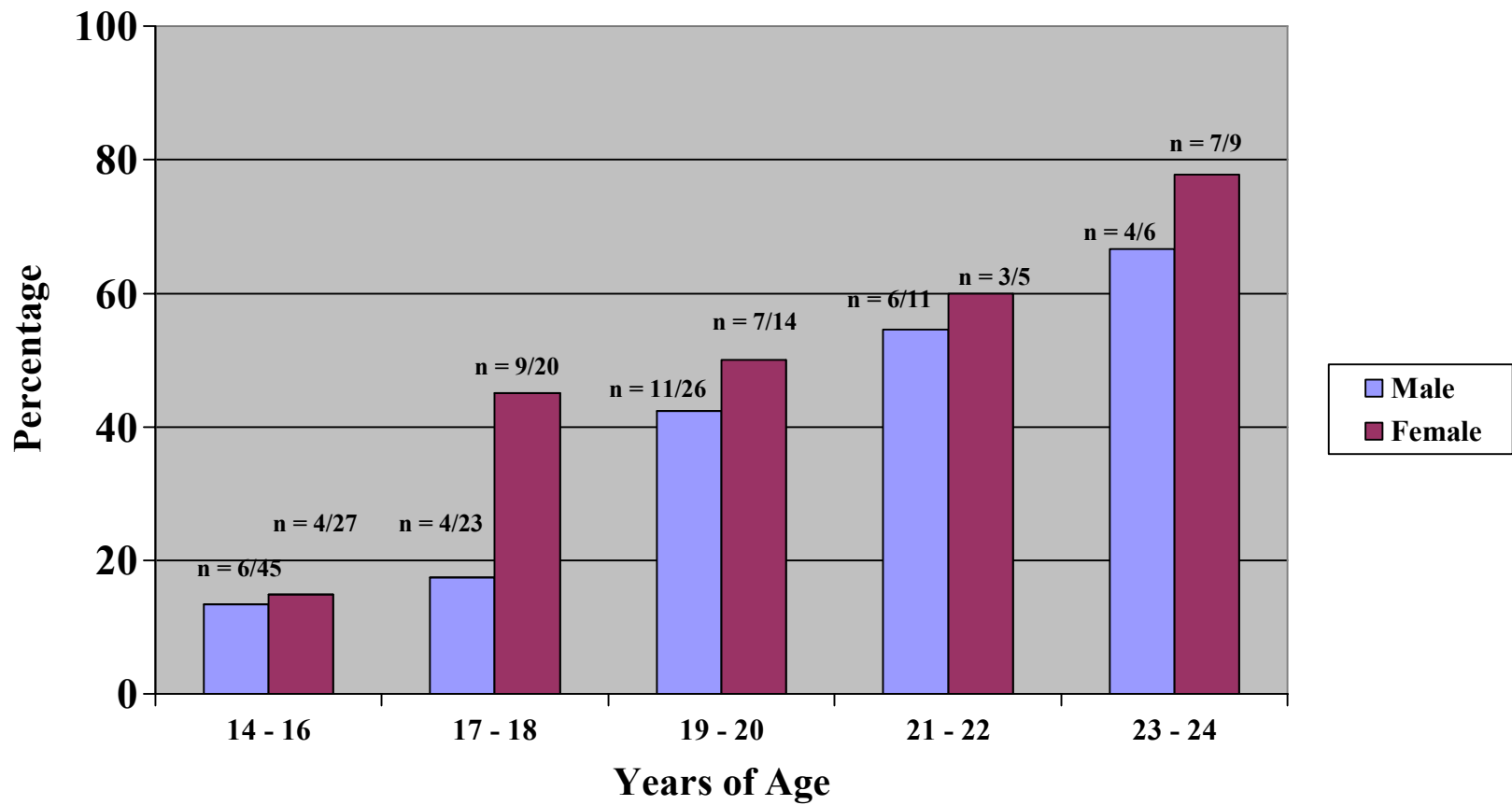
Figure 4-7b. Prevalence of injection drug use by age and gender in Saskatoon street youth participants (N = 186).

There were 156 youth who provided blood specimens for HCV screening. Overall, thirteen youth were found to be HCV antibody positive and two youth were HCV antibody indeterminate for an overall prevalence of 9.6% (n = 15). Indeterminate results are to be resolved by PCR testing (Health Canada, 2001b), however the results of any further testing have not been received by Health Canada. Of those that tested positive, only 26.7% (n = 4) youth were aware of this infection at the time of the interview. Figure 4-8 presents prevalence of HCV by age and gender, with no significant associations identified.

The prevalence of HCV was 20% in those participants that had underwent HCV screening and identified as having used injection drugs (n = 11/55). Females were more likely to have HCV at an earlier age than males. No males between 14 and 16, or 23 and 24 years had HCV infection. Likewise, no females between the ages of 21 and 22 years had HCV infection.

Further analysis was conducted comparing those participants who had provided serum for HCV screening with those participants who had not provided serum. Demographic and injection drug use behavior by participants who underwent HCV screening and those who did not is presented in Table 4-5. No significant associations were found between the two groups.
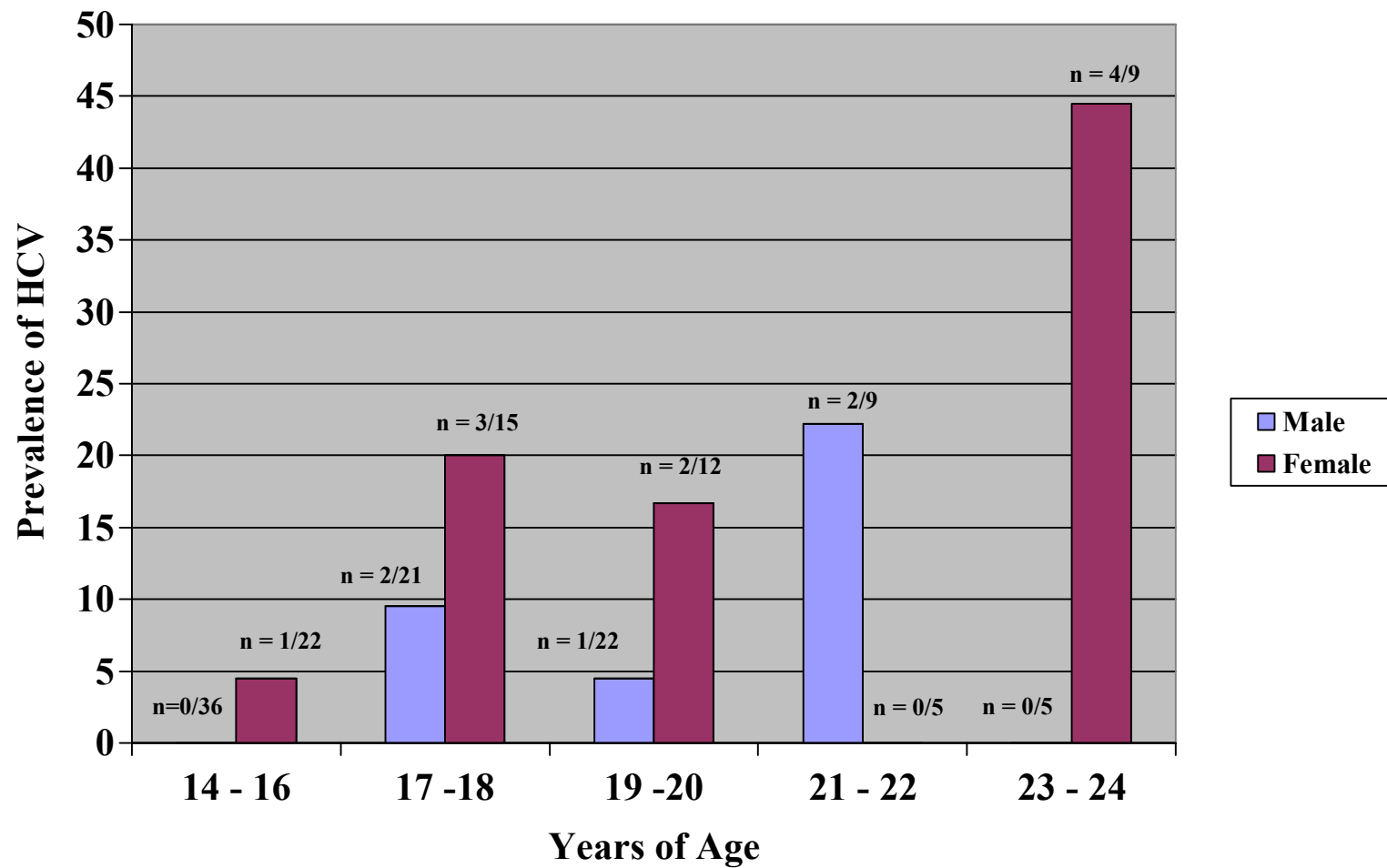
Figure 4-8. Prevalence of HCV within gender by age groups in Saskatoon street youth participants (n = 156).

Table 4-5

Demographic and Injection Drug Use Behavior by Hepatitis C Virus Screening (n = 156)

Variable n (%)	No HCV Screening (n = 30)	HCV Screening (n = 156)
Age mean (SD)	17.3 (2.69)	18.0 (2.65)
Gender		
Male	18 (60.0)	93 (59.6)
Female	12 (40.0)	63 (40.4)
Aboriginal ethnicity		
No	5 (16.7)	29 (18.6)
Yes	25 (83.3)	127 (81.4)
Use of injection drugs *		
Never	24 (80.0)	101 (64.7)
Once	5 (16.7)	38 (24.4)
More than once	1 (3.3)	17 (10.9)

∗ 1 cell (16.7) has expected count less than 5. The minimum expected count is 2.90.

4.3.2 Research Question 2

What characteristics are associated with injection drug use in Saskatoon street youth?

Participants who reported having used injection drugs (n = 61) included both current and past users. Characteristics by gender are seen in Table 4-6. The mean age of first injection drug use in this group of injection drug users was 15.6 ± 2.41 years. Females were significantly younger (mean age = 15.6 ± 2.28 years) than their male counterparts (mean age = 16.2 ± 2.40 years) in their age of initiation into this risk behavior (t = 2.10, df = 59, p = 0.04). Of particular concern is that 65.6% of all participants that reported ever using injection drugs did so at age of less than 16 years. Females were injecting drugs for a longer period of time averaging 4.5 years, or on average 1.2 years longer than their male counterparts (t = -1.770, df = 59, p = 0.08).

Street youth were questioned about their use of clean equipment when injecting drugs in order to determine the degree of sharing behavior in this population. Participants that responded as using clean equipment 'some of the time' or 'most of the time' were categorized as having used unclean equipment. The questionnaire did not differentiate between the types of gear used in the sharing behavior. More females used unclean drug paraphernalia versus males (χ^2 = 0.560, df = 1, p = 0.508 FET), however this was not significant. Overall, very few participants (16.4%) reported using unclean equipment when injecting drugs. Among those currently injecting drugs that report injecting on a weekly basis, the mean number of injections per week was 24.4 (± 63.49) or approximately 3.5 injections per day. In the three months prior to the interview, Ritalin was the drug most frequently injected (44.3%), followed by morphine (39.3%), and cocaine (27.9%).

Table 4-6

Injection Drug Use Characteristics by Gender in Saskatoon Street Youth Participants
(n = 61)

Variable	Male n = 31	Female n = 30	Total N = 61
Mean age of first injection (SD)[1]	16.2 (2.40)	15.0 (2.28)	15.6 (2.41)
By age category			
<14 years	4 (12.9)	9 (30.0)	13 (21.3)
14 to 16 years	15 (48.4)	12 (40.0)	27 (44.3)
17-18 years	6 (19.4)	8 (26.7)	14 (23.0)
>18 years	6 (19.4)	1 (3.3)	7 (11.5)
Mean frequency of injections/week (SD)	12.9 (11.45)	36.2 (89.0)	24.4 (63.49)
Ritalin by injection	14 (45.2)	13 (43.3)	27 (44.3)
Morphine by injection	11 (35.5)	13 (43.3)	24 (39.3)
Cocaine by injection	7 (22.6)	10 (33.3)	17 (27.9)
Mean years of injecting(SD)[2]	3.3 (2.27)	4.5 (2.89)	3.9 (2.64)
By year category [2]			
$\leq$ 2 years	13 (41.9)	11 (36.7)	24 (39.3)
3 years	5 (16.1)	4 (13.3)	9 (14.8)
4-5 years	8 (25.8)	2 (6.7)	10 (16.4)
$\geq$ 6 years	5 (16.1)	13 (43.3)	18 (29.5)
Used unclean equipment	4 (12.9)	6 (20.0)	10 (16.4)

[1]$p < 0.05$; [2]$p < 0.10$

The relationships between injection drug use and demographic characteristics and high-risk behaviors were further examined. Table 4-7 presents findings for these population characteristics by injection drug use status.

Females were more likely to use injection drugs than males ($\chi^2 = 2.96$, df = 1, p = 0.09). The majority of all street youth identified themselves as being Aboriginal; however ethnicity was not found to be significantly associated with injection drug use.

The mean number of lifetime sexual partners for the sample was 19.65 ± 56.49 partners (median = 7.0, range = 0- 515 partners). The mean number of lifetime partners was significantly higher for those youth that had used injection drugs (mean = 39.2 ± 92.58 partners) than those youth that had never used injection drugs (mean = 10.1 ± 18.26 partners). Those participants who identified as having a sexual partner that used injection drugs in the three months prior to the interview, were more likely to use injection drugs themselves. The abuse of other substances did not differ between those youth who used and didn't use injection drugs.

The relationships among culture of homelessness variables and injection drug use were also examined as seen in Table 4-8. Participants who were not attending school ($\chi^2 = 16.90$, df = 1, p < 0.001) and not living with their parent/caregiver on a daily basis ($\chi^2 = 8.49$, df = 1, p = 0.004) were more likely to report injection drug use.

A history of sexual abuse was significantly associated with injection drug use ($\chi^2 = 7.216$, df = 1, p < 0.01), as was physical abuse use ($\chi^2 = 6.677$, df = 1, p = 0.02 FET), and emotional abuse use ($\chi^2 = 8.493$, df = 1, p < 0.01). A history of working in the sex trade was also significantly associated with injection drug use ($\chi^2 = 14.51$, df = 1, p < 0.001).

Table 4-7

Demographics and High Risk Behaviors by Injection Drug Use Status in Saskatoon Street Youth Participants (N = 186)

Variable	IDU Ever	IDU Never	Total
Age mean(SD)[1]	19.4 (2.78)	17.2 (2.28)	17.9 (2.67)
Sex n(%)[2]			
Male	31 (50.8)	80 (64.0)	111 (59.7)
Female	30 (49.2)	45 (36.0)	75 (40.3)
Aboriginal ethnicity			
No	8 (13.1)	26 (20.8)	34 (18.3)
Yes	53 (86.9)	99 (79.2)	152 (81.7)
Mean lifetime partners[3]	39.2 (92.58)	10.1 (18.26)	19.7 (56.49)
Lifetime sexual partners[1]			
≤ 7 partners	19 (31.1)	78 (62.4)	97 (52.2)
≥ 8 partners	42 (68.9)	47 (37.6)	89 (47.8)
Sexual partner with IDU[1]			
No			
Yes	46 (75.4)	121(98.6)	167 (89.8)
	15 (24.6)	4 (3.2)	19 (10.2)
Sex trade history[1]			
No	33 (54.1)	101 (80.8)	134 (72.0)
Yes	28 (45.9)	24 (19.2)	52 (28.0)
Non-injection drug use			
No			
Yes	1 (1.6)	5 (4.0)	6 (3.2)
	60 (98.4)	120 (96.0)	180 (96.8)
Regular use of alcohol			
No	33 (54.1)	77 (61.6)	110 (59.1)
Yes	28 (45.9)	48 (38.4)	76 (40.9)
Smoke cigarettes[2]			
No	1 (1.6)	11 (8.8)	12 (6.5)
Yes	60 (98.4)	114 (91.2)	174 (93.5)

[1]$p < 0.001$; [2]$p < 0.10$; [3]$p < 0.05$

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Table 4-8

Culture of Homelessness Characteristics by Injection Drug Use Status in Saskatoon Street Youth Participants (N = 186)

Variable	IDU Ever	IDU Never	Total
Attending school[1]			
No	43 (70.5)	48 (38.4)	91 (48.9)
Yes	18 (29.5)	77 (61.6)	95 (51.1)
Main income of social welfare			
No	40 (65.6)	87 (69.6)	127 (68.3)
Yes	21 (34.4)	38 (30.4)	59 (31.7)
Father IDU			
No	53 (86.9)	108 (86.4)	161 (86.6)
Yes	8 (13.1)	17 (13.6)	25 (13.4)
Mother IDU			
No	50 (82.0)	108 (86.4)	158 (84.9)
Yes	11 (18.0)	17 (13.6)	28 (15.1)
Parents separated/divorced	19 (31.1)	33 (26.4)	52 (28.0)
No	42 (68.9)	92 (73.6)	134 (72.0)
Yes			
Sexual abuse history[2]			
No	42 (68.9)	107 (85.6)	149 (80.1)
Yes	19 (31.1)	18 (14.4)	37 (19.9)
Emotional abuse history[2]			
No	51 (83.6)	120 (96.0)	171 (91.9)
Yes	10 (16.4)	5 (4.0)	15 (8.1)
Physical abuse history[2]			
No	53 (86.9)	121 (96.8)	174 (93.5)
Yes	8 (13.1)	4 (3.2)	12 (6.5)
Living with parents[2]			
No	44 (72.1)	62 (49.6)	106 (57.0)
Yes	17 (27.9)	63 (50.4)	80 (43.0)

[1]$p < 0.001$; [2]$p < 0.01$; [3]$p < 0.05$

Table 4-8 (continued)

Culture of Homelessness Characteristics by Injection Drug Use Status in Saskatoon
Street Youth Participants (N = 186)

Variable	IDU Ever	IDU Never	Total
Ever in detention or jail[1]			
No	5 (8.2)	50 (40.0)	55 (29.6)
Yes	56 (91.8)	75 (60.0)	131 (70.4)
Ever had social worker[2]			
No	11 (18.0)	49 (39.2)	60 (32.3)
Yes	50 (82.0)	76 (60.8)	126 (67.7)
Ever been in foster care			
No	22 (36.1)	51 (40.8)	73 (39.2)
Yes	39 (63.9)	74 (59.2)	113 (60.8)
Ever been in group home[3]			
No	31 (50.8)	83 (66.4)	114 (61.3)
Yes	30 (49.2)	42 (33.6)	72 (38.7)
Depressed			
No	37 (60.7)	90 (72.0)	127 (68.3)
Yes	24 (39.3)	35 (28.0)	59 (31.7)
Attempted suicide[2]			
No	29 (47.5)	89 (71.2)	118 (63.4)
Yes	32 (52.5)	36 (28.8)	68 (36.6)
Ever lived on streets[2]			
No	33 (54.1)	91 (72.8)	124 (66.7)
Yes	28 (45.9)	34 (27.2)	62 (33.3)
Hang out on streets[3] (>40 hrs/week)			
No	35 (57.4)	75 (60.0)	110 (59.1)
Yes	26 (42.6)	50 (40.0)	76 (40.9)

[1]$p < 0.001$; [2]$p < 0.01$; [3]$p < 0.05$

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Street youth participants whose parents had separated or divorced and who identified as having a mother who used injection drugs, or as having a father who had used injection drugs, were examined as determinants of family dysfunction. Seventy-two percent (72%) of youth reported that their parents had separated or divorced. More street youth reported having a mother (15.1%) than a father (13.4%) who used injection drugs, however neither variable were associated with injection use.

Street youth participant's contact with social support systems and the law were also examined as these systems are often indicators to homelessness and street involvement. Ever having a social worker ($\chi^2 = 8.405$, df = 1, p = 0.004), ever living in a group home ($\chi^2 = 4.194$, df = 1, p = 0.041), or ever having been in detention center or jail overnight or longer ($\chi^2 = 19.910$, df = 1, p < 0.001), were significantly associated with injection drug use. Participants who reported a history of attempted suicide were also likely to use injection drugs ($\chi^2 = 9.89$, df = 1, p = 0.002). Depression in this group was also examined, but was not found to be significant. A history of living on the street was significantly associated with injection drug use. ($\chi^2 = 6.45$, df = 1, p = 0.01).

4.3.2.1 Summary of findings of population characteristics with injection drug use.

Separate analyses were conducted to examine associations between population characteristics and injection drug use as the outcome. This analysis compared injection drug use between street youth participants who have ever injected drugs with those youth who have never used injection drugs as the reference. A number of characteristics were found to be significant for injection drug use status at the univariate level. A summary of these variables with odds ratios and 95% confidence intervals (CI) are presented in Table 4-9. The continuous variable, lifetime sexual partners, was recoded into categories

Table 4-9

Univariate OR (95% CI) Results for Variables Associated with Injection Drug Use

(p < 0.25)

Variable	OR	95% CI
Gender	1.72	0.92 - 3.20
Aboriginal ethnicity	1.74	0.74 - 4.11
Currently smoke cigarettes	5.79	0.73 - 45.92
Lifetime sexual partners	3.67	1.91 - 7.04
Sexual partners that use injection drugs(past 3 months)	9.86	3.11 - 31.23
Sex trade history	3.57	1.82 - 6.99
Sexual abuse history	2.69	1.29 - 5.62
Physical abuse history	4.57	1.32 - 15.82
Emotional abuse history	4.71	1.53 - 14.46
Feeling depressed/ hopeless	1.67	0.88 - 3.18
Attempted suicide	2.73	1.45 - 5.14
Not attending school	0.26	0.14 - 0.50
Not living with parents/caregiver (daily)	0.38	0.20 - 0.74
Ever in detention or jail	7.47	2.80 - 19.94
Ever had a social worker	2.93	1.39 - 6.17
Ever been in a group home	1.91	1.02 - 3.57
Ever lived on streets	2.27	1.20 - 4.30

because of the large standard deviations reported. This recoding resulted in the variable, lifetime sexual partners, having two categories: participants that have less than seven sexual partners and participants that have more than seven sexual partners. Strong associations between injection drug use, as observed by the p-value (p ≤ 0.01) were found for age, lifetime sexual partners, having sexual partners that use injection drugs, a history with the sex trade, a history of abuse (sexual, physical, and emotional), having attempted suicide, not attending school, not living with a parent or caregiver, a history of incarceration, having had a social worker, and a history of living on the street.

4.3.2.2 Multivariate analysis.

Model building began with selection of clinically important variables and statistically significant variables associated with injection drug use from the univariate logistic analysis, based on p-values ≤ 0.25. Variables chosen for the full model included: age, gender, Aboriginal ethnicity, history of lifetime sexual partners, having sexual partners that used injection drugs, history of sex trade work, abuse history (sexual, physical, and emotional), depression, having attempted suicide, not attending school, not living with parents/caregiver on a daily basis, having had a social worker, having lived in a group home, incarceration history, and having lived on the streets. Variables to be included in the model were then tested for interaction with age and gender, using logistic regression. Nine interaction terms with independent variables and age and gender were identified as significant as seen in Table 4-10: sexual abuse history by age and by gender, sex trade history by age and by gender, being in a group home by age and by gender, having lived on the street by age and by gender, and not attending school by gender. These interaction terms were entered into the model as well.

Table 4-10

Logistic Regression OR (95% CI) Results for Interaction Variables Associated with
Injection Drug Use (p < 0.25)

Variable	OR	95% CI
Interaction of sexual abuse and gender	17.45	1.67 - 182.96
Interaction of sex trade and gender	53.96	8.96 - 324.96
Interaction of sexual abuse and age	0.79	0.59 - 1.05
Interaction of sex trade and age	0.72	0.55 - 0.95
Interaction of not attending school and gender	0.39	0.10 - 1.59
Interaction of being in a group home and gender	2.74	0.75 - 10.03
Interaction of being in a group home and age	1.33	0.97 - 1.84
Interaction of living on street and gender	0.61	0.39 - 0.98
Interaction of living on street and age	1.26	0.92 - 1.73

The full model can be seen in Table 4-11. The significance for retention of variables in the model was set at $p = 0.05$. The full model was reduced by removing non-significant clinical variables one at a time. The variables, Aboriginal ethnicity, categories of lifetime sexual partners, history of sexual and physical abuse, depression, not attending school, not living with parents/caregiver on a daily basis, having had a social worker, having lived in a group home, sexual abuse interactions, group home interactions, not attending school by gender, and living on the street by gender were removed from the full model. Any further exclusion of variables from the reduced model resulted in a change of ß value greater than 20% having moderate effects on all the other variables included in the reduced model.

Therefore, 11 of the 26 variables included in the full model were chosen to fit the final model as seen in Table 4-12. Significant positive associations in the final model continued for seven variables which included: age, having sexual partners that use injection drugs, incarceration history, having lived on the streets, sex trade history by gender and by age, and having lived on the street by age. Model building analysis can be seen in Appendix H.

4.3.2.3 Model diagnostics.

Several approaches were taken to look at the fit of the final model. The full and final models were compared using the likelihood ratio test. The full model differed somewhat from the final model ($\chi^2 = 14.697$, df =15, $p > 0.05$), but not significantly. Thus, the reduced model appeared to have good fit (with the full model).

Table 4-11

Full Model using Logistic Regression comparing the Injection Drug Using Group to the Never Used Injection Drug Group

Variable	ß	SE	OR (95%CI)	p-value
Age	0.292	0.195	1.34 (0.92, 1.96)	0.13
Female (ref: male)	-0.143	1.149	0.87 (0.91, 8.25)	0.90
Aboriginal (ref: non-Aboriginal)	0.642	0.747	1.90 (0.44, 8.22)	0.39
Eight or more lifetime sexual partners (ref: ≤ 7 sexual partners)	0.340	0.563	1.41 (0.47, 4.24)	0.55
Sexual partners that use injection drugs (ref: sexual partners do not use injection drugs)	2.578	0.975	13.18 (1.95, 88.99)	0.01
Sex trade work history (ref: no history of sex trade work)	4.944	5.135	140.29 (0.01, 3296259.00)	0.34
Sexual abuse history (ref: never sexually abused)	-1.151	5.998	0.32 (0.00, 40349.50)	0.85
Emotional abuse history) (ref: never emotionally abused)	3.829	1.486	46.02 (2.50, 847.25)	0.01
Physical abuse history (ref: never physically abused	-2.039	1.722	0.13 (0.00, 3.80)	0.24
Feeling depressed/hopeless (ref: not feeling depressed/hopeless)	0.447	0.576	1.564 (0.51, 4.84)	0.44
Have attempted suicide (ref: never attempted suicide)	0.874	0.533	2.40 (0.84, 6.81)	0.10
Not attending school (ref: currently attending school)	-0.838	1.644	0.432 (0.2, 10.85)	0.61
Not living with parent/caregiver (daily)(ref: daily living with parents/caregiver)	0.801	0.644	2.23 (0.63, 7.87)	0.21

χ^2 = 114.933, df = 26, $\acute{\alpha}$ = 0.05
-2 log likelihood = 120.440

Table 4-11 (continued)

Full Model using Logistic Regression comparing the Injection Drug Using Group to the Never Used Injection Drug Group

Variable	ß	SE	OR (95%CI)	p-value
Have had a social worker (ref: never had a social worker)	0.180	0.607	1.20 (0.37, 3.93)	0.77
Ever lived in a group home (ref: never lived in a group home)	-7.184	6.021	0.00(0.00, 101.23)	0.23
History of incarceration (ref: no history of incarceration)	1.826	0.886	6.21 (1.09, 35.24)	0.04
Ever lived on the streets	-19.972	7.673	0.00 (0.00, 0.01)	0.01
Sex trade work history by gender	3.647	1.407	38.37 (2.44, 604.47)	0.01
Sex trade work history by age	-0.565	0.255	0.57 (0.35, 0.94)	0.03
Sexual abuse history by gender	1.666	1.598	5.29 (0.23, 121.32)	0.30
Sexual abuse history by age	-0.094	0.250	0.91 (0.56, 1.49)	0.71
Not attending school by gender	-0.018	1.089	0.98 (0.12, 8.29)	0.99
Group home history by gender	0.216	1.244	1.24 (0.11, 14.21)	0.86
Group home history by age	0.320	0.286	1.38 (0.79, 2.41)	0.26
Living on the street history by gender	1.337	1.470	3.81 (0.21, 67.89)	0.36
Living on the street history by age	0.984	0.354	2.68 (1.34, 5.36)	0.01

χ^2 = 114.933, df = 26, ά = 0.05
-2 log likelihood = 120.440

Table 4-12

Final Model using Logistic Regression comparing the Injection Drug Using Group to the Never Used Injection Drug Group

Variable	ß	SE	OR (95%CI)	p-value
Age	0.316	0.128	1.37 (1.07, 1.76)	0.01
Female (ref: male)	-0.365	0.708	0.69 (0.17, 2.78)	0.61
Sexual partners that use injection drugs (ref: sexual partners do not use injection drugs)	1.925	0.779	6.85 (1.49, 31.55)	0.01
Sex trade work history (ref: no history of sex trade work)	3.313	4.387	27.46 (0.01, 148789.80)	0.45
Emotional abuse history (ref: never emotionally abused)	1.795	0.938	6.02 (0.96, 37.80)	0.06
Have attempted suicide (ref: never attempted suicide)	0.792	0.480	2.21 (0.86, 5.66)	0.10
History of incarceration (ref: no history of incarceration)	1.924	0.741	6.85 (1.60, 29.25)	0.01
Ever lived on the streets (ref: never lived on the streets)	-11.052	4.626	0.001 (0.001, 0.14)	0.02
Sex trade work history by gender	3.770	1.172	43.39 (4.36, 431.55)	0.00
Sex trade work history by age	-0.464	0.209	0.63 (0.42, 0.95)	0.03
Living on the street history by age	0.582	0.242	1.79 (1.12, 2.88)	0.02

$\chi^2 = 100.236$, df = 11, $\acute{\alpha} = 0.05$
-2 log likelihood = 135.137

4.3.2.4 The relationship between sex trade history, gender in street youth and injection drug use.

A significant finding in the model was the interaction between sex trade and gender in those participants identified as having used injection drugs (see Figure 4-9). Firstly, females were more likely than males to be involved in the sex trade. Secondly, females are more likely to use injection drugs when they are involved in the sex trade as compared to their injection drug use when not involved in the sex trade. Conversely, males were more likely to use injection drugs when they were not involved in the sex trade as compared to their injection drug use when involved in the sex trade.

4.3.2.5 The relationship between sex trade history, age of street youth and injection drug use.

Interaction between sex trade and age for injection drug use was also identified as being significant in the multivariate model as seen in Figure 4-10. In younger age groups, having used injection drugs is less likely to occur if youth had not participated in the sex trade. However, in older age groups, use of injection drugs occurred regardless if youth participated in the sex trade or not.
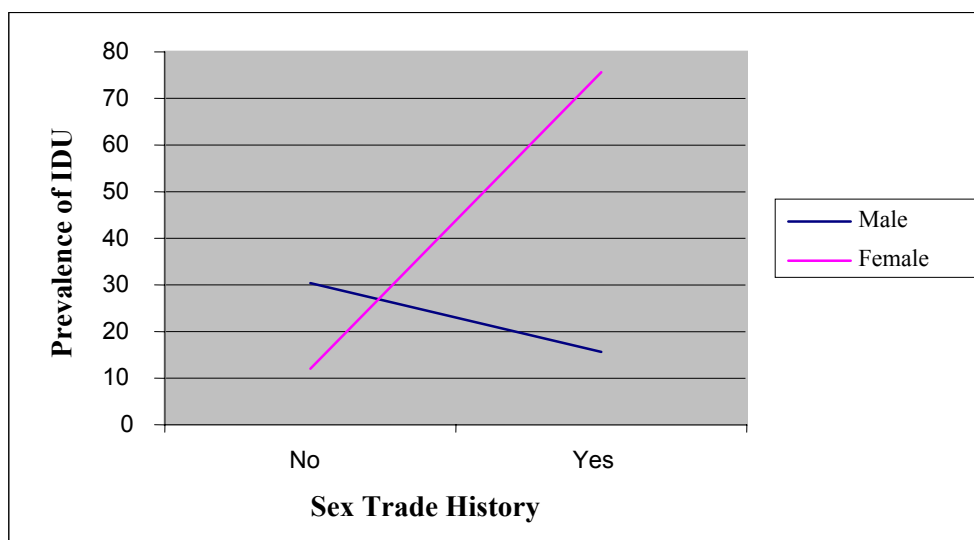
Figure 4-9. Proportions of street youth participants with using injection drugs by sex trade participation and gender
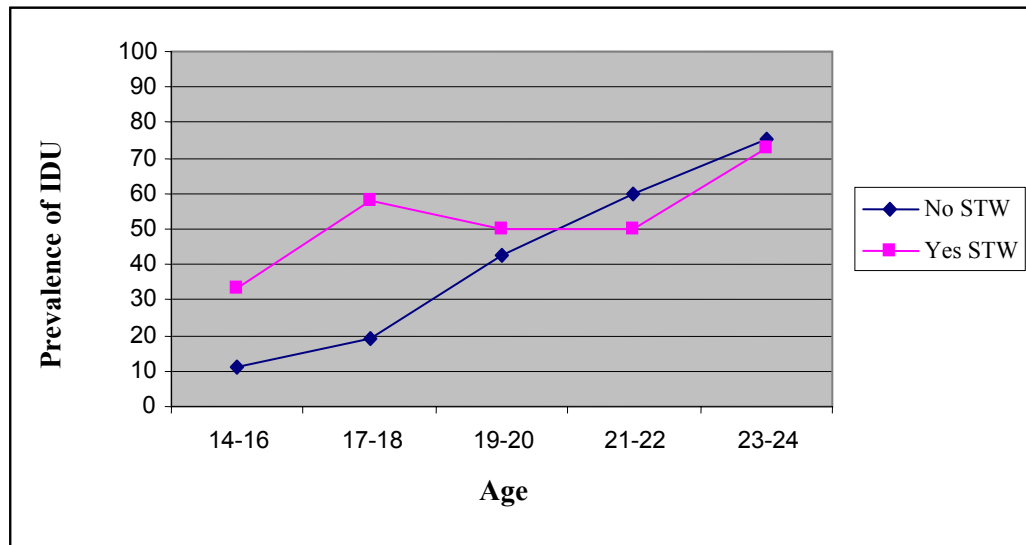
Figure 4-10. Proportions of street youth participants with using injection drugs by sex trade work participation and age.

4.3.2.6 The relationship between living on the street history, age of street youth and injection drug use.

A significant finding in the model was the interaction between history of living on the street and age in those participants who have identified as having used injection drugs as seen in Figure 4-11. This interaction identifies that the proportion of youths having used injection drugs is highest in young adulthood. Injection drug is similar in early age groups. Injection drug use increases dramatically in those participants with a previous history of living in the streets.

4.3.3 Research Question 3

What characteristics are associated with Hepatitis C Virus in Saskatoon street youth?

Selected demographic and risk behaviors for HCV status are compared in Table 4-13. From this table it can be seen that participants infected with HCV were significantly older than those youth without infection (t = -2.91, df = 154, p = 0.004), were more likely to be female (χ^2 = 4.76, df = 1, p = 0.03) and be Aboriginal (χ^2 = 3.79, df = 1, p = 0.08 FET). Although participants with HCV were more likely to have body piercing and to have one or more tattoos, the latter findings were not significant.

Other substance use examined by HCV status included non-injection drugs, alcohol use and smoking cigarettes. All HCV participants smoked cigarettes and had used common street drugs. Participants that were HCV negative were more likely to drink alcohol regularly (43.3%) than those participants that were HCV positive (20.0%).
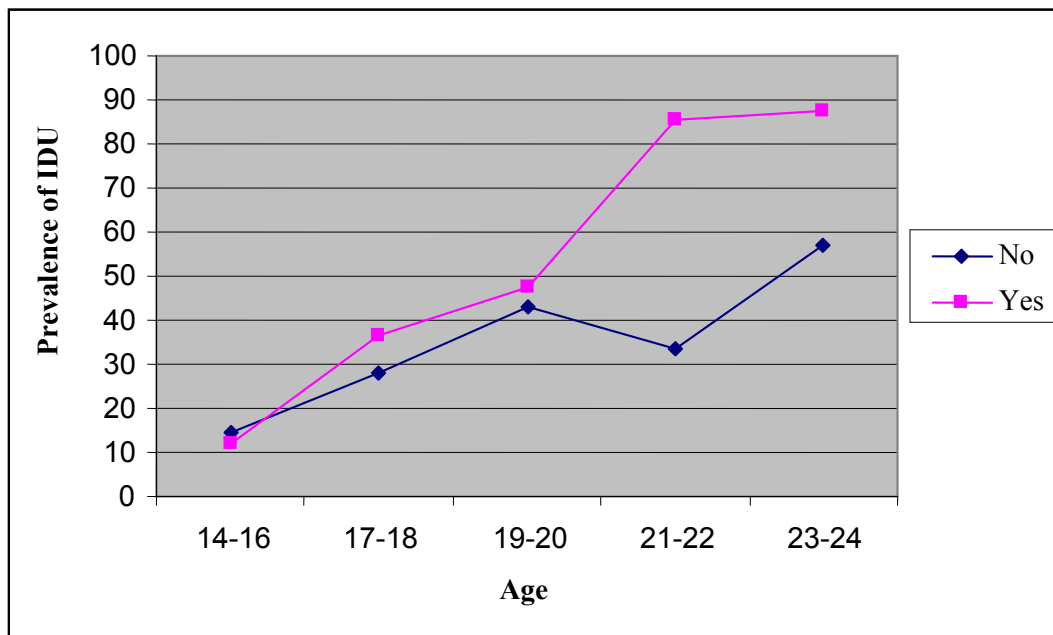
Figure 4-11. Proportions of street youth participants having used injection drugs by living on the street and age.

Table 4-13

Demographic and Risk Behaviors Associated with Hepatitis C Virus in Saskatoon Street Youth Participants (n = 156)

Variable (%)	HCV Positive n = 15	HCV Negative n = 141	Total HCV N = 156
Age mean(SD)[1]	19.9 (2.85)	17.8 (2.57)	18.0 (2.65)
Gender[2]			
Male	5 (33.3)	88 (62.4)	93 (59.6)
Female	10 (66.7)	53 (37.6)	63 (40.4)
Aboriginal ethnicity[3]*			
No	0 (0.0)	29 (20.6)	29 (18.6)
Yes	15 (100)	112 (79.4)	127 (81.4)
One or more tattoos			
No	6 (40.0)	75 (53.2)	81 (51.9)
Yes	9 (60.0)	66 (46.8)	75 (48.1)
Body piercing[3]*			
No	2 (13.3)	49 (34.8)	51 (32.7)
Yes	13 (86.7)	92 (65.2)	105 (67.3)
Use of injection drugs [4]**			
Never	4 (68.8)	97 (68.8)	101 (64.7)
Once	1 (6.7)	16 (11.3)	17 (10.9)
More than once	10 (66.7)	28 (19.9)	38 (24.4)
Age of first injection (SD)	16.6 (1.66)	15.38 (1.34)	15.5 (1.41)
Use of Ritalin by injection[4]* (past 3 months)			
No	7 (46.7)	122 (86.5)	129 (82.7)
Yes	8 (53.3)	19 (13.5)	27 (17.3)
Ever used unclean equipment[4]			
No	11 (73.3)	136 (96.5)	147 (94.2)
Yes	4 (26.7)	5 (3.5)	9 (5.8)

[1]$p < 0.01$; [2]$P< 0.05$; [3]$p < 0.10$; [4]$p< 0.001$

* Fishers Exact Test

** 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.63.

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Table 4-13 (continued)

Demographic and Risk Behaviors Associated with Hepatitis C Virus in Saskatoon Street Youth Participants (n = 156)

Variable (%)	HVC Positive	HVC Negative	Total HVC
Non-injection drug use			
No	0 (0.0)	6 (4.3)	6 (3.8)
Yes	15 (100.0)	135 (95.7)	150 (96.2)
Regular use of alcohol[3]			
No	12 (80.0)	80 (56.7)	92 (59.0)
Yes	3 (20.0)	61 (43.3)	64 (41.0)
Smoke cigarettes			
No	0 (0.0)	11 (7.8)	11 (7.1)
Yes	15 (100)	130 (92.2)	145 (92.9)
Mean lifetime sexual partners (SD)	46.9 (129.85)	18.6 (48.87)	21.3 (61.24)
Sex trade history			
No	8 (53.3)	102 (72.3)	110 (70.5)
Yes	7 (46.7)	39 (27.7)	46 (29.5)

[3]$p < 0.10$

Injection drug use was common with 73.3% (n = 11/15) of HCV infected youth reporting this behavior (χ^2 = 10.54, df = 1, p< 0.001). Use of Ritalin by injection (χ^2 = 15.05, df = 1, p = 0.001 FET), a history of using unclean equipment with injection drug use (χ^2 = 13.33, df = 1, p = 0.005), and age of first injection (t = -3.28, df = 154, p = 0.001) were all associated with HCV positive status. Table 4-14 examines selected characteristics of injection drug users by HCV screening. Frequency of injection on a weekly basis, and mean years of using injection drugs were not significant between HCV positive and negative groups. However, it is worth noting that there was a trend for 63.6% of participants to use injection drugs for two years or less had HCV infection and 36.4% to use injection drugs for six years or more had HCV infection.

Table 4-15 shows further population characteristics specific to variables of culture of homelessness. A history of sex trade work was higher for HCV positive participants (χ^2 = 2.36, df = 1, p = 0.14 FET). Participants infected with HCV were more likely to have any history that included emotional abuse (χ^2 = 7.302, df = 1, p = 0.02), physical abuse (χ^2 = 5.104, df = 1, p = 0.06), and sexual abuse (χ^2 = 6.023, df = 1, p = 0.02 FET).

More HCV positive participants reported being depressed at the time of the interview and had attempted suicide in their lifetime compared to those who were not infected with HCV. HCV positive participants were more likely not to attend school (χ^2 = 3.23, df = 1, p = 0.07), not live with their parent/caregiver (χ^2 = 2.38, df = 1, p = 0.12), have lived in a group home (χ^2 = 3.47, df = 1, p = 0.06), or have lived on the streets at some point in their lives (χ^2 = 3.70, df = 1, p = 0.08 FET).

Table 4-14

Injection Drug Use Characteristics of Participants who Consented to Hepatitis C Virus Screening (n = 55)

Variable	HCV Positive n = 11 (20%)	HCV Negative n = 44 (80%)	Total IDU N = 55 (%)
Gender[1]			
Male	3 (27.3)	25 (56.8)	28 (50.9)
Female	8 (72.7)	19 (43.2)	27 (49.1)
Mean age of first injection(SD)[2]	17.0 (1.79)	15.1 (2.39)	15.5 (2.39)
By age category[1]			
<14 years	0 (0.0)	13 (29.5)	13 (23.6)
14 to 16 years	4 (36.4)	20 (45.5)	24 (43.6)
17-18 years	5 (45.5)	8 (18.2)	13 (23.6)
>18 years	2 (18.2)	3 (6.8)	5 (9.1)
Frequency of injection/week (SD)	20.2 (24.19)	27.0 (73.79)	25.6 (66.72)
Ritalin by injection[2]*	8 (72.7)	19 (43.2)	27 (49.1)
Morphine by injection	5 (45.4)	15 (34.1)	20 (36.4)
Cocaine by injection	4 (36.4)	12 (27.3)	16 (29.1)
Mean years of injecting(SD)	3.6 (2.77)	3.9 (2.68)	3.9 (2.68)
By year category [1]			
≤2 years	7 (63.6)	15 (34.1)	22 (40.0)
3 years	0 (0.0)	8 (18.2)	8 (14.5)
4-5 years	0 (0.0)	10 (22.7)	10 (18.2)
≥ 6 years	4 (36.4)	11 (25.0)	15 (27.3)
Used unclean equipment[1]*	4 (36.4)	5 (11.4)	9 (16.4)

[1]$p < 0.10$; [2]$p < 0.05$
*by Fishers Exact Test

Table 4-15

Culture of Homelessness Variables Associated with Hepatitis C Virus in Saskatoon Street Youth Participants (n = 156)

Variable (%)	HVC Positive	HVC Negative	Total HVC
Sexual abuse history[1]			
No	8 (53.3)	114 (80.9)	122 (78.2)
Yes	7 (46.7)	27 (19.1)	34 (21.8)
Emotional abuse history[2]			
No	11 (73.3)	132 (95.0)	143 (91.7)
Yes	4 (26.7)	9 (5.0)	13 (8.3)
Physical abuse history[1]			
No	12 (80.0)	134 (95.0)	146 (93.6)
Yes	3 (20.0)	7 (5.0)	10 (6.4)
Depressed[1]			
No	7 (46.7)	105 (94.5)	112 (71.8)
Yes	8 (53.3)	36 (25.5)	44 (28.2)
Attempted suicide[1]			
No	5 (33.3)	92 (65.2)	97 (62.2)
Yes	10 (66.7)	49 (34.8)	59 (37.8)
Attending school[3]			
No	11 (73.3)	69 (48.9)	80 (51.3)
Yes	4 (26.7)	72 (51.1)	76 (48.7)
Live with parent/caregiver (daily)			
No	11 (73.3)	74 (52.5)	85 (54.5)
Yes	4 (26.7)	67 (47.5)	71 (45.5)
Ever in detention or jail			
No	3 (20.0)	44 (31.2)	47 (30.1)
Yes	12 (80.0)	97 (68.8)	109 (69.9)
Main income of social welfare			
No	9 (60.0)	98 (69.5)	107 (68.6)
Yes	6 (40.0)	43 (30.5)	49 (31.4)

[1]$p < 0.05$; [2]$P < 0.01$; [3]$p < 0.10$
[*]by Fishers Exact Test

Table 4-15 (continued)

Culture of Homelessness Variables Associated with Hepatitis C Virus in Saskatoon Street Youth Participants (n = 156)

Variable (%)	HVC Positive	HVC Negative	Total HVC
Ever had social worker			
No	5 (33.3)	46 (32.6)	51 (32.7)
Yes	10 (66.7)	95 (67.4)	105 (67.3)
Ever been in foster care			
No	4 (26.7)	59 (41.8)	63 (40.4)
Yes	11 (73.3)	82 (58.2)	93 (59.6)
Ever been in a group home[3]*			
No	6 (40.0)	91 (64.5)	97 (62.2)
Yes	9 (60.0)	50 (35.5)	59 (37.8)
Ever lived on streets[3]*			
No	7 (46.7)	100 (70.9)	107 (68.6)
Yes	8 (53.3)	41 (29.1)	49 (31.4)

[1]$p < 0.05$; [2]$p < 0.01$; [3]$p < 0.10$
*by Fishers Exact Test

4.3.3.1 Summary of findings for population characteristics with Hepatitis C Virus.

     This analysis compared HCV between street youth participants who were HCV antibody positive with those youth who were HCV antibody negative as the reference. A number of characteristics were found to be significant for HCV status at the univariate level. Results of univariate analysis including odds ratios (OR) and confidence intervals (CI) to assess variables associated with injection drug use are seen in Table 4-16. These finding reflect observations made in the descriptive analysis. Strong associations with HCV, as observed at ($p \leq 0.01$) were found for age, injection drug use, use of Ritalin by injection, use of unclean equipment, age of first injection, and history of emotional abuse. Variables associated with HCV with a univariate significance level of $p \leq 0.25$ were considered for entry into the multivariate model.

Table 4-16

Univariate OR (95% CI) Results for Variables Associated with Hepatitis C Virus

Variable	OR	95% CI
Gender	3.32	1.08 - 10.24
Aboriginal ethnicity	1.13	1.06 - 1.21
Body piercing	3.46	0.75 - 15.96
Ever used injection drugs	6.06	1.83 - 20.10
Use of Ritalin by injection (past 3 months)	7.34	2.39 - 22.57
Ever used unclean equipment	9.89	2.32 - 42.22
Regular use of alcohol	0.33	0.09 - 1.21
Sex trade history	2.29	0.78 - 6.74
Abuse history (physical/emotional/sexual)	3.60	1.22 - 10.65
Depressed	3.33	1.13 - 9.84
Attempted suicide	3.76	1.22 - 11.60
Not attending school	0.35	0.11 - 1.15
Not living with parent/caregiver (daily)	0.40	0.12 - 1.32
Ever been in a group home	2.73	0.92 - 8.11
Ever lived on streets	2.79	0.95 - 8.19

4.3.3.2 Multivariate analysis.

Based on a p-values of ≤ 0.25 or clinical relevance, variables chosen for the full model included: age, gender, body piercing, use of Ritalin by injection, use of unclean equipment for injection, age of first injection, regular use of alcohol, history of sex trade work, abuse history (sexual, physical, and/or emotional), depression, attempted suicide, not attending school, not living with parents/caregiver on a daily basis, having lived in a group home, and having lived on the streets. Variables to be included in the model were then tested for interaction by age and gender using logistic regression. The interaction between age of first injection by gender for HCV was found to be significant (p = 0.02) and therefore was included in the full model. Aboriginal ethnicity was excluded from the model because every HCV antibody positive case was Aboriginal. Results of the model analysis are presented in Table 4-17.

The significance for retention in the model was set at p < 0.05. The full model was reduced by removing significantly unimportant variables one at a time. The variables of depression, not attending school, having lived in a group home, and regular alcohol use was removed from the full model one at a time. Model building analysis can be seen in Appendix H.

The final model, presented in Table 4-18 included variables of: age, gender, body piercing, use of Ritalin by injection, use of unclean equipment for injection, age of first injection, age of first injection by gender, suicide, history of sex trade work, history of abuse, not living with parents/caregivers, and history of living on the street. Significant positive associations continued for use of Ritalin by injection, history of living on the street, and age of first injection in the final model.

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Table 4-17

Full Model using Logistic Regression comparing the HCV Positive Group to the HCV Negative Group

Variable	ß	SE	OR (95%CI)	p-value
Age	-0.009	0.211	0.99 (0.66, 1.50)	0.97
Female (ref: male)	-19.786	11.206	0.00 (0.00, 8.99)	0.08
Body piercing (ref: no piercing)	0.895	1.173	2.45 (0.25, 24.38)	0.45
Use of Ritalin by injection (ref: never used Ritalin by injection)	1.806	1.026	6.08 (0.81, 45.44)	0.08
Use of unclean equipment (re: use of clean equipment)	0.826	1.264	2.29 (0.19, 27.20)	0.51
Age of first injection	-1.284	0.905	0.28 (0.05, 1.63)	0.16
Regular use of alcohol (ref: non-regular use)	-1.517	0.977	0.22 (0.03, 1.49)	0.12
Sex trade history (ref: never involved in sex trade)	-2.567	1.590	0.08 (0.00, 1.73)	0.11
Abuse history (ref: never sexually, emotionally, or physically abused)	0.511	0.892	1.67 (0.29, 9.58)	0.57
Depressed (ref: not depressed)	0.088	0.897	1.09 (0.19, 6.34)	0.92
Attempted suicide (ref: never attempted suicide)	1.489	0.947	4.43 (0.69, 28.38)	0.12
Not attending school (ref: attending school)	-0.634	0.993	0.53 (0.08, 3.71)	0.52
Not living with parent/caregiver (daily)(ref: daily living with parents/caregiver)	0.622	0.949	1.86 (0.29, 11.96)	0.51

$\chi^2 = 44.838$, df = 16, p < 0.001
-2 log likelihood = 54.829

Table 4-17 (continued)

Full Model using Logistic Regression comparing the HCV Positive Group to the HCV

Negative Group

Variable	ß	SE	OR (95%CI)	p-value
Ever lived in a group home (ref: never lived in a group home)	0.504	0.827	1.66 (0.33, 8.38)	0.54
Ever lived on streets (ref: never lived on the streets)	2.002	0.988	7.40 (1.07, 51.31)	0.04
Age of first injection by gender	1.354	0.721	3.87 (0.94, 15.93)	0.06

$\chi^2 = 44.838$, df = 16, p < 0.001
-2 log likelihood = 54.829

Table 4-18

Final Model using Logistic Regression comparing the HCV Positive Group to the HCV

Negative Group

Variable	ß	SE	OR (95%CI)	p-value
Age	0.056	0.188	1.06 (0.73, 1.53)	0.77
Female (ref: male)	-19.636	10.784	0.00 (0.00, 4.49)	0.07
Body piercing (ref: no piercing)	0.623	1.017	1.86 (0.25, 13.68)	0.54
Use of Ritalin by injection (ref: never used Ritalin by injection)	1.845	0.900	6.33 (1.08, 36.94)	0.04
Use of unclean equipment (re: use of clean equipment)	0.590	1.161	1.80 (0.19, 17.56)	0.61
Age of first injection (ref: never used injection drugs)	-1.305	0.866	0.27 (0.05, 1.48)	0.13
Sex trade history (ref: never involved in sex trade)	-2.507	1.412	0.08 (0.01, 1.30)	0.08
Abuse history (ref: never sexually, emotionally, or physically abused)	0.869	0.800	2.38 (0.50, 11.44)	0.28
Attempted suicide (ref: never attempted suicide)	1.586	0.879	4.89 (0.87, 27.36)	0.07
Not living with parent/caregiver (daily)(ref: daily living with parents/caregiver)	0.739	0.890	2.09 (0.37, 11.98)	0.41
Ever lived on streets (ref: never lived on the streets)	1.873	0.941	6.51 (1.03, 41.19)	0.05
Age of first injection by gender	1.350	0.693	3.86 (0.99, 15.01)	0.05

$\chi^2 = 39.972$, df = 12, p < 0.001
-2 log likelihood = 58.792

4.3.3.3 Model diagnostics.

The fit of the final model was evaluated using the likelihood ratio test (Hosmer & Lemeshow, 2000). The reduced model did not differ from the final model ($\chi^2 = 3.963$, df = 4, p > 0.05), thus the final model appeared to have good fit.

4.3.3.4 The relationship between age of first injection by gender

A significant finding in the model was the interaction term for HCV, that being, age of first injection by gender as seen in Figure 4-12. In this study, HCV infection is higher in females who initiated injection drug use at a later age. More males than females with HCV initiated injection drug use prior to age 15 years. Previous results identified more females were engaging in injection drug use at an earlier age than males (see Table 4-6), however, these females are not being identified as having HCV.

4.4 Summary of Results

The results of this analysis provide some important information regarding injection drug use and HCV in the Saskatoon street youth community. With regards to prevalence of injection drug use and associated characteristics, the following findings are of interest:

1. The prevalence of injection drug use in Saskatoon street youth was 32.8%.

2. Females were more likely to initiate injection drug use, repeat this behavior at a younger age, and use injection drugs for a longer period of time as compared to males.

3. Females were more likely to use unclean drug paraphernalia than males.

4. The drug of choice by injection was Ritalin. Frequency of injection drug use for females was greater than that in males.
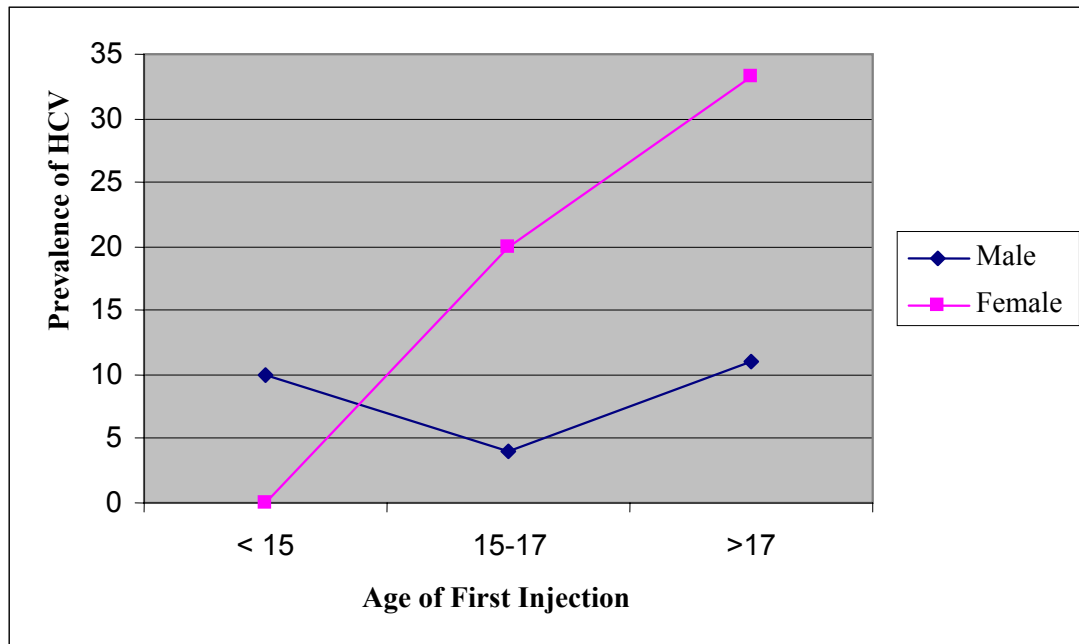
Figure 4-12. Proportions of street youth participants with Hepatitis C Virus by age of first injection and gender.

5. Risks found to be significantly associated with injection drug use include: age, having sexual partners that use injection drugs, history of incarceration, and having lived on the streets.

6. Significant interaction was seen for injection drug use including sex trade work and gender, sex trade work and age, and ever lived on the street and age.

With regard to HCV and associated characteristics, the following findings are of interest:

1. The prevalence of HCV was 9.6%.

2. Participants infected with HCV tend to be older, female and Aboriginal.

3. Injection drug use was the strongest risk factor for HCV in street youth population.

4. Risks found to be associated with HCV included Ritalin by injection and history of living on the street.

5. There was a direct increase in the prevalence of HCV with age of first injection for female youth.

Chapter 5: Discussion

The purpose of the analysis was to firstly, determine the prevalence of injection drug use and Hepatitis C Virus in street involved youth in Saskatoon, Saskatchewan. Secondly, this study was undertaken to describe the behaviors and determinants of street-related behaviors in relation to injection drug use and Hepatitis C Virus. The results will be discussed in relation to the three research questions that directed the analysis

5.1 Research Question 1

What is the prevalence of injection drug use and Hepatitis C Virus in Saskatoon street youth?

The research findings in the Saskatoon study regarding the role of injection drug use in the transmission of HCV are consistent with those obtained nationally. The prevalence rate of injection drug use in Saskatoon was higher (32.8%) than the overall prevalence determined in the same phase of the Enhanced Surveillance of Canadian Street Youth Study (17.9%). This prevalence rate is comparable to other recent studies of injection drug use prevalence among street youth populations. In Montreal, the prevalence of injection drug use was 46% (Roy et al, 2001) and the prevalence in Ottawa was 17% (Slinger et al, 2001).

The prevalence of HCV in the Saskatoon street youth population was twelve times higher (9.6%) than the estimated HCV prevalence of 0.8% in the general Canadian Population (Remis, 1998). In addition, the HCV prevalence in this study was twice as high as the HCV prevalence of 4.1% determined in the overall Enhanced Surveillance of

Canadian Street Youth Phase III Study (Health Canada, 2003). This HCV rate is within

the range of findings from other street youth populations with 12.6% in Montreal (Roy et

al, 2001) and 4% in Ottawa (Slinger et al, 1999).

The 20% prevalence of HCV infection in this study's injection drug users was

much higher than the 9.6% seen in the overall Saskatoon sample. Previous studies that

have 100% injection drug use samples with similar age groupings, as that of the

Saskatoon sample, demonstrate HCV prevalence to range from 19.2% in Regina (Regina

Health District, n.d.) to 46% in Vancouver (Miller et al, 2002). The HCV prevalence rate

of 20%, in the IDU Saskatoon sample, falls within the lower end of this range. Thus,

populations with a higher prevalence of injection drug use behavior have a

correspondingly higher rate of HCV. Diversity in prevalence rates across the country

demonstrates the need for data to be specific to where the risk behavior occurs so those

characteristics of this risk behavior can be understood and interventions can be adapted to

that behavior.

5.2 Research Question 2

What characteristics are associated with injection drug use in Saskatoon street youth?

Several important associations between population characteristics and injection

drug use have been identified in this study. Factors found to be associated for using

injection drugs in the Saskatoon street population include: older age, having sexual

partners that also use injection drugs (in the three months prior), a history of

incarceration, and having lived on the street. As well, three interactions were found to be

significantly associated with injection drug use which include sex trade by age and by

gender, and living on the street by age.

Age was found to be significantly associated with injection drug use. The overall mean age of 17.9 years within these youth was younger when compared to other studies examining street populations. In the study by Roy et al (2001), Montreal street youth had a mean age of 19.5 years, while in Vancouver the median age was 21 years (Miller et al., 2002).

Street youth having sexual partners that use injection drugs was strongly associated with their own injection drug use. Evans et al. (2003) found that females were more likely than males to have injection drug using sex partners, however this gender difference was not seen in this analysis. Injection drug use in the context of sexual relationships may represent a social behavior among young users (Weibe & Reimer, 2000) and indicates interventions need to target risk behavior at the partnership level (Evans et al, 2003).

After adjusting for age and gender, history of incarceration was strongly associated with injection drug use (p < 0.01). This finding is important, especially considering the overall sample excluded those youth who had been recruited to the total study from a correctional facility. Prison populations have a significant portion of people who either currently use injection drugs or have a history of doing so. Drugs are quite available in prison settings and many offenders report using injecting drugs began while in prison (Provincial Strategy Team on Blood Borne Pathogens and Injection Drug Use, 2000). Those study subjects who had previously been in correctional settings may be at higher risk for HCV infection because of lack of access to sterile drug paraphernalia and other harm reduction measures while in these environments (Weibe & Reimer, 2000).

In the final model, a history of living on the street was found to be independently associated with injection drug use behavior in this street youth population. Other determinants that place people at higher risk for injecting drugs include poverty, homelessness, lack of education, family dysfunction, parental substance abuse, mental health problems, and child abuse (ACPH, 2001). At the univariate level, all of these determinants with the exception being parental injection drug use were associated with injection drug use. After controlling for other factors, living in the street was a significant risk factor for injection drug use. Homelessness and shelter associated with injection drug use has been identified previously in the literature (Strathdee, 1997; Miller et al, 2002). Lack of affordable housing has been linked to injection drug use in Vancouver in which needle sharing and concentrations of young injection drug users within one small area (Vancouver's downtown East side) have contributed to the spread of blood-borne infections (Strathdee, 1997; Miller et al, 2002). Although Saskatoon does not have the same visible homelessness or volumes of homeless individuals as Vancouver's downtown east side, Saskatoon does have a concentration of injection drug use and sex trade activity in its inner city. Clearly housing and safe shelter is a concern for these youth, however it is unknown where these study participants resided.

The interaction of living on the street by age was strongly associated with using injection drugs. This interaction is seen in youth over 20 years of age in those with a history of living in the street continuing to use injection drugs. Youth often become homeless because of a failure in family, school, community, child protection services, and youth correction systems that normally keep youth anchored in mainstream society. Once on the street, youth by circumstance and necessity participate in high-risk

behaviors, including injecting drugs (Caputo, Weiler & Anderson, 1997; Higgitt, 2003). In Saskatoon's Community Plan for Homelessness and Housing (City of Saskatoon, 2003), youth are identified as being over-represented among the population of homeless and are also over-represented among the population at-risk of becoming homeless. This study has identified the many associations between social support and justice systems and injection drug use. One has to question if these support systems failed these youth in providing adequate supports. In the current study, there was a strong association for homeless youth to engage in injection drugs and this risk behavior continues to escalate while youth remain on the street. Support systems have to change in order to address the needs of street youth appropriately. Prevention strategies are needed early on before these youth engage in this risk behavior.

The interactions of sex trade by age and by gender were significantly associated with injection drug use. Literature on sex trade activities identifying such interactions could not be located, indicating either a gap in the literature or unpublished findings. Analysis identified that females, who use injection drugs, were more likely than males to be involved in the sex trade. Conversely, males were less likely to use injection drugs when involved in the sex trade. Three hypotheses are generated from this interaction: First, it is hypothesized that the increase in female sex trade workers to use injection drugs implies drug dependency as a coping mechanism to endure trading sex. A national consultation project examining Canadian Aboriginal children and youth speaking out about sexual exploitation found Aboriginal youth used drugs to provide a mental and emotional break thereby sedating the feelings surrounding sex trade work (Kingsley, 1995). In addition, youth reported heavy drug use after entering the sex trade (Kingsley,

1995). A second hypothesis generated by the interaction seen is that sex is traded as a means to support the drug dependency. This hypothesis is also supported in Kingsley's findings where youth reported being forced into the trade through the need to support their addiction (1995). Lastly, an increase in sex trade by females and using injection drugs could result from pimps using drug dependency to ensure compliancy on the part of the sex trade worker. It is unclear how the interaction identified impacts males.

When examining the interaction between sex trade by age and injection drug use, such use is seen in higher age groups where prevalence of injection drug use continues, despite decreased sex trade involvement. Currently, there is no literature that supports or conflicts with this finding. Sex trade in the street youth population has been previously identified in the literature (Kidd & Kral, 2002; Weber, Boivin, Blais, Haley, & Roy, 2002). Weber et al. (2002) found females aged 14 to 25 having a history of injection drug use were four times more likely to report having been involved in the sex trade thereby being at increased risk for HIV infection. In a qualitative analysis Kidd & Kral (2002) found that trading sex was linked with suicidal experiences. It is further noted that drug abuse was perceived by participants as a *slow suicide*.

Emotional abuse had borderline significance ($p = 0.06$) in the final model. It is believed that abuse in the home, including that of emotional abuse, is a major pathway to the street lifestyle (Radford, King, & Warren, 1989; Caputo, Weiler & Anderson, 1997). Other studies have indicated that a history of emotional abuse is related to engaging in drug abuse and other high-risk behaviors (Hibbard, Ingersoll & Orr, 1990; Walker, Gelfand, Katon, Koss, Von Korff & Russo, 1999; Moeller, Bachmann & Moeller, 1993).

Although Aboriginal ethnicity was not found to be associated with injection drug use, it is worth noting that 86.9% (n = 53/61) of participants report being Aboriginal and having used injection drugs. Although literature specific to Aboriginal people and injection drug use are limited, one study (Mill, 1997), identified injection drug use as a survival technique for Aboriginal women that have low self-esteem. Using drugs and alcohol has also been identified in the literature examining street youth, as a coping strategy to deal with stress and depression (Ayerst, 1999).

5.3 Research Question 3

What characteristics are associated with Hepatitis C Virus in Saskatoon street youth?

Several important associations between potential risk factors and HCV that were identified during the multivariate analysis, included use of Ritalin by injection, having ever lived in the street, and interaction between age of first injection and gender for HCV.

Other studies have identified injection drug use as a major route of transmission for HCV in street youth (Diaz et al, 2001; Hahn et al, 2001; Regina Health District, n.d.; Miller et al, 2002; Patrick et al, 2001; Roy et al, 2001; Thorpe et al, 2000). Overall, injection drug use was associated with HCV in the study population. Ritalin was the drug most often chosen for injection by participants. The variable for Ritalin was chosen for analysis versus the injection drug use variable, because the injection drug use variable was unstable having two cells with expected count less than five (see Table 4-13) and had a negligible level of significance by comparison (Ritalin: $p = 0.001$; injection drug use: $p < 0.001$). Within this study, after adjusting for age, gender, and other risk factors for HCV, use of Ritalin by injection showed the strongest association with HCV with a six-fold increase in the probability of having an antibody HCV positive result. This finding is

unique from other studies. Most studies have reported cocaine use by injection (Miller et al, 2002; Roy et al, 2001; Patrick et al, 2001), and heroin or speedballs by injection (Miller et al, 2002) as being predictors of HCV. Cocaine has been identified as the drug of choice among many Canadians who use injection drugs (Wiebe & Reimer, 2000), however the ages of the users in these studies were older and not typical of street youth populations. Ritalin is the drug most commonly prescribed in the treatment of attention deficit disorder with hyperactivity in children (Provincial Strategy Team on Blood Borne Pathogens and Injection Drug Use, 2000). Ritalin is widely available and thus, may have been more accessible to this age group. Ritalin has been identified as the drug most commonly injected in studies from other parts of Saskatchewan. In the Prince Albert sero-prevalence study Ritalin was used by 70% of those studied (Provincial Strategy Team on Blood Borne Pathogens and Injection Drug Use, 2000). In the Regina study, 16.5% of subjects used Ritalin by injection (Regina Health District, n.d.).

A history of living on street was identified in the final model as being strongly associated with HCV infection. This finding is unique. In previous studies examining predictors of HCV, the exact living circumstances of street youth were not examined. These studies tended to focus on associations with transmission of HCV versus social and environmental characteristics. High-risk behaviors which include multiple sexual partners (Beech, Myers & Beech, 2002; Miller et al, 2002); sharing/borrowed drug paraphernalia (Diaz et al, 2001; Hahn et al, 2001; Regina Health District, n.d.; Thorpe et al, 2000); working in the sex trade (Miller et al, 2002) and tattooing (Roy et al, 2001) have been identified as predictors of HCV. Each of these risk behaviors was entered in the full model analysis, however none of these variables were found to be significantly associated

with HCV. It is disturbing that many of the participants reported living on the street. The exact reasons for this behavior were not examined in this study and further study of the street environment lifestyles of youth would be useful.

Findings from this study showed that compared with males, females infected with HCV are initiating more injection drug use after the age of 15. Prevalence of HCV is seen to increase with older age of initiation into injection behavior. Older age of injection has been identified as being predictive of HCV in other studies (Beech, Myers & Beech, 2002; Hahn et al, 2001; Miller et al, 2002; Roy et al, 2001). The trend towards more females using injection drugs and having HCV infection is consistent with other studies (Patrick et al, 2001).

This study did not associate length of time injecting with HCV infection. However, we cannot ignore that 63.6% of youth acquired HCV within the first two years of injecting. Diaz et al (2001) found using injection drugs for three years or more was associated with HCV. A study of injection drug use in young adults in San Francisco found 9% HCV prevalence in those who had been injecting for less than two years, rising to 78% in those who had injected for ten years or more (Hahn et al, 2001). The Regina study (n.d.) of youth and adults found the likelihood of becoming infected with HCV increased by 10% per year for every year that a person injected drugs. The Chicago study, again an adult population, found those who had injected for one to four years were nearly three times more likely to have HCV; those who had injected for more than four years were ten times more likely to have HCV infection (Thorpe et al, 2000). This apparent lack of association between length of use and HCV infection in the current study is unusual but may be a function of the study's population characteristics as the sample

included a sub-group of young injection drug users, many with short durations of injection behavior. This study contrasts with the other studies above, in that their samples are comprised entirely with injection drug users whereas the current study included all street youth whether injecting or not.

Other studies have found the sharing or borrowing of syringes or other drug paraphernalia as predictors of HCV (Diaz et al, 2001; Hahn et al, 2001; Regina Health District, n.d.; Thorpe et al, 2000). These studies are based on samples comprised entirely of injection drug users. This study did not detect an association between HCV and using unclean equipment in multivariate analysis. Only 16.4% of injection drug users reported using unclean equipment in this study. It is reasonable to assume that the question was either misunderstood or misinterpreted by youth, or information was inaccurately reported, or there was limited power to find an association. This finding may also be a reflection of the study's population characteristics or this risk behavior may not correlate with HCV infection, particularly when this risk behavior is low.

All HCV positive participants in this sample were Aboriginal. Therefore, it is reasonable to assume that Aboriginal street youth may be at particular risk for HCV in Saskatoon. A study conducted in Vancouver found Aboriginal ethnicity to be predictive for HCV (Patrick et al, 2001). This may be an important sub-population to examine more closely.

The high prevalence of HCV and the strong association with injection drug use suggests there is a very small window of opportunity in prevention of HCV once injection drug behavior is initiated. The need for interventions targeted early in injection

drug use or those contemplating the behavior, is essential. This is especially needed for the young Aboriginal females in Saskatoon.

5.4 Methodological Strengths and Limitations of the Study

A number of limitations and biases may have been introduced in the primary study, which could influence the findings from this secondary analysis. These potential limitations will be addressed in this section.

5.4.1 Selection Bias

A form of selection bias, *self-selection bias,* occurs when an individual's interest and motivation for study participation is related to the study, thus influencing the results (Torrence, 1997). A self- selection bias may have been introduced in the primary study as participants received an honorarium for their study participation. Thus, the possibility exists that those youth that were only seeking compensation and not truly representative of the target population were included. However, self-selected participants still had to meet eligibility criteria of the study in order to be considered as subjects.

5.4.2 Sampling Bias

In cross-sectional surveys, such as this study, exposure and disease are assessed at the same time. This study design while appropriate for determining prevalence of disease does not permit causal inference about association between HCV and exposure (Burns & Grove, 1997). However, given that the objective of the analysis was to determine prevalence of injection drug use and HCV and to generate various hypotheses regarding what risk factors are important for Saskatoon youth, this study design was appropriate to complete these objectives.

Street youth are often invisible and transient in nature therefore, a random sample in the primary study was not possible. Representative surveys often do not capture street youth, as sampling schemes of such surveys cannot access participants outside of the school system or those without a fixed address. Snowball sampling was the method used to recruit youth and has been demonstrated as the best way to survey "hard-to-reach" populations (Roy et al, 2001). Measures were taken in the initial study by Health Canada to minimize sampling bias. First, at least three drop-in centers were approached as recruitment sites, as youth who are on the streets do not necessarily visit the same drop-in centers (2001b). Second, specific requests were made by the research team for agency staff to identify participants who were representative of their client population. Lastly, the research team was familiar with the study participants and street youth characteristics, having worked directly with these young people. The above measures taken during the sampling process were intended to minimize biases to ensure the sample was as representative of the street youth population as possible.

5.4.3 Response Bias

The data in this analysis was largely based on self-reported information by the participants as is the case with other studies of injection drug use behavior (Miller et al, 2002; Hahn et al, 2001; Thorpe et al, 2000). Self-reported data should be interpreted cautiously as it is the tendency of participants to provide responses that either present themselves favorably, or that are congruent with social norms resulting in inaccurate information (Polit & Hyngler, 1995). Strategies that included ensuring confidentiality, creating a trusting atmosphere, and encouraging honesty (Polit & Hungler) were used in the primary study to reduce response bias. Confidentiality was discussed with participants

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and was ensured by the process used in data collection and giving test results.

Participants were assigned a unique identification number that was used on all data forms

known only to the research team. Following the interview, participants were counseled on

their risk behaviors as identified during the questionnaire, and referrals were made as

required.

5.4.4 Information Bias

Accuracy of the data was a concern in this analysis as participants might have had

difficulty recalling and providing reliable information. As was the case with other studies,

to minimize recall bias, participants were asked questions in reference to the previous

three months and the questions were asked in relation to significant life circumstances in

order to help participants remember specific behaviors (Thorpe et al., 2000; Diaz et al.,

2001). Interviewers read aloud the questions and completed the questionnaire for

participants. Responses that were not recorded by interviewers, resulted in missing data,

and may have created a misclassification bias. Questions used on the questionnaire were

previously assessed for reliability prior to their use in Phase III.

5.5 Implications for Nursing Practice

Population characteristics that may contribute to the risk of street youth using

injection drugs and becoming infected with HCV were examined to provide insight and

assistance to health professionals delivering prevention interventions and community

health care. The high HCV prevalence rate among Saskatoon street youth requires

interventions specific to the risk profiles of these youth. The common link for injection

drug use and HCV in Saskatoon is the street. Therefore living on the street can serve as a

valuable marker for injection drug use and developing HCV infection in Saskatoon street

youth. Because this street relationship is so significant, a greater understanding of homelessness, which tends to be more common amongst Aboriginal people, (Health Canada, 1999) is needed by health professionals. Many Aboriginal youth migrate to urban areas to escape abusive environments on reserves and remote communities (Kingsley, 1995). A larger centre is seen as a solution for employment, education, and better housing (Health Canada, 1999; Kingsley, 1995). However, once Aboriginal youth arrive to the city, they find networks and services are scarce and many of their family and friends are in the same situation the youth are in (Kingsley, 1995). Having no where to go, youth find themselves in a situation of survival for basic necessities of life (Kingsley, 1995). Youth are forced to fend for themselves, placing themselves at risk for many harms.

The incidence of HCV among injection drug users and youth, particularly Aboriginal youth, suggest that health care professionals need to acquire a better understanding of the socio-cultural and behavioral context within which health care is provided. Nurses need to understand where this risk behavior comes from or those social determinants that predispose youth to drug use as well as the dynamics associated with injection drug use. Messages of health promotion and disease prevention need to engage street youth while being culturally, socially and developmentally appropriate. Because housing and safe shelter is a problem for this youth population, professionals are encouraged to seek out street youth social networks and provide health care in non-traditional settings. Nurses working in prison and detention settings need to offer prevention services and harm reduction interventions to young offenders and recognize their vulnerability to the outcomes found in the present study.

Once street youth are engaging in injection drugs, the window for opportunity for HCV prevention is limited. Intercollaborative interventions to identify and target youth early in their risk behavior, or in those contemplating the behavior, are essential. Saskatoon's young Aboriginal females, including those in the sex trade, are at particular risk for using injection drugs and HCV infection. Ideally, prevention efforts should be aimed at children and youth early in their psychosocial development, long before they begin to contemplate use of injection drugs. Nurses are in a pivotal position to work with individual youth and the community in providing support and guidance when developing and implementing these efforts.

Lastly, the prevalence of HCV emphasizes the potential burden of illness that may be experienced by healthcare in the years to come. Statistics demonstrate that between 75% and 85% of all individuals infected with HCV will progress to chronic infection and remain as a source of transmission for HCV (LCDC, 1999). Clinical care services will need to be available to meet the needs of those infected with HCV (Regina Health District, n.d.).

5.6 Recommendations for Research

Presently there is no reliable information concerning the adolescent population in Saskatoon who use injection drugs or on the size of the street youth population. Research to assess the size of these populations would be useful and could provide more accurate estimates of prevalence.

This study identified use of Ritalin as being predictive of HCV infection. The finding is in contrast to other Canadian studies where cocaine is reported as the drug most often injected. Further understanding why Ritalin is so appealing to the youth populations

in Saskatoon and how Ritalin is being diverted to these youth in the first place is needed. Surveillance programs could be useful to monitor activity of this drug over time. Secondly, further research needs to be conducted on the characteristics of equipment that these youth use during the practice of injection, such as equipment used to dissolve and divide drugs, as this was not well defined in this study.

The majority of street youth that used injection drugs in this study were Aboriginal. In addition, every HCV positive case was of Aboriginal ethnicity. This may be an important sub-population to examine more closely and must be taken into account when planning services. Aboriginal groups need to be included in planning and service delivery, to ensure culturally appropriate services. The transient nature of street youth within Saskatchewan is also worth examining. It would be useful to know if rural and remote youth are coming to Saskatoon and if so, are they more likely to live in the street environment.

In this study, prevalence of injection drug use is associated with age. Youth who never experienced living in the street appear to be less likely to use injection drugs after age 21. A cohort study, following the same youth by age and living on the street, compared with youth that have never lived on the street would be useful to determine why these youth decrease their injection drug use after adolescence.

This study has identified strong associations with youth living on the street to injection drug use behavior and consequently HCV infection. Youth in this study have had many interactions with multiple social support systems, yet despite this, many youth may end up on Saskatoon streets. Further understanding is needed in how these support systems have failed these youth and allowed them to fall through the social safety net.

Research is needed to develop service delivery strategies in the context of health care for those youth already on the streets, particularly those female youth involved in the sex trade. This understanding is necessary so that interventions can be developed to ideally prevent youth homelessness, to provide support to those already on the street, and assist those youth who are street entrenched to get out of the street environment and ensure they do not return. It is anticipated that additional research by the Saskatoon site in Phase V (in 2005) of the overall *Enhanced STD Surveillance in Canadian Street Youth Study* will provide a framework for these interventions.

5.7 Conclusions

In this study, the use of injection drugs and HCV infection is clearly prevalent in this predominantly Aboriginal street youth sample. The relationship identified between HCV and injection drug use was a history of living on the street. This link could serve as a valuable marker for use of injection drugs and developing HCV infection in street youth. Knowledge of risk factors and causes for injection drug use and HCV provides important contextual information about the health states of street youth that health professionals need to recognize. New and innovative prevention and harm reduction interventions adapted to the profiles of these youth are needed for those that are engaged in high risk behavior. Interventions need to address basic social determinants and be culturally and developmentally appropriate for youth. While accessible health care for youth is clearly warranted, education and health promotion is needed throughout multiple social systems, which ideally would occur during early childhood psycho-social development. An inter-collaborative, multi-sectoral approach is needed to prevent youth from entering the street environment in the first place.

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Appendix A: Enhanced STD Surveillance In Canadian Street Youth Phase III Questionnaire- Female Version

Enhanced STD Surveillance In Canadian Street Youth

Questionnaire

Female Version

Phase III

Section One

Subject information sheet. Please ensure all study numbers are the same on the questionnaire as they are on the urine &/or sera containers.

Date of Interview _____

Interviewer _____

Location Of Interview _____

Location of Recruitment _____

Type of Recruitment   OUTREACH / DROP IN CENTRE

Identification Number _____

1. **Have you participated in a previous phase of this same study?**

    $_0$ ☐   no

    $_1$ ☐   yes

2. **Urine Collected?**

    $_0$ ☐   no

    $_1$ ☐   yes →

	Test Results	**Result?**		**Treated?**	
	Chlamydia →	$_0$ ☐	negative	$_0$ ☐	no
		$_1$ ☐	positive	$_1$ ☐	yes
		$_2$ ☐	indeterminate		
	Gonorrhea →	$_0$ ☐	negative	$_0$ ☐	no
		$_1$ ☐	positive	$_1$ ☐	yes
		$_2$ ☐	indeterminate		

5. **Blood Collected for Hepatitis B?**

0 ☐   no

1 ☐   yes →   **Test Results**

Core Antibody ?		**Surface Antibody ?**	
0 ☐	non reactive	0 ☐	non reactive
1 ☐	reactive	1 ☐	reactive
2 ☐	indeterminate	2 ☐	indeterminate

4. **Blood Collected for Syphilis?**

0 ☐   no

1 ☐   yes →   **Test Results**

RPR/VDRL ?		**FTA ABS/MHATP?**	
0 ☐	non reactive	0 ☐	non reactive
1 ☐	reactive	1 ☐	reactive
2 ☐	indeterminate	2 ☐	indeterminate

5. **Permission for blood storage granted?**

0 ☐   no

1 ☐   yes →   Tests to be run on stored blood

         0 ☐ ALL TESTS LISTED BELOW
         1 ☐ HIV
         2 ☐ HTLV
         3 ☐ Hepatitis C
         4 ☐ HSV

6. **Has subject taken any antibiotics (oral or by injection) within the past month?**

0 ☐   no

1 ☐   yes, one of the following :→

1 ☐ Amoxicillin	2 ☐ Azithromycin
3 ☐ Clarithromycin	4 ☐ Doxycycline
5 ☐ Erthromycin	6 ☐ Minocycline
7 ☐ Ofloxacin	8 ☐ Tetracycline

2 ☐   yes, but unsure which one (s)

7. **If yes to antibiotics, for what condition?**

*(please specify)*_____

Section Two

I would like to start off by asking you some questions regarding your background and about your family life.

1. **Where were you born?**

    1☐   in Canada

    2☐   outside Canada

2. **How long have you been in (city were interview taking place)?**

    0☐   always lived in this city
    1☐   I'm only passing through
    2☐   for less than 3 months
    3☐   for more than 3 months but less than 6 months
    4☐   for more than 6 months but less then 1 year
    5☐   other   →   (*specify*)   _____

3. **What ethnic origin do you consider yourself to be?**
   Check all that apply

    1☐   First Nations, Metis, Inuit, Cree, Indian or First Nations tribes
    2☐   Canadian (Including; English, French, American, European (Caucasian))
    3☐   Hispanic, Mexican, Central/South American
    4☐   African, African American, African Canadian, black
    5☐   Chinese, Korean, Vietnamese, Cambodian, Indonesian, Japanese, Laotian
    6☐   Carribean, Haitian, Jamaican
    7☐   Middle East
    8☐   Other   (*specify*)_____

4. **Have you ever . . .**

	1-yes
had a social worker	☐
been in a foster family	☐
been in a group home	☐
had a probation / parole officer	☐

5. **What is your birth date ?**

    _____/_____/_____
    Day   Month   Year

6a. Are you currently registered for school?

       ₀☐   no →   **6b.**   **Is it because . . . (Give all choices)**

                           ₁☐   you finished school
                           ₂☐   you dropped out of school
                           ₃☐   move a lot/no permanent address
                           ₄☐   kicked out of school
                           ₅☐   in jail/correctional centre
                           ₆☐   other   (*specify*) _____

                           → **go to question 6c**

       ₁☐   yes →   **go to question 6c**

       ₂☐   yes, but has not started yet → **go to question 6c**

6c. What level are you at ? (Ask the youth to answer the following question referring to the period when he was in school in the past three months. Give all choices. If he is at two different levels, mark the lowest level.)

       ₁☐   primary school
       ₂☐   secondary
       ₃☐   trade school or training program
       ₄☐   college
       ₅☐   university
       ₆☐   other   (*specify*)_____

7a. Are you living with your parent(s) / caregiver(s)? (Ask the youth not to refer to their street mom or dad when responding to this question)

      ₁☐   yes , living with parent(s) / caregiver (s)   →   go to question 8
      ₂☐   live with parents part of the week but not everyday   →   go to question 8
      ₀☐   no, no longer living with parent(s) / caregiver(s)   →   go to question 7b

7b. For how long have you *not* been living with your parents?

       ₁☐   less than a week
       ₂☐   less than a month
       ₃☐   less than a year
       ₄☐   more than a year
       ₅☐   other   (*specify*)_____

7c. **Why are you no longer living with your parents?**

Check all that apply	1 - yes
1 independence/travel/move to larger city	☐
2 moved to go to school/find work	☐
3 taken away / placed in foster care by Social Services/Children's Aid	☐
4 parent(s) 's / caregiver(s) 's addiction/health problem	☐
5 left to live with partner of my children	☐
6 trouble with the law	☐
7 abuse (verbal, sexual, physical or emotional)	☐
8 parent(s) /caregiver(s) left	☐
9 being thrown out	☐
10 your drug / alcohol use	☐
11 arguing with parents	☐
12 parent(s) s/caregiver(s)'s financial difficult	☐
13 parent(s) /caregiver(s) passed away	☐
14 other (specify):_____	☐

7d. **What was the main reason for not living with your parents ?**

(Write the corresponding number from 7c) _____

→ *If response of ABUSE was chosen for 7c , then go to 7e*
→ *If response of ARGUING was chosen for 7c , then go to 7h*
→ *Otherwise, go to 8.*

7e. **Can you elaborate on the abuse? Was it ...**

1 ☐   physical   → 7f.   **Would you define the physical abuse as MOSTLY ...**
                          1 ☐   physical fighting between your parents
                          2 ☐   physical fighting between you and your parents

2 ☐   sexual

3 ☐   emotional   → 7g.   **Would you define the emotional abuse as MOSTLY...**
                          1 ☐   mean things being said to you
                          2 ☐   items, such as food and shelter, being held back from you.
                          3 ☐   having possessions deliberately destroyed by parents
                          4 ☐   being regularly humiliated
                          5 ☐   being told by your parents that they wished you dead or never born

7h. **Was the arguing with your parents / caregivers about...** *(As a broad general category only.*
Choose only one that captures the main theme of most of the arguments.)

1 ☐   arguing about rules being set by them and then broken
2 ☐   financial difficulties
3 ☐   your parents / caregivers boy/girl friend
4 ☐   your friends or your boy/girl friend
5 ☐   you or your partners' pregnancy or children
6 ☐   physical appearance; such as body piercing, tattoos or hair style /colour
7 ☐   your drug or alcohol use
7 ☐   your parent's drug or alcohol use
8 ☐   school
9 ☐   other   *(please specify)*_____

8. Was your family ever homeless or living in a shelter, while you were growing up?

      0 ☐   no
      1 ☐   yes
      89 ☐   refused

9. Did your parents ever get separated or divorced while you were growing up?

      0 ☐   no
      1 ☐   yes
      89 ☐   refused

10a. While you were growing up, did one or both of your parents (or guardian / parents boy/girl friend) ...

      1 - yes
      1 ☐   verbally abuse (shouting, yelling, swearing) at one another.
      2 ☐   hit or assault one another.
      3 ☐   get arrested or put in jail or prison.
      4 ☐   throw , break or damage things in anger.

10b. In terms of working, did one or both of your parents (or guardian / parents boy/girl friend) ...

      1 ☐   have full-time jobs .
      2 ☐   have part-time jobs.
      3 ☐   jobs on and off sometimes full-time other times part-time.
      4 ☐   have no jobs.
      89 ☐   refused

11. Where will you will sleep tonight?

      0 ☐   with parent(s) / caregiver(s)/siblings/relatives
      1 ☐   with friend / boyfriend / girlfriend
      2 ☐   own place (either room, apartment, house)
      3 ☐   on the road while travelling
      4 ☐   shelter / hotel / hostel
      5 ☐   the street / park
      7 ☐   other → (specify)_____
      79 ☐   don't know

12 What is the closest intersection to where you "hang-out" most often?

      (specify)_____

      89 ☐   refused

13.   How many hours a week do you usually spend "hanging out" on the streets? (*This could be to socialize or even working e.g. prostituting or drug dealing*).

      0 ☐   I never hang out on the streets   → *Go to question 15*
      1 ☐   about an hour a week
      2 ☐   2-10 hours a week
      3 ☐   11-20 hours a week
      4 ☐   21-30 hours a week
      5 ☐   31-40 hours a week
      6 ☐   41-50 hours a week
      7 ☐   more than 50 hours a week

14a.   In the past month, would you say you are "hanging out" on the street...
Since it is hard to give an exact amount of time, approximately determine in the past month

      1 ☐   only once in the past month
      2 ☐   1 week in the past month
      3 ☐   2 or 3 weeks in the past month
      4 ☐   4 weeks in the past month
      5 ☐   all the time hanging out on the street

14b.   Does this change due to the weather?

      0 ☐   no
      1 ☐   yes

14b.   In your life, have you ever "lived on the streets" all the time?

      0 ☐   never lived on the street, just "*hang-out*" on the street
      1 ☐   yes, have lived on the streets but not any more
      2 ☐   yes, have in the past and continue to live on the streets

15.   Have you ever been to a detention facility, youth detention centre, prison or jail, overnight or longer ?

      0 ☐   no
      1 ☐   yes
      89 ☐   refused

Section Three

I would like to ask you now about your relationship with your caregivers and a bit about school.

16a. In the past three months, were you in contact with your mother or female caregiver? (Ask the youth not to refer to their street mom when responding to this question)

     0 ☐   no   →   go to question 17a

     99 ☐   does not have a mother figure or mother is dead → go to question 17a

     1 ☐   yes   →   16b.   How often were you in touch with her ?

                                     1 ☐   regularly, once or more a week
                                       2 ☐   occasionally, not every week
                                       3 ☐   very irregularly

17a. In the past three months, were you in contact with your father or male caregiver? (Ask the youth not to refer to their street dad when responding to this question.)

     0 ☐   no   →   go to question 18a

     99 ☐   does not have a father figure or father is dead   → go to question 18a

     1 ☐   yes   →   17b.   How often were you in touch with him ?

                                       1 ☐   regularly, once or more a week
                                       2 ☐   occasionally, not every week
                                       3 ☐   very irregularly

18a. In the past three months, how did you get the money you live on ? I will give you some possible sources of income. (read and check all answers that apply)

		1-yes
1	social welfare/disability pension/family allowance/GST check/Income Tax	☐
2	employment insurance or U.I.C.	☐
3	occasional work (small contracts every now and then)	☐
4	regular work (part-time or full-time)	☐
5	money from my family	☐
6	money from friends	☐
7	prostitution	☐
8	stealing/robbery/scams	☐
9	selling drugs or doing drug runs	☐
10	panhandling/selling belongings	☐
11	money from a youth centre or from a social worker or personal needs allowance	☐
12	squeegee	☐
13	other (specify): _____	☐

18b. In the past 3 months, what was your principal source of income ? (write the corresponding number) _____

18c. In the past 3 months, what was your other main source of income? (write the corresponding number) _____

Section Four

I would like to ask you some questions on drugs and alcohol. We ask these questions to everyone, even those who do not drink or take drugs.

19a. **In the past three months, how often did you drink?**

- 0 ☐ never in the past three months → go to question 20a
- 1 ☐ occasionally, not every week
- 2 ☐ regularly, one or two times a week
- 3 ☐ regularly, three or five times a week
- 4 ☐ everyday

19b. **In the past three months, did you binge on alcohol (got drunk for one day or more)?**

- 0 ☐ no
- 1 ☐ yes → 19c. **Did you ever have sex during a period of binge drinking?**
  - 0 ☐ no
  - 1 ☐ yes
  - 79 ☐ don't know
- 79 ☐ don't know

20a. **Do you currently smoke cigarettes?**

- 0 ☐ never
- 2 ☐ occasionally → 20b. **On the days when you do smoke, how many cigarettes do you smoke, including shared cigarettes, in a day?**
- 1 ☐ everyday →

_____ cigarettes

21. **Since your birth, would you say that your father, or the person you consider as your father, is now or has ever injected drugs ... (Ask the youth not to refer to their street dad when responding to this question)**

- 0 ☐ no
- 1 ☐ yes
- 79 ☐ don't know

22. **Since your birth, would you say that your mother or the person you consider as your mother is now or has ever injected drugs... (Ask the youth not to refer to their street mom when responding to this question)**

- 0 ☐ no
- 1 ☐ yes
- 79 ☐ don't know

Please note the next set of questions does not include tobacco, alcohol or prescription drugs in its definition of drugs.

23a. **In your life, have you ever taken any drugs at least once, without injecting (or being injected) in your veins or under your skin ?**

- 0 ☐ no
- 1 ☐ yes

23b. In the past three months, in terms of non injection drugs, did you do more, about the same, less or quit?

- 3☐   more
- 2☐   about the same
- 1☐   less
- 0☐   quit   → **23c.**   **Since when?**   (*specify*)_____

                    → **23d.**   **Did you go through drug treatment to quit non injection drugs?**

- 0☐   no
- 1☐   yes

23e. Which drug did you take the most often in the past three months, WITHOUT injecting ?

         (*specify*)_____

23f. In a typical week, how often do you take drugs WITHOUT injecting? (*specify*) _____

23g. In your life, have you ever injected or been injected at least once with drugs in your veins or under your skin (make a fix or to shoot yourself up) ?

- 0☐   no   →   Go to question 24a
- 1☐   yes , but only tried it once
- 1☐   yes   →   **23h.**   **How old were you the first time you injected drugs ?**

                              _____ years old

23i. In the past three months, in terms of injecting drugs, did you do more, about the same, less or quit?

- 3☐   more
- 2☐   about the same
- 1☐   less
- 0☐   quit   → **23j.**   **Since when?**   (*specify*)_____

                   → **23k.**   **Did you go through drug treatment to quit injecting drugs?**

- 0☐   no
- 1☐   yes   →Go to question 24a

23l. In the past three months, what drug(s) did/do you inject ? (read and check all choices)

		0-no	1-yes	
1	cocaine, coke	☐	☐	
2	heroin	☐	☐	
3	speed ball	☐	☐	(*specify*) _____
4	PCP	☐	☐	
5	alcohol	☐	☐	
6	morphine	☐	☐	
7	ritalin	☐	☐	
8	dilandid	☐	☐	
8	other	☐	☐	(*specify*) _____

23m. Which drug did you inject the most often in the past three months ?

         (write the corresponding number from 23l)_____

23n.   In a typical week, how many times do you inject drugs ?

            (specify)_____

23o.   When using needles or other drug equipment, would you say you use clean equipment . . .

            3☐ all of the time
            2☐ most of the time
            1☐ some of the time
            0☐ never

24a.   Have you been tattooed or pierced?

        0☐   no
        1☐   yes, tattooed   →   24b.   Who did the tattoos? Was it ...

                                            1☐   a professional (specify _____)
                                            2☐   a friend
                                            3☐   yourself
                                            4☐   another person (specify _____)

        2☐   yes, pierced   →   24c.   Who did the piercing? Was it ...

                                            1☐   a professional (specify _____)
                                            2☐   a friend
                                            3☐   yourself
                                            4☐   another person (specify _____)

                                     24d.   What instrument was used?

                                                (Specify)_____

Section Five

For the next few questions, we are going to talk about various sexual activities that you have perhaps had, about different types of people with whom you might have had sexual relations and whether or not you used condoms. We realize that these questions are very personal but your answers are very important for this research project. Remember that these questions are anonymous and that your answers will not be linked to your name.

25. Have you ever had sexual activities with men or with women? *These activities could have been anything from sexual fondling, penetration with penis, or genital contact with a finger, the mouth or an object. These activities could have been forced on you or not.*

    ₀☐   no → go to question 34, page 18

    ₁☐   yes

26a. Has someone in your family, a relative, or others in a position of authority had sex with you ? *(For example, a parent, a brother, an uncle, boyfriend of your mother, girlfriend of your father, or father in a foster family. This does not necessarily mean that there was force used or that the activity included penetration but it does mean you had sex (oral, anal or vaginal) when you did not want to.)*

    ₀☐   no → Go to question 27a

    ₁☐   yes → 26b.   How old were you the first time ? _____ years old

    → 26c.   With whom did you have this type of activity? (read and check all choices)

	1-yes		1-yes
(foster) father	☐	cousin	☐
(foster) mother	☐	boy/girlfriend	☐
(foster) siblings (brothers, sisters)	☐	stranger	☐
uncle, grandfather, aunt	☐	mother's boy / girl friend	☐
father's girlfriend or boyfriend	☐	family friend	☐
babysitter or caregiver	☐	friend	☐
other (specify): _____			☐

    → 26d.   How many times have you viewed this as sexual abuse?

    ₃☐   all of the time
    ₂☐   most of the time
    ₁☐   some of the time
    ₀☐   never

27a. Have you ever willingly had sexual activities with women or with men (vaginal, anal or oral) ? These voluntary activities could have been with a friend, a lover, a one night stand or someone who has given you or to whom you have given something in exchange.

     0☐   no   →   go to question 34 on page 18

     1☐   yes   →   27b.   How old were you the first time? _____ years old

28a. Have you ever had a male sexual partner? A sexual partner could be someone with whom you have a steady relationship or even a casual one night stand with.

     0☐   no   →   go to question 29a

     1☐   yes   →   28b.   How many male sexual partners have you been with, in your life?

                         (*specify*): _____

        →   28c.   How many male sexual partners have you been with, in the past three months?

                         (*specify*): _____

        →   28d.   IF you were looking for a new male sexual partner, where would you go? *If they currently do not have a partner, ask them to think back to the last partner.*

Choose only ONE	1-yes		1-yes
1 on the street	☐	2 through a family member	☐
3 same hotel (hostel)	☐	4 school	☐
5 a pimp or sex trade worker	☐	6 Internet	☐
7 a shooting gallery	☐	8 a bar/club	☐
9 mutual friend (s)	☐	10 neighbour	☐
11 travelling/camping	☐	12 bathhouse	☐
13 work	☐	14 park/beach	☐
15 youth centre	☐	16 rec. activity	☐
17 rave	☐	18 dance /party	☐
19 concert/festival/fair	☐	20 mall/coffee shop	☐
21 other (*specify*): _____			☐

        →   28e.   Have you met a partner in the past three months there?

                0☐   no

                1☐   yes

        →   28f.   In the past three months, with your male sexual partner(s), has there been ...

	1-yes
oral sex ?	☐
anal penetration ?	☐
vaginal sex?	☐

        →   28g.   The last time you were with your male sexual partner (most recent) did you use a condom?

                0☐   no   1☐   yes

29a. Have you ever had a female sexual partner? A sexual partner could be someone with whom you have a steady relationship or have a casual encounter, one night stand.

     ₀ ☐   no   →   go to question 30a.

     ₁ ☐   yes   →   **29b.** How many female sexual partners have you been with in the past three months ?

                     (*specify*):_____

     →   **29c.** How many female sexual partners have you been with, in your life?

                     (*specify*): _____

     →   **29d.** IF you were looking for a new female sexual partner, where would you go? *If they currently do not have a partner, ask they to think back to the last partner.*

Choose only ONE	1-yes		1-yes
₁ on the street	☐	₂ through a family member	☐
₃ same hotel (hostel)	☐	₄ school	☐
₅ a pimp or sex trade worker	☐	₆ Internet	☐
₇ a shooting gallery	☐	₈ a bar/club	☐
₉ mutual friend (s)	☐	₁₀ neighbour	☐
₁₁ travelling/camping	☐	₁₂ bathhouse	☐
₁₃ work		₁₄ park/beach	☐
₁₅ youth centre	☐	₁₆ rec. activity	☐
₁₇ rave	☐	₁₈ dance /party	☐
₁₉ concert/festival/fair	☐	₂₀ mall/coffee shop	☐
₂₁ other (*specify*): _____			☐

     →   **29e.** Have you met a partner in the past three months there?

         ₀ ☐   no
         ₁ ☐   yes

     →   **29f.** In the past 3 months, with your female sexual partner(s), has there been . . .

                                 1-yes

         giving oral sex ?   ☐
         receiving oral sex ?   ☐

     →   **29g.** The last time you were with your female sexual partner (most recent) did you use a dental dam?

         ₀ ☐   no
         ₁ ☐   yes

30a.　IN YOUR LIFE, have you ever had sex and then received money, gifts, drugs or a place to sleep ? This could include oral, anal or vaginal sex.

    ₀☐　no　→　go to question 32

    ₁☐　yes　→　30b.　How old were you the first time? _____ years old

            →　30c.　In your life, what were some of the items you received after having sex?

                  Check all that apply
                    ₁☐　money
                    ₂☐　gifts
                    ₃☐　cigarettes, drugs and/or alcohol
                    ₄☐　shelter
                    ₅☐　food
                    ₆☐　clothing
                    ₇☐　transportation
                    ₈☐　other *(specify)* _____

            →　30d.　What was the most common item you received?

                (Please enter number from 30c) _____

            →　30e.　How many partners have you received something in exchange for sexual activities, in your life ?

                (specify) _____

            →　30f.　When you have exchanged sexual activities for something , was it ... ?

                    ₁☐　how you regularly supplement (ed) your income.
                    ₂☐　to get out of difficult situation (food /shelter).
                    ₃☐　done as needed to support yourself (or drug habit).
                    ₄☐　forced into it.
                    ₅☐　other *(specify)* _____

31a.　In the past three months, have you had sex and received money, gifts, drugs or a place to sleep ?

    ₀☐　no　→　go to question 31d

    ₁☐　yes　→　31b.　In past three months, what were some of the items you received after having sex ?　Check all that apply
                    ₁☐　money
                    ₂☐　gifts
                    ₃☐　cigarettes, drugs and/or alcohol
                    ₄☐　shelter
                    ₅☐　food
                    ₆☐　other (specify)
                    ₇☐　clothing
                    ₈☐　transportation

            →　31c.　What was the most common item? (enter number from 31b) _____

'1d. The last time that you had sex with penetration and received something in return, such as money, gifts, drugs or other things, did you use a condom?

    ₀ ☐ no
    ₁ ☐ yes
    ₂ ☐ I'm not sure

32. On average, how often do you have sex in a week? *Even if they are not having sex now, ask them to think back to when they are having sex.*

(Specify and include all types of partners - regular, casual and paying partners)_____

33. Think about all the people you have had sex with in the past three months. Do any of them ...

	1-yes	0- no	79-don't know
... smoke cigarettes?	☐	☐	☐
... drink alcohol regularly?	☐	☐	☐
... use non injection drugs?	☐	☐	☐
... use injection drugs?	☐	☐	☐
... are high on drugs when having sex with you	☐	☐	☐
... are friends that hang out on the street ?	☐	☐	☐
... been told they had an STD ?	☐	☐	☐
... prostitute themselves to make ends meet? *(This does not mean they were hired by you, but rather that they prostitute themselves to others).*	☐	☐	☐

Section Six

In this section, I would like you to tell me how you feel about each of the statements. If you agree then answer "Strongly agree" or "Agree" depending on how much you agree. If you do not agree then answer "Disagree" or "Strongly disagree" depending on much you disagree. If you do not know how you feel about the statement, answer "Uncertain".

34a.   I often am sorry for the things I do.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

34b.   I have confidence in myself.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

34c.   I have trouble making up my mind.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

34d.   I would change how I look if I could.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

34e.   I often wish I were someone else.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

34f.   No one cares much about what happens to me.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

34g.   I have little interest or pleasure in doing things.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

34h.   I am feeling down, depressed or hopeless.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

35a.   In the past I have attempted to commit suicide.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

35b.   I am a happy person.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

35c.   I like myself.

     5☐ strongly agree   4☐ agree   3☐ unsure   2☐ disagree   1☐ strongly disagree

Section Seven

For the next few questions, we are going to talk about various sexual transmitted diseases. Remember that these questions are anonymous and that your answers will not be linked to your name.

36a. **Have you ever been tested for an STD?**

₀☐   no

₁☐   yes   →   **36b.** **When you did go to be tested was it because...**

	0-no	1-yes
1 you had symptoms	☐	☐
2 no symptoms, wanted to be sure	☐	☐
3 no symptoms, but a contact told you to go	☐	☐
4 a doctor/nurse recommended it	☐	☐
5 part of routine while in jail	☐	☐
7 no symptoms, but parents/caregivers/friend told you to go	☐	☐
8 part of routine due to sexual assault	☐	☐
6 other (specify) _____	☐	☐

37a. **Have you ever been told you had an STD?**

₀☐   no

₁☐   yes →   **37b.** **When?**

     ₁☐   less than 30 days ago
     ₂☐   more than 30 days but less than 3 months ago
     ₃☐   more than 3 months ago but less than 6 months ago
     ₄☐   more than a year ago

     37c. **Have you ever had ...**

	1-yes
1 gonorrhea	☐
2 herpes	☐
3 chlamydia	☐
4 syphilis	☐
5 genital warts	☐
6 HIV / AIDS	☐
7 other STD (specify):	☐
8 an unknown STD	☐
9 hepatitis B	☐
10 hepatitis C	☐
11 hepatitis other (specify)	☐
12 trichomoniasis	☐
13 pelvic inflammatory disease	☐
14 crabs or lice and scabies	☐
15 yeast	☐

→ **37d.** **After having an STD, did you do anything different to protect yourself from getting another?**

    ₀☐   no

    ₁☐   yes   → **37e.** **Are you still doing this?**

             ₀☐   no

             ₁☐   yes

38. **In terms of risk of getting an STD, HIV or hepatitis B, do you believe you are . . .**

    ₀☐   at no risk at all

    ₁☐   at low risk

    ₂☐   medium risk

    ₃☐   high risk

39a. **Would you inform any of your sexual partners about having an STD and or Hepatitis B, if you were informed that you had it?**

    ₀☐   no

    ₁☐   yes

    ₇₉☐   don't know

39b. **Have you ever been tested for...**

    ₁☐   HIV
    ₂☐   Hepatitis C
    ₃☐   Hepatitis B

40a. **Have you ever been pregnant?**

    ₀☐   no

    ₁☐   yes   → **40b.** **How did the pregnancy end?**

             If more than one pregnancy, most recent only.
             ₁☐   live birth
             ₂☐   abortion
             ₃☐   miscarriage

Thank you for taking part in the study.

Section Eight

Follow up questionnaire - to be asked of youth when they return for their results. Please inform youth about their results and then proceed with the remaining questions.

1.   Are you surprised you have an STD &/or Hepatitis B?

        ₀☐   no
        ₁☐   yes
        ₈₉☐   refused

2.   How many sex partners have you had sex (anal, vaginal or oral) with whom you used condoms always (every single time) over the past three months?

        (specify the number)

3.   How many sex partners have you had sex (anal, vaginal or oral) with whom you have never used condoms over the past three months?

        (specify the number)

4.   How many of your sex partners in the past three months could you find so that you could tell them you have an STD &/or Hepatitis B, if you wanted to?

        (specify the number)

5.   How many of your sex partners in the past three months could you NOT find to tell them you have an STD &/or Hepatitis B, if you wanted to?
        (specify the number)

6.   Will you be informing any of sexual partner(s) from the past three months that you do have an STD &/or Hepatitis B?

        ₀☐   no
        ₁☐   yes
        ₇₉☐   don't know

Thank you for taking part in the study.

Additional Services Requested ? Please specify

Appendix B: Algorithm For Saskatoon Street Youth Study Phase III

ALGORITHYM FOR STREET YOUTH STUDY PHASE III

Consent to to study participation:
1. Protocol of study explained; Eligibility criteria met.
2. Obtained 2 signed consents; 1 given to youth; other stored with questionnaire.
3. Questionnaire administered.

Consent to Blood Testing
1. Blood collected as per consent.
2. Specimen for Syphilis, anti-HBV, and HBV core antigen sent to Provincial lab.
3. Specimen for HCV, HIV, HSV, and HTLV sent to St. Paul's Hospital lab for centifuging prior to sending to Ottawa for testing and storage.

Consent to Urine Testing
1. Ask youth for first catch urine specimen.
2. Specimen sent to Provincial lab.

Youth requested to return to site where they were tested in 2 weeks time for results:
- ❖ Reminder card given to youth
- ❖ Youth given $10.00 honorarium

If Youth RETURNED for Results:
Results for Chlamydia, Gonorrhea, Hepatitis B, Syphilis given. Youth given $10.00 honorarium.
- ❖ IF all tests **negative**: No further action.
- ❖ IF **Ct and/or GC Positive**: Treatment and counselling provided; contact information obtained; condoms given.
- ❖ IF **Hepatitis B core Positive**: Follow up initiated.
- ❖ IF **Hepatitis B core and surface antibody negative**: Referred for immunization.

If Youth DOES NOT Return for Results

1. No action taken unless positive for Ct, GC, HBV core, or Syphilis.

2. If positive: contact tracing initiated for follow up and treatment.

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Appendix C: Location Of Saskatoon Recruitment Agencies

1. Bridges Alternative School
   20th Street

2. Calder House
   2003 Arlington Avenue

3. Egadz Downtown Youth Center
   301 1st Avenue North S7K 1X5

4. *Health Works* van- Street Health Program-Public Health Services
   101-310 Idylwyld Drive N S7L 0Z2

5. *Safe House*- Saskatoon Tribal Council
   526 Avenue S South

6. *Sexual Health Clinic*- Sexual Health Program-Public Health Services
   101-310 Idylwyld Drive N S7L 0Z2

Appendix D: Ethical Approval For Primary Research

Certificate of Approval

PRINCIPAL INVESTIGATOR	DEPARTMENT	BMC#
C. Neudorf	Saskatoon District Health	1999-100

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED (STUDY SITE)

Saskatoon District Health – Public Health Services (various cities across Canada)

SPONSORING AGENCIES

Saskatoon District Health – Public Health Services and Health Canada

TITLE:

Enhanced STD Surveillance in Canadian Street Youth – PHASE III

ORIGINAL APPROVAL DATE	CURRENT EXPIRY DATE
September 7, 1999	October 1, 2001

CERTIFICATE UPDATES	APPROVED ON
Phase III Protocol	February 16, 2001
Questionnaire – Phase III (Male Version)	February 16, 2001
Revised Consent Form	February 16, 2001

CERTIFICATION

The University Advisory Committee on Ethics in Human Experimentation (UACEHE) has reviewed the above-named research project including the protocol and consent form, if applicable. The proposal was found to be acceptable on ethical grounds. Approval to proceed with the study is a finding that the research as proposed meets ethical guidelines and standards for research involving human subjects. The principal investigator is responsible to assure that carrying out of authorized research is done according to governing law. This Certificate of Approval is valid for the above time period provided there is no change in experimental procedures.

ONGOING REVIEW REQUIREMENT(S)

The UACEHE will require the submission of an annual status report at least one month prior to the expiry date.

APPROVED.

D.W. Quest, Chair
University Advisory Committee on
Ethics in Human Experimentation

Please send all correspondence to:

Office of Research Services
University of Saskatchewan
Room 207 Kirk Hall, 117 Science Place
Saskatoon, SK S7N 5C8
Phone: (306) 966-4063 Fax: (306) 966-8597

TOTAL P.03

Appendix E: Consent For Research Participants

Subject: **Enhanced STD Surveillance in Canadian Street Youth**

Investigators: Dr. C. Neudorf, Karen Grauer, Jocelyn Andrews, Maureen Laurie,
                        Pamela de Bruin, Kathy Taylor, Colleen Charpentier, June Semple

Contact Person: Jocelyn Andrews

The purpose of this study is to explore issues in the lives of street youth that contribute to
the risk of getting sexually transmitted infections, including HIV and to see what
proportion of street youth are infected.

You have been asked to take part in this study as a young person who spends much of
your time in or around the streets. The study involves taking part in a survey lasting
thirty (30) to forty-five (45) minutes, giving a urine sample and two(2) tubes of blood
from a single needle stick. Your part in the study will be kept confidential. A study
number, NOT your name, will appear on the survey and the urine and/or blood samples.

It is possible that working through the survey with the nurse may bring up issues that are
disturbing. If so, please tell the nurse who will be able to help you. You may freely
refuse to answer any of the questions if you do not wish to disclose that information.

Results to your tests (chlamydia, gonorrhea, hepatitis B and syphilis) will only be known
to the study nurses and the laboratory.

The urine will be tested for chlamydia and gonorrhea at the Provincial Laboratory. If
positive, one of the study nurses will treat you free of charge. Treatment is simple: it
involves taking four (4) or five (5) pills at one time. This medicine is standard treatment
for chlamydia and/or gonorrhea; it is not experimental treatment. If you are positive, it
will be necessary for your sexual partners to be treated also and that can be done without
using your name.

Your blood will be tested for hepatitis B and syphilis at the Provincial Laboratory. If you
are positive for these, the nurse will refer you for treatment for syphilis and for proper
medical care for hepatitis B and a different consent will be obtained at that time- If you
are positive for syphilis or hepatitis B, it will be necessary for your sexual partners to be
notified. This can be done without using your name. The other blood tests will be done in
Ottawa. One tube of blood will be stored and frozen and may be tested at a later date for
antibodies to herpes, hepatitis C, HIV and HTLV. These results are unlinked and we
will NOT be able to give them to you. If you would like to know your HIV and hepatitis
C status, the nurse can arrange for you to be re-tested.

For taking the time to answer the survey, you will be given $10.00 at the end of the first visit and $10.00 when you come back for your results at the second visit. If you answer the survey questions, but do not agree to the blood and/or urine sample, you can still get the $10.00.

If you have any questions or want more information about this study or rights as a research subject, or if you experience any side effects or concerns about your treatment, you can contact Jocelyn Andrews at (306) 655-4620.

Subject Statements:

1. I understand that my part in this study is strictly voluntary and that I can refuse to take part or withdraw from the study at any time without any consequences to my continuing medical care.

2. I have received a copy of this consent form for my own records.

3. I consent to take part in this study provided the information I give is kept confidential.

Name (please print): _____

Signature: _____

Witness: _____

Date: _____

Notation:
2 copies required: 1 for the participant and 1 for the Public Health Nurse study files.

Appendix F: Letter Of Ethical Approval For Secondary Analysis

UNIVERSITY OF SASKATCHEWAN
BEHAVIOURAL RESEARCH ETHICS BOARD
http://www.usask.ca/research/ethics.shtml

NAME: Donna Rennie (Jocelyn Andrews)   **BSC#:** 03-1293
          Agricultural Medicine
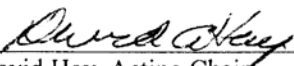
DATE: November 18, 2003

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the Application for Ethics Approval for your study "Student Researcher's Secondary Analysis of Original Study: The Relationship Between Hepatitis C Virus and Injection Drug Use in Saskatoon Street Youth" (03-1293).

1. Your study has been APPROVED.

2. Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Committee consideration in advance of its implementation.

3. The term of this approval is for 5 years.

4. This approval is valid for five years on the condition that a status report form is submitted annually to the Chair of the Committee. This certificate will automatically be invalidated if a status report form is not received within one month of the anniversary date. Please refer to the website for further instructions: http://www.usask.ca/research/behavrsc.shtml

I wish you a successful and informative study.

Dwrd Hay
Dr. David Hay, Acting Chair
University of Saskatchewan
Behavioural Research Ethics Board

DH/ck

Appendix G: Personal Communication: Study Approval From Health Canada

Subject: FW: Saskatoon Street Youth
  Date: Tue, 25 Mar 2003 08:58:15 -0600
  From: "Andrews, Jocelyn SktnHR" <jocelyn.andrews@saskatoonhealthregion.ca>
    To: 'Donna Rennie' <rennied@sask.usask.ca>

```
Hi Donna,
This is the reply I received back from Health Canada....
Jocelyn


-----Original Message-----
From: Susanne Shields [mailto:Susanne_Shields@hc-sc.gc.ca]
Sent: Monday, March 24, 2003 8:07 AM
To: Andrews, Jocelyn SktnHR
Cc: 'Jennifer Phelan'
Subject: Re: Saskatoon Street Youth


Hello Jocelyn,

I think that spring has arrived here. I bet we will get one more snow stc
before we say goodbye to the white
stuff for a while. And in your end. how is the weather?

Understood about the later start date.  It seems that most sites are
starting a bit later this cycle. We will have a
teleconference at the end of April for all sites to touch base.

As for your analysis request for HCV and IDU, great to see it being done
with local data! :) We too are examining the
issue and can provide guidence if needed.

Take care.


Susanne Shields
Senior Biostatistician
Division of Sexual Health Promotion and STD  Prevention and Control /
Division de la promotion de la santé sexuelle et de la prévention et du
contrôl des MTS
Centre for Infectious Disease Prevention and Control / Centre de prévent:
et du contrôle des maladies infectieuses
Health Canada / Santé Canada
AL 1907A4, Jeanne Mance Building
Tunney's Pasture, Ottawa
Ontario  K1A 0K9
PH: (613) 946-8637
FAX: (613) 957 0381
E-mail / Courrier életronique: susanne_shields@hc-sc.gc.ca




                    "Andrews, Jocelyn SktnHR"

                       <jocelyn.andrews@saskatoonhealt        To:
"'Susanne Shields'" <Susanne_Shields@hc-sc.gc.ca>
```

hregion.ca>   cc:
"'Jennifer Phelan'" <Jennifer_Phelan@hc-sc.gc.ca>, "'Sandra Burton'"

<Sandra_Burton@hc-sc.gc.ca>

                    2003-03-19 03:41 PM   Subject:
Saskatoon Street Youth

Greetings from Saskatoon...
        We hope to begin Phase IV data collection April 1st. We are still
waiting to get our letter of approval from Prov lab in order to proceed.
        On a separate issue, as part of a course grade for my Masters in
Nursing, I would like to do a secondary analysis using phase III data in
regards to the Relationship of HCV and IDU in Saskatoon Street Youth. I do
however, need your approval to proceed. Please respond at your earliest
convenience.
Best regards,
Jocelyn
Jocelyn Andrews BSN, RN.
A/Supervisor Street Outreach Program
Healthy Lifestyles Department
Public Health Services
101-310 Idylwyld Drive N.
Saskatoon, SK. S7L 0Z2
Ph: (306) 655-4734
Fax: (306) 655-4723
e-mail: jocelyn.andrews@saskatoonhealthregion.ca

Appendix H: Summary Multivariate Analysis

List of Abbreviations for Variables Analyzed

Injection Drug Use Outcome:

GENDER:
  1 = male
  2 = female

DOB2: age

FRSTNAT:
  0 = Non- Aboriginal
  1 = Aboriginal

DISXPART:
  1 = ≤ 7 lifetime sexual partners
  2 = Eight or more lifetime sexual partners

TOTINJSX:
  0 = Sexual partners do not use injection drugs
  1 = Sexual partners that use injection drugs

ALLSTW:
  0 = No history of sex trade work
  1 = History of sex trade work

TOTABUSE:
  0 = Never sexually abused
  1 = Have been sexual abused

PYSABUSE:
  0 = Never physically abused
  1 = Have been physically abused

EMABUSE:
  0 = Never emotionally abused
  1 = Have been emotionally abused

DEPRESS2:
  0 = Not feeling depressed/hopeless
  1 = Feeling depressed/hopeless

SUICIDE2:
  0 = Never attempted suicide
  1 = Have attempted suicide

NOTINSCH3:
      0 = Not attending school
      1 = Currently attending school

LIVPAR2:
      0 = Not Living with parent/caregiver (daily)
      1 = Living with parents/caregiver (daily)

SOCWRK:
      0 = Never had a social worker
      1 = Have had a social worker

GRPHM:
      0 = Never lived in a group home
      1 = Have lived in a group home

DPJE:
      0 = No history of incarceration
      1 = History of incarceration

LVSTRT2:
      0 = Never lived on the streets
      1 = Have lived on the streets

ABUSXGEN: Sexual abuse history by gender

ABUSXDOB: Sexual abuse history by age

STWXGEN: Sex trade work history by gender

STWXDOB: Sex trade work history by age

GRPHXGEN: Group home history by gender

GRPHXDOB: Group home history by age

LVSTXGEN: Living on the street history by gender

LVSTXDOB: Living on the street history by age

NOSCXGEN: Not attending school by gender

Full Model of Injection Drug Use Outcome

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1ᵃ	GENDER(1)	-.143	1.149	.015	1	.901	.867	.091	8.249
	DOB2	.292	.195	2.253	1	.133	1.339	.915	1.962
	FRSTNAT(1)	.642	.747	.740	1	.390	1.901	.440	8.217
	DISXPART(1)	.340	.563	.364	1	.546	1.405	.466	4.235
	TOTINJSX(1)	2.578	.975	6.999	1	.008	13.175	1.951	88.988
	ALLSTW(1)	4.944	5.135	.927	1	.336	140.294	.006	3296259
	TOTABUSE(1)	-1.151	5.998	.037	1	.848	.316	.000	40349.500
	PYSABUS2(1)	-2.039	1.722	1.402	1	.236	.130	.004	3.804
	EMABUS2(1)	3.829	1.486	6.638	1	.010	46.022	2.500	847.245
	DEPRESS2(1)	.447	.576	.602	1	.438	1.564	.506	4.838
	SUICIDE2(1)	.874	.533	2.694	1	.101	2.397	.844	6.811
	NOTINSC3(1)	-.838	1.644	.260	1	.610	.432	.017	10.848
	LIVPAR2(1)	.801	.644	1.550	1	.213	2.228	.631	7.866
	SOCWRK(1)	.180	.607	.088	1	.766	1.198	.365	3.932
	GRPHM(1)	-7.184	6.021	1.423	1	.233	.001	.000	101.232
	DPJE(1)	1.826	.886	4.248	1	.039	6.209	1.094	35.242
	LVSTRT2(1)	-19.972	7.673	6.775	1	.009	.000	.000	.007
	ABUSXGEN	1.666	1.598	1.086	1	.297	5.290	.231	121.323
	ABUSXDOB	-.094	.250	.141	1	.707	.911	.558	1.485
	STWXGEN	3.647	1.407	6.722	1	.010	38.366	2.435	604.474
	STWXDOB	-.565	.255	4.908	1	.027	.568	.345	.937
	GRPHXDOB	.320	.286	1.255	1	.263	1.378	.786	2.413
	LVSTXDOB	.984	.354	7.714	1	.005	2.675	1.336	5.355
	GRPHXGEN	.216	1.244	.030	1	.862	1.241	.108	14.207
	LVSTXGEN	1.337	1.470	.828	1	.363	3.808	.214	67.891
	NOSCXGEN	-.018	1.089	.000	1	.987	.982	.116	8.294
	Constant	-9.158	3.664	6.249	1	.012	.000		

a. Variable(s) entered on step 1: GENDER, DOB2, FRSTNAT, DISXPART, TOTINJSX, ALLSTW, TOTABUSE, PYSABU⸱ EMABUS2, DEPRESS2, SUICIDE2, NOTINSC3, LIVPAR2, SOCWRK, GRPHM, DPJE, LVSTRT2, ABUSXGEN, ABU⸱ STWXGEN, STWXDOB, GRPHXDOB, LVSTXDOB, GRPHXGEN, LVSTXGEN, NOSCXGEN.

-2 Log Likelihood = 120.440, df = 26

Final Model of Injection Drug Use Outcome

(Aboriginal ethnicity, categories of sexual lifetime partners, history of sexual and physical abuse, depression, not attending school, not living with parents/caregivers, social worker, group home, sexual abuse interactions, group home interactions, not attending school by gender, living on the street by gender excluded)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1ᵃ	GENDER(1)	-.365	.708	.266	1	.606	.694	.173	2.782
	DOB2	.316	.128	6.106	1	.013	1.371	1.067	1.761
	TOTINJSX(1)	1.925	.779	6.103	1	.013	6.852	1.488	31.548
	ALLSTW(1)	3.313	4.387	.570	1	.450	27.457	.005	148789.8
	EMABUS2(1)	1.795	.938	3.663	1	.056	6.017	.958	37.796
	SUICIDE2(1)	.792	.480	2.718	1	.099	2.207	.861	5.655
	DPJE(1)	1.924	.741	6.738	1	.009	6.845	1.602	29.253
	LVSTRT2(1)	-11.052	4.626	5.707	1	.017	.000	.000	.137
	STWXGEN	3.770	1.172	10.349	1	.001	43.392	4.363	431.547
	STWXDOB	-.464	.209	4.937	1	.026	.629	.417	.947
	LVSTXDOB	.582	.242	5.805	1	.016	1.790	1.115	2.875
	Constant	-8.735	2.471	12.493	1	.000	.000		

a. Variable(s) entered on step 1: GENDER, DOB2, TOTINJSX, ALLSTW, EMABUS2, SUICIDE2, DPJE, LVSTRT2, STWXGEN, STWXDOB, LVSTXDOB.

-2 Log Likelihood = 135.137; df=11

RM - FM = 135.137 - 120.440 = 14.697, $\acute{\alpha}$ =0.05 (calculated value < tabulated value, therefore model differences not significant)

List of Abbreviations for Variables Analyzed

HCV Outcome:

GENDER:
      1 = male
      2 = female

DOB2: age

DEPRESS2:
      0 = Not feeling depressed/hopeless
      1 = Feeling depressed/hopeless

SUICIDE2:
      0 = Never attempted suicide
      1 = Have attempted suicide

ALLSTW:
      0 = No history of sex trade work
      1 = History of sex trade work

UNCLEAN2:
      0 = Use of clean equipment all of the time
      1 = Use of unclean equipment

PIERCE2:
      0 = No ear and/or body piercing
      1 = Has ear and/or body piercing

FRSTINJ: Age of first injection

FINJXGEN: Age of first injection by gender

OFTDRK2:
      0 = Alcohol use < once per week
      1 = Alcohol use one or more times a week

NOTINSCH3:
      0 = Not attending school
      1 = Currently attending school

ALLABUSE:
      0 = Never sexually/emotionally/physically abused
      1 = Have been sexually and/or emotionally and/or phyically abused

List of Abbreviations for Variables Analyzed (continued)

GRPHM:
      0 = Never lived in a group home
      1 = Have lived in a group home

LIVPAR2:
      0 = Not Living with parent/caregiver (daily)
      1 = Living with parents/caregiver (daily)

LVSTRT2:
      0 = Never lived on the streets
      1 = Have lived on the streets

RITINJ2:
      0 = Never used Ritalin by injection
      1 = Use of Ritalin by injection

Full Model for HCV Outcome

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Step 1ᵃ	GENDER(1)	-19.768	11.206	3.112	1	.078	.000	.000	8.988
	DOB2	-.009	.211	.002	1	.967	.991	.655	1.500
	DEPRESS2(1	.088	.897	.010	1	.922	1.092	.188	6.337
	SUICIDE2(1)	1.489	.947	2.471	1	.116	4.433	.693	28.375
	ALLSTW(1)	-2.567	1.590	2.605	1	.107	.077	.003	1.734
	UNCLEAN2(1	.826	1.264	.428	1	.513	2.285	.192	27.204
	PIERCE2(1)	.895	1.173	.582	1	.446	2.447	.246	24.384
	FRSTINJ	-1.284	.905	2.016	1	.156	.277	.047	1.630
	FINJXGEN	1.354	.721	3.523	1	.061	3.873	.942	15.928
	OFTDRK2(1)	-1.517	.977	2.411	1	.120	.219	.032	1.488
	NOTINSC3(1)	-.634	.993	.409	1	.523	.530	.076	3.711
	ALLABUSE(1)	.511	.892	.329	1	.566	1.667	.290	9.577
	GRPHM(1)	.504	.827	.371	1	.543	1.655	.327	8.379
	LIVPAR2(1)	.622	.949	.430	1	.512	1.863	.290	11.959
	LVSTRT2(1)	2.002	.988	4.107	1	.043	7.402	1.068	51.306
	RITINJ2(1)	1.806	1.026	3.097	1	.078	6.083	.814	45.441
	Constant	-6.171	6.040	1.044	1	.307	.002		

a. Variable(s) entered on step 1: GENDER, DOB2, DEPRESS2, SUICIDE2, ALLSTW, UNCLEAN2, PIERCE2
FINJXGEN, OFTDRK2, NOTINSC3, ALLABUSE, GRPHM, LIVPAR2, LVSTRT2, RITINJ2.

-2 log likelihood = 54.829
df = 16

Reduced Model: (Depression excluded)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1 [a]	GENDER(1)	-19.894	11.138	3.190	1	.074	.000	.000	6.928
	DOB2	-.009	.211	.002	1	.965	.991	.655	1.498
	SUICIDE2(1)	1.519	.899	2.853	1	.091	4.569	.784	26.629
	ALLSTW(1)	-2.574	1.587	2.632	1	.105	.076	.003	1.709
	UNCLEAN2(1)	.821	1.267	.420	1	.517	2.273	.190	27.216
	PIERCE2(1)	.897	1.177	.581	1	.446	2.453	.244	24.631
	FRSTINJ	-1.291	.902	2.046	1	.153	.275	.047	1.612
	FINJXGEN	1.363	.717	3.616	1	.057	3.907	.959	15.915
	OFTDRK2(1)	-1.507	.972	2.406	1	.121	.221	.033	1.488
	NOTINSC3(1)	-.622	.983	.400	1	.527	.537	.078	3.688
	ALLABUSE(1)	.523	.882	.352	1	.553	1.688	.300	9.512
	GRPHM(1)	.515	.821	.394	1	.530	1.674	.335	8.360
	LIVPAR2(1)	.635	.942	.454	1	.500	1.887	.298	11.963
	LVSTRT2(1)	1.999	.988	4.096	1	.043	7.379	1.065	51.124
	RITINJ2(1)	1.829	.998	3.358	1	.067	6.229	.881	44.057
	Constant	-6.222	6.014	1.070	1	.301	.002		

a. Variable(s) entered on step 1: GENDER, DOB2, SUICIDE2, ALLSTW, UNCLEAN2, PIERCE2, FRSTINJ, FINJXGEN, OFTDRK2, NOTINSC3, ALLABUSE, GRPHM, LIVPAR2, LVSTRT2, RITINJ2.

-2 log likelihood= 54.839; df= 15

Reduced Model: (Depression, not attending school excluded)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1 [a]	GENDER(1)	-19.547	11.243	3.023	1	.082	.000	.000	12.049
	DOB2	.025	.199	.016	1	.900	1.025	.694	1.516
	SUICIDE2(1)	1.454	.876	2.758	1	.097	4.282	.769	23.834
	ALLSTW(1)	-2.254	1.438	2.457	1	.117	.105	.006	1.758
	UNCLEAN2(1)	.839	1.262	.442	1	.506	2.314	.195	27.470
	PIERCE2(1)	.831	1.161	.512	1	.474	2.295	.236	22.347
	FRSTINJ	-1.262	.903	1.952	1	.162	.283	.048	1.663
	FINJXGEN	1.335	.720	3.434	1	.064	3.798	.926	15.580
	OFTDRK2(1)	-1.521	.976	2.429	1	.119	.218	.032	1.479
	ALLABUSE(1)	.461	.883	.273	1	.601	1.586	.281	8.945
	GRPHM(1)	.482	.815	.350	1	.554	1.619	.328	7.992
	LIVPAR2(1)	.582	.929	.392	1	.531	1.789	.290	11.054
	LVSTRT2(1)	1.978	.983	4.047	1	.044	7.228	1.052	49.648
	RITINJ2(1)	1.991	.978	4.143	1	.042	7.324	1.077	49.821
	Constant	-7.051	5.850	1.453	1	.228	.001		

a. Variable(s) entered on step 1: GENDER, DOB2, SUICIDE2, ALLSTW, UNCLEAN2, PIERCE2, FRSTINJ, FINJXGEN, OFTDRK2, ALLABUSE, GRPHM, LIVPAR2, LVSTRT2, RITINJ2.

-2 log likelihood = 55.243; df = 14

Reduced Model: (Depression, not attending school, lived in a group home excluded)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Step 1ᵃ	GENDER(1)	-20.319	11.830	2.950	1	.086	.000	.000	17.591
	DOB2	.018	.199	.008	1	.928	1.018	.690	1.502
	SUICIDE2(1)	1.496	.885	2.856	1	.091	4.462	.787	25.289
	ALLSTW(1)	-2.106	1.419	2.203	1	.138	.122	.008	1.964
	UNCLEAN2(1)	.769	1.233	.389	1	.533	2.157	.192	24.168
	PIERCE2(1)	.915	1.139	.645	1	.422	2.496	.268	23.254
	FRSTINJ	-1.286	.935	1.891	1	.169	.276	.044	1.727
	FINJXGEN	1.380	.757	3.328	1	.068	3.975	.902	17.510
	OFTDRK2(1)	-1.592	.976	2.660	1	.103	.204	.030	1.378
	ALLABUSE(1)	.454	.873	.271	1	.603	1.575	.284	8.725
	LIVPAR2(1)	.462	.907	.259	1	.611	1.587	.268	9.389
	LVSTRT2(1)	2.009	.979	4.213	1	.040	7.459	1.095	50.821
	RITINJ2(1)	2.071	.968	4.573	1	.032	7.934	1.189	52.945
	Constant	-7.107	5.869	1.466	1	.226	.001		

a. Variable(s) entered on step 1: GENDER, DOB2, SUICIDE2, ALLSTW, UNCLEAN2, PIERCE2, FRSTINJ, FINJXG
OFTDRK2, ALLABUSE, LIVPAR2, LVSTRT2, RITINJ2.

-2 log likelihood = 55.585; df = 13

Final Model:
(Depression, not attending school, lived in a group home, regular use of alcohol excluded)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Step 1ᵃ	GENDER(1)	-19.636	10.784	3.315	1	.069	.000	.000	4.487
	DOB2	.056	.188	.088	1	.767	1.058	.731	1.530
	SUICIDE2(1)	1.586	.879	3.257	1	.071	4.886	.873	27.360
	ALLSTW(1)	-2.507	1.412	3.152	1	.076	.082	.005	1.298
	UNCLEAN2(1)	.590	1.161	.258	1	.612	1.803	.185	17.562
	PIERCE2(1)	.623	1.017	.375	1	.540	1.864	.254	13.677
	FRSTINJ	-1.305	.866	2.272	1	.132	.271	.050	1.480
	FINJXGEN	1.350	.693	3.794	1	.051	3.858	.992	15.014
	ALLABUSE(1)	.869	.800	1.178	1	.278	2.383	.497	11.438
	LIVPAR2(1)	.739	.890	.689	1	.407	2.093	.366	11.977
	LVSTRT2(1)	1.873	.941	3.960	1	.047	6.509	1.029	41.188
	RITINJ2(1)	1.845	.900	4.198	1	.040	6.326	1.083	36.943
	Constant	-7.468	5.570	1.798	1	.180	.001		

a. Variable(s) entered on step 1: GENDER, DOB2, SUICIDE2, ALLSTW, UNCLEAN2, PIERCE2, FRSTINJ, FINJXG
ALLABUSE, LIVPAR2, LVSTRT2, RITINJ2.

-2 log likelihood = 58.792; df = 12
RM- FM = 58.792 – 54.829 = 3.963, α =0.05 (calculated value < tabulated value,
therefore model differences not significant)