

**THE JUSTICE SYSTEM AS A PUBLIC HEALTH INSTRUMENT:  
DOES THE DRUG TREATMENT COURT OF VANCOUVER  
CHANGE PATTERNS OF HEALTH SERVICES UTILIZATION  
FOR DRUG-ADDICTED CRIMINAL OFFENDERS?**

by

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## **ABSTRACT**

It is well established that despite a broad range of complex health needs, substance-abusing individuals do not use health services in a consistent, efficient manner. While drug courts have proliferated across North America as a means of addressing substance abuse and reducing criminality, their potential role in improving the health of drug-addicted criminal offenders has remained largely ignored. The current study examines the Drug Treatment Court of Vancouver's impact on participants' patterns of health services utilization for those entering the court between December 2001 and March 2004. While results suggest that drug court participants were alienated from health services, and generally remained so even after involvement with the drug court, they also indicate that the court may have influenced the way in which participants engaged with the health system, particularly in relation to substance-use related health services. Further research into the potential health benefits of this judicial intervention is required.

**Keywords:** drug courts; health services; substance abuse; criminal justice; addiction

*For family and friends.*

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## GLOSSARY

|                               |  |
|-------------------------------|--|
| <b>Change Score</b>           | A score representing the change in frequency for a specific variable of interest between the two years following and two years preceding the Index Date for each individual (post-Index Date value minus pre-Index Date value).  |
| <b>Co-Occurring Disorders</b> | A term used to describe co-existing psychiatric and substance use disorders.   |
| <b>Dual Disorders</b>         | Used interchangeably with “co-occurring disorders,” this term also describes co-existing psychiatric and substance use disorders.  |
| <b>DTCV Group</b>             | The 144 individuals processed by the DTCV between December 1, 2001 and March 31, 2004 who were examined in this study.   |
| <b>IM Database</b>            | A linked Inter-Ministry database containing integrated records of service utilization from British Columbia’s Ministries of Public Safety and Solicitor General, Employment and Income Assistance, and Health over a multi-year timeframe.   |
| <b>Index Date</b>             | The date representing the juncture between pre- and post-offence time for each individual in this study. For the DTCV Group, the Index Date was defined as the date of first contact with the DTCV, while for the Theft Group, the Index Date was defined as the start of a community sentence or the end of a custodial sentence.   |
| <b>Index Offence</b>          | The criminal offence of interest in this study. For the DTCV Group, this was the <i>Controlled Drugs and Substances Act</i> offence (possession, possession for the purposes of trafficking, or trafficking in small amounts of a controlled substance) resulting in an individual’s arrest and eventual participation in the DTCV. For the Theft Group, this was the theft offence resulting in an individual’s arrest and prosecution. |
| <b>MD Claims</b>              | A count of MSP visits related to mental disorders.   |
| <b>Methadone Claims</b>       | A count of MSP visits for methadone treatment.   |

|                         |   |
|-------------------------|---|
| <b>Non-Psych Claims</b> | A count of MSP or hospitalization visits not related to methadone treatment, mental disorders, or substance use disorders.                            |
| <b>SUD Claims</b>       | A count of MSP or hospitalization visits related to substance use disorders, not including methadone claims   |
| <b>Theft Group</b>      | The 144 control individuals convicted of a theft offence and matched on a 1:1 basis using propensity score matching to individuals in the DTCV Group. |
| <b>Total SUD Claims</b> | A count of total MSP visits for both methadone treatment and other treatment related to substance use disorders.                                      |

## **ACRONYMS**

**DTCV** The Drug Treatment Court of Vancouver

**FHS** Faculty of Health Sciences

**HIV** Human Immunodeficiency Virus

**ICD-9** International Statistical Classification of Diseases and Related Health Problems, 9<sup>th</sup> Edition

**MD** Mental Disorder

**MSP** Medical Services Plan, which insures medically required services provided by physicians along with services provided by supplementary health care practitioners, laboratory services, and diagnostic procedures for residents of British Columbia (Ministry of Health Services, 2009)

**STI** Sexually Transmitted Infection

**SUD** Substance Use Disorder



# **1: INTRODUCTION**

## **1.1 Research Context**

Since the first drug court opened in Miami, Florida in 1989, drug courts have been implemented internationally as a means of increasing public safety, improving effective judicial supervision, and promoting treatment and recovery for drug-addicted criminal offenders (Cooper, 2003). The primary goal of drug courts is to end substance abuse among offenders whose drug use has played a role in their criminal behaviour, and consequently, to reduce crime (Harrell, 2003). However, while drug courts primarily aim to decrease criminal recidivism and treat addiction, they may also result in improved health for participants. Nearly all drug courts utilize a number of public health services, including screening participants for a range of infectious diseases and medical conditions, and referring individuals to appropriate care providers for treatment (Cooper, 2003). This is significant because like addicted individuals more generally, drug treatment court clients often suffer from a range of physical and mental health issues that can act to complicate both treatment and recovery (Belenko, 2002).

It has been suggested that drug courts may potentially act as a bridge between criminal justice and health services for drug-addicted offenders (Wenzel, Longshore, Turner, & Ridgely, 2001). However, relatively little is known about

how drug abuse treatment programs generally, and drug courts specifically, work to link individuals to medical and psychosocial services (Friedmann, D'Aunno, Jin, & Alexander, 2000; Wenzel et al., 2001). Furthermore, likely because of the paucity of information regarding the value of integrated health services, the integration of medical services into drug treatment programs “has proceeded at a glacial pace” (Gourevitch, Chatterji, Deb, Schoenbaum, & Turner, 2007, p. 144).

This potential linkage to health services, however, is significant because numerous studies have found that drug-dependent individuals make up a vulnerable, underserved population with a disproportionate burden of illness. Drug-addicted individuals are known to face a variety of unique health challenges and often have numerous medical and psychiatric comorbidities for which they do not receive adequate medical care (Stein, 1999; Gourevitch et al., 2007). A pattern of unmet health needs, including both substance use and psychiatric disorders, can also be seen among individuals involved with the criminal justice system (Somers, Carter, & Russo, 2008).

The health and psychosocial dysfunctions seen in this population may increase the probability that a substance-abusing patient will relapse to drug use (Friedmann, Lemon, Stein, Etheridge, & D'Aunno, 2001). However, despite a disproportionate burden of medical and mental health problems, and an increased need for treatment, patients with substance-abuse problems often do not have sufficient access to medical services (Samet et al., 2003). Substance abusers do not effectively use preventive health care and frequently postpone necessary care for

specific health problems, often because their lifestyle centres around the acquisition and use of illicit drugs (Chitwood, Sanchez, Comerford, & McCoy, 2001).

This is particularly problematic because the management of medical problems in this population can act to stabilize recovery and long-term wellbeing (Friedmann et al., 2001). Health care may prevent relapse, improve appointment keeping and medication adherence, and result in improved outcomes in substance abuse treatment (Samet, Friedmann, & Saitz, 2001). At the same time, substance abuse treatment may act to improve an individual's health and health-care utilization, along with issues of social adjustment, employment, and criminality (Friedmann, Zhang, Hendrickson, Stein, & Gerstein, 2003). Integrated services may also provide an opportunity to positively impact other behaviour-related problems, including smoking and sexually transmitted infections (Samet et al., 2001).

Although this vulnerable population has much to gain from increased linkage to both medical and substance abuse treatment, interventions to improve the health status of substance abusers must go beyond dealing with the alcohol or drug problem alone. The physical and mental health problems experienced by many substance-using individuals are exacerbated by the poor social conditions in which they live, meaning that interventions must be aimed at both the individual and systemic factors that result in poor health and prevent the effective use of health services (Adrian & Barry, 2003).

The Drug Treatment Court of Vancouver (the "DTCV"), just the second of its kind in Canada, opened in 2001 to address high rates of heroin, cocaine, and crack-

cocaine use in Vancouver, particularly in the city's Downtown Eastside (Canadian Centre on Substance Abuse [CCSA], 2007). Vancouver's Downtown Eastside has high rates of several communicable diseases related to drug use, with HIV prevalence rates between 17% and 31% in different cohorts, and Hepatitis C infections in Vancouver's intravenous drug users reported from 63% to 92% in different cohorts. Tuberculosis, syphilis, and pneumococcal pneumonia are also known to be problematic in this group (Canadian Community Epidemiology Network on Drug Use [CCENDU], 2007). As part of its program, the DTCV employs medical screening and works to link participants to a range of medical, psychological, and social services.

Despite commonalities in operation, the DTCV differs from other drug courts in the population it serves, based both on criteria for entry and on characteristics of its participants. Although there is no detailed research, thus far, on the DTCV, it has been recognized by both members of the Vancouver drug court team and by individuals from other drug courts visiting the DTCV that the severity and complexity of needs seen in DTCV participants are greater than seen in other North America drug treatment courts (Somers, 2007)

While numerous studies have examined the effectiveness of drug courts, these studies have generally focused on rates of recidivism and costs to the criminal justice system, rather than on linkages to health services and the potential health benefits of drug court participation (Belenko, 2002; Wenzel et al., 2001). The lack of information on the potential health benefits of drug courts is regrettable, because such information could provide important evidence regarding the effectiveness of

drug courts, the importance of collaboration between the health and criminal justice systems, and the need for increased efforts to link this vulnerable group to health services.

## **1.2 Scope and Research Questions**

This project will examine some of the potential health benefits of the Drug Treatment Court of Vancouver. The research question for this project is:

Does the DTCV change patterns of health-services utilization for drug-addicted criminal offenders?

To answer this question, the project will specifically examine:

1. Changes in the overall frequency of health services utilization, as reflected in Medical Service Plan (“MSP”) and inpatient hospitalization data;
2. Changes in the frequency of health services utilization, as reflected in MSP and inpatient hospitalization data broken down into specific categories of treatment; and
3. Changes in the frequency of several specific diagnostic codes associated with MSP treatment.

The project will also consider descriptive characteristics for all individuals of interest.

## **2: BACKGROUND AND LITERATURE REVIEW**

### **2.1 Population Health Needs**

#### **2.1.1 General Health Patterns**

Drug-addicted criminal offenders suffer from a broad array of serious health and social problems and have complex needs extending far beyond drug treatment. Overall, drug- and alcohol-dependent individuals—particularly those without primary care—have a significant burden of disease and experience high rates of hospitalization, along with both chronic and episodic illness (De Alba, Samet, & Saitz, 2004). Drug- and alcohol-dependent individuals have particularly high rates of mental disorders, infections, and diagnoses for injury and poisoning related to their substance use (Adrian & Barry, 2003).

Although substance abusers suffer from a broad range of medical problems, and die at rates much higher than comparable groups in the general population, it was the advent of the HIV epidemic in the 1980s that brought medical care for drug users to the forefront of the public health agenda (Stein, 1999). Though HIV has brought greater attention to the risks of injection drug use, all modes of drug administration can lead to serious medical harm (Stein, 1999).

Prolonged substance abuse exposes individuals to variety of acute and chronic health problems through several different avenues. A number of medical complications, such as overdose and injury while intoxicated, are directly associated with the pharmacological properties of the ingested drug, while other complications, such as infections resulting from non-sterile injections, arise from ingestion behaviours (Chitwood et al., 2001). Indeed, medical complications associated with injection drug use are most often infectious because of non-sterile injection techniques and the transmission of bloodborne pathogens (Contoreggi, Rexroad, & Lange, 1998).

Additional medical complications arise because of the lifestyle associated with illicit drug use. Certain behaviours associated with drug use, such as exchanging sex for drugs or money, place drug users at increased risk for conditions such as HIV and other sexually transmitted infections (“STIs”) (Gourevitch & Arnsten, 2005). Substance abusers are frequently socially disadvantaged and, consequently, may live in locations, such as shelters, that leave them more vulnerable to contracting infectious diseases (Gourevitch & Arnsten, 2005). As a result of their daily preoccupation with acquiring and using drugs, substance abusers frequently neglect their physical health, fail to practice preventive health behaviours, and fail to effectively use available health care services (Wenzel et al., 2001; Gourevitch & Arnsten, 2005).

Adrian and Barry (2003) briefly summarize how alcohol and drugs, while having a biological effect on the body, can also affect behaviour and ultimately lead to disease:

This may be due to:

- the effect of alcohol and drugs on the organism,

- their effect as metabolic toxins,

- their mode of administration,

- their chronic use, producing a cumulative effect which results in disruptions of general metabolism, with the body losing its ability to absorb nutrients from food and to self-repair in case of disease, which leads to:

- modifications in behaviour, resulting in difficulties of employment, economic self-sufficiency, and

- in the ability to maintain adequate housing, nutrition, and hygiene,

- resulting in ill health affecting a variety of body systems,

- resulting in infections and parasitic disease,

- diseases of the endocrine and metabolic systems,

- diseases of the nervous system and sense organs or

- diseases of the respiratory system. (p. 1606)

The general patterns of poor health found among substance abusers are mirrored within the criminal justice system, where many offenders are users of alcohol and other drugs. Correctional facilities have been described as a “reservoir of illness,” with high rates of numerous diseases, including HIV, tuberculosis, hepatitis, and STIs such as gonorrhoea (Conklin, 1994, p. 14). Much like substance abusers more generally, individuals involved with the criminal justice system are



generally poor, undereducated, and socially disadvantaged, putting them at increased risk for health problems (Glaser & Greifinger, 1993).

While there has been growing research into health problems found in drug-dependent criminal offenders, a great deal remains unknown regarding the frequency, severity, and risk factors associated with disease and medical complications in this population (De Alba et al., 2004). An improved understanding of these issues is essential to improving access to health services for this vulnerable, underserved population.

## **2.1.2 Specific Health Problems**

While the spectrum of disease related to substance use is broad, there are several categories of illness and medical problems that are seen frequently in drug- and alcohol-dependent individuals. The most common of these complications are outlined below.

### **2.1.2.1 Mental Illness**

While not necessarily a direct consequence of substance abuse, mental illness is a clear correlate of drug- and alcohol-addiction. There is a large population of individuals who suffer from both substance use and psychiatric disorders, such as schizophrenia, bipolar disorder, and anxiety disorders (Dennison, 2005).

Individuals with “dual disorders” or “co-occurring disorders,” to which they are

frequently referred, generally have worse overall prognoses than individuals with substance-abuse disorders alone, and may be at increased risk for poverty, homelessness, accidental and homicide death, and non-compliance with medication and treatment (Dennison, 2005).

Underlying mental disorders and neurocognitive impairments may result in impulsivity and poor decision-making that can be linked to both substance abuse and criminal behaviour. Research shows that mental illness is significantly more common among individuals in the criminal justice system than in the general population (Ogloff, Davis, & Somers, 2004). A study of Canadian offenders in federal correctional facilities showed a high prevalence of both mental and co-occurring disorders, with 82.4% of individuals with a psychotic illness also having a substance-use disorder (Brink, Doherty, & Boer, 2001). Rates of psychiatric and substance-use disorders are even higher in provincial correctional facilities (Bland, Newman, Thompson, & Dyck, 1998). In British Columbia, it is estimated that over 30% of the corrections population has been diagnosed with a substance-use disorder, with more than 75% of these individuals also being diagnosed with a co-occurring mental disorder (Somers et al., 2008). However, because disorders often go undiagnosed, these figures likely under-estimate the prevalence of substance abuse and mental disorders in the corrections population.

Stephanie Hartwell (2004) characterizes persons with mental illness and substance abuse problems who are involved with the criminal justice system as having a “triple stigma,” noting that individuals with co-occurring disorders are more likely not only to violate probation and reoffend, but also to be homeless

following their release from custody, a factor putting them at increased risk for numerous health problems (p. 85). Indeed, in addition to greater involvement with the criminal justice system, co-occurring disorders have also been linked to increased health and human services costs (Somers et al., 2008).

#### **2.1.2.2 Skin and Soft-Tissue Damage**

Damage to skin and soft tissue was once the most common reason for emergency room visits by intravenous drug users, and continues to be among the most common complications associated with injection drug use (Cherubin & Sapira, 1993; Stein, 1999). Damage, including infection and abscesses, results from non-sterile injection, needle sharing, poor hygiene, intramuscular or subcutaneous injection (respectively known as muscling and skin popping) that occurs when intravenous injection is not possible, and injection into the veins of the neck or groin (Cherubin & Sapira, 1993; Gourevitch & Arnsten, 2005; Contoreggi et al., 1998).

#### **2.1.2.3 Pulmonary Complications**

Substance abusers experience a broad range of pulmonary complications, such as bacterial pneumonias, opportunistic infections, and tuberculosis, which have been worsened by the emergence of HIV and crack-cocaine use (Cherubin & Sapira, 1993). While pneumonia and tuberculosis are relatively common among injection drug users, crack-cocaine smokers may be at the greatest risk for pulmonary complications, including asthma exacerbations, barotraumas,

noncardiogenic pulmonary edema, and a disease known as “crack lung” resulting from a hypersensitivity to cocaine or an unknown dilutant (Gourevitch & Arnsten, 2005; Stein, 1999). It has been reported that among crack-cocaine smokers, the prevalence of respiratory symptoms is greater than fifty percent (Gourevitch & Arnsten, 2005).

#### **2.1.2.4 Cardiovascular Complications**

Drug use may also result in a number of cardiovascular complications. Cocaine, in particular, is associated with a broad range of complications including myocardial infarction, angina, and endocarditis, a serious infection of the heart valves and endocardium, (Cherubin & Sapira, 1993). Indeed, chest pain, frequently the result of myocardial infarction or cardiac eschemia, is the most common medical symptom associated with cocaine use (Gourevitch & Arnsten, 2005).

However, endocarditis is more closely associated with injection drug use and non-sterile injection practices (Contoreggi et al., 1998). Indeed, prior to the HIV epidemic, endocarditis was the infection most classically associated with intravenous drug use (Gourevitch & Arnsten, 2005). While endocarditis in the general population is most often left-sided, it is more commonly right-sided when found in injection drug users (Gourevitch & Arnsten, 2005).

#### **2.1.2.5 Injuries and Poisoning**

Individuals with drug and alcohol addictions frequently report excess morbidity in relation to injuries and poisoning. Individuals with a medically identified substance abuse problem are more likely to experience injuries, injury-related hospitalizations, and a greater number of injury events than those without substance abuse problems, with injuries resulting from both the substance abuse itself and the associated lifestyle (Miller, Lestina, & Smith, 2001). Poisoning frequently results from use of both legal and illegal drugs, while injuries, such as fractures and dislocations are frequently related to the increased trauma and accidents seen in substance users (Adrian & Barry, 2003). Injury may also result from the increased risk of violence—as both offender and victim—found among individuals who abuse alcohol and other drugs (Boles & Miotto, 2003).

#### **2.1.2.6 HIV**

Drug use, particularly injection drug use, is a well-established risk factor for HIV infection. Drug users are at an increased risk for acquiring HIV as a result of needle sharing, trading sex for money or drugs, and sexual relationships with steady partners who are already infected (Stein, 1999). A substance abuser's lifestyle may interfere with his or her ability to seek care or comply with treatment, and the immuno-suppression associated with HIV infection may put a substance-abusing individual at increased risk for other medical complications, including fungal

infections, pneumonia, and opportunistic bacterial and viral infections (Contoreggi et al., 1998).

#### **2.1.2.7 Hepatitis Viruses**

Drug use, and particularly intravenous drug use, is associated with the transmission of Hepatitis A, B, C, and delta viruses (Cherubin & Sapira, 1993). While Hepatitis A is associated with fecal-oral transmission and is generally spread through close, personal contact or the ingestion of contaminated drugs, the other Hepatitis viruses are generally spread through needle sharing (Contoreggi et al., 1998; Cherubin & Sapira, 1993). Hepatitis B and Hepatitis C are especially common in injection drug users, with a large proportion of at-risk individuals being infected with both viruses (Contoreggi et al., 1998). Sexual transmission, frequently resulting from risky sexual behaviours associated with substance use, is also common in this population (Stein, 1999).

#### **2.1.2.8 Sexually Transmitted Infections**

Substance abuse is associated with high rates of STIs, including syphilis, gonorrhoea, chlamydia, genital herpes, and the human papilloma virus (Gourevitch & Arnsten 2005). STIs are associated with substance abuse not only because of the exchange of sex for drugs or money, but also because of the sexual impulsivity and risk-taking behaviours associated with various substances, particularly cocaine, amphetamines, and alcohol (Stein, 1999). Risk behaviours associated with

substance use include inconsistent condom use and multiple sexual partners (Gourevitch & Arnsten, 2005). Sexually transmitted diseases that cause genital ulceration are particularly problematic because they may increase an individual's risk of contracting HIV (Stein, 1990).

#### **2.1.2.9 Other Medical Complications of Substance Use**

Substance abuse is associated with a multitude of other medical complications. These include bone and joint infections (Contoreggi et al., 1998), liver damage resulting from alcohol (Stein, 1999), gastrointestinal complications (Gourevitch & Arnsten, 2005), and renal disease or failure (Stein, 1990). Substance abuse has also been associated with endocrine, nutritional, and metabolic diseases and immunity disorders, which may result from poor eating habits associated with lifestyle or reduced ability to metabolize the nutrients found in food (Adrian & Barry, 2003). Injection drug users also frequently show subtle abnormalities in immune function that are not related to HIV or other retroviral infections (Contoreggi et al., 1998). Neuropsychiatric complications, such as agitation and drug-induced psychosis associated with the use of methamphetamines, are also a significant medical complication of substance abuse (Cherubin & Sapira, 1993; Dore & Sweeting, 2006).

## **2.2 Population's Use of Health Services**

Despite recognition of the numerous medical complications associated with substance abuse and research showing that substance abusers are among those most in need of health care services, individuals with alcohol- and drug-abuse problems frequently do not receive adequate medical care and have less access to health care than comparable individuals who do not abuse alcohol or drugs (McCoy, Metsch, Chitwood, & Miles, 2001; Samet et al., 2003). Substance users often face significant personal and systemic barriers to receiving health services (Friedmann et al., 2000). While various mechanisms have been proposed for linking this population with health services, relatively little is known about if and how such mechanisms work.

### **2.2.1 Patterns of Health Services Utilization**

While it has long been recognized that substance abusers have a unique set of health care needs, the HIV epidemic, in particular, made it apparent that patients with alcohol and drug abuse issues not only bare a disproportionate burden of health problems, but also use health services in inefficient ways and do not seek or use primary care in a consistent, meaningful manner (Samet et al., 2001). While drug users are more likely than non-drug users to require medical treatment, they are less likely to actually utilize health services and receive care than comparable non-drug using individuals (Chitwood et al., 2001).



The use of alcohol and other drugs is frequently associated with high levels and costs of service utilization. While there is a general perception that drug users over utilize health services, in reality, such individuals tend to postpone care and ignore existing health problems (Chitwood et al., 2001). However, ignored preventive and outpatient services may ultimately result in costlier emergency or inpatient hospital care (McCoy et al., 2001). Unfortunately, because there is little empirical data regarding health services utilization for substance users matched to non-users, the exact nature of the link between drug use and health care utilization remains poorly established (French, McGeary, Chitwood, & McCoy, 2000).

One clear observation for substance-abusing individuals is that they frequently lack primary preventive health care. It has been shown that chronic users of alcohol or other drugs are significantly less likely than non-drug users to have utilized primary preventive health care in the previous twelve months (Chitwood et al., 2001). This means that for this vulnerable population, it is less likely that major health problems will be prevented or identified while still manageable with lower-cost early treatment interventions, and before illnesses become symptomatic and more difficult to treat (Chitwood et al., 2001). Primary care is particularly important because evidence suggests that such care can improve not only general health, but also substance-abuse-related outcomes for this population (De Alba et al., 2004).

Failure to seek preventive primary care means that demand for treatment-seeking care will frequently be high within the substance-abusing population (Chitwood et al., 2001). However, even when drug users become aware that they

may require treatment, they often defer such treatment until the health problem becomes so severe that treatment becomes unavoidable. Consequently, emergency departments are frequently the only source of health care for many substance-abusing individuals (De Alba et al., 2004). The underutilization of both preventive and treatment health services by this population acts to exacerbate health problems and increase the inappropriate use of expensive services to treat complications that could have been prevented through early diagnosis (Chitwood et al., 2001).

### **2.2.2 Barriers to the Effective Use of Health Services**

In order to address the ineffective use of health services frequently seen in individuals who abuse alcohol and other drugs, it is necessary to understand why such individuals do not seek medical care in a consistent, ongoing manner. For many substance abusers, general health and even serious medical problems may be ignored because of the high value placed on living in the present. Health care, along with other “personal investments,” such as education, employment, and nutrition, may not be viewed as a priority for many in this population (French et al., 2000, p. 1711).

Illicit drug users have reported that they often put off seeking care, likely because they prioritize acquiring and using drugs over seeking treatment for known health problems (Chitwood et al., 2001; McCoy et al., 2001). They frequently procrastinate, do not want treatment, and are more likely to self-treat than non-drug users, and individuals with the worst health conditions are frequently the most

likely to avoid seeking care (McCoy et al., 2001). Delaying treatment is consistent with the lifestyle of addiction, particularly addiction to illicit drugs. Overall, for many substance users, preventing illness and promoting health are secondary to the daily struggles associated with substance abuse (Chitwood et al., 2001).

Substance users may also avoid necessary health services because of a fear of stigmatization and discrimination related to their drug use (McCoy et al., 2001). Many addicts believe that they are treated poorly by physicians and that they receive less than adequate medical care (Adrian & Barry, 2003). While it is unclear if this perception is true, it may nevertheless prevent many addicts from seeking medical attention.

Another major barrier to the effective use of health services arises from the fact that drug treatment programs and health care are generally offered separately, meaning that substance users must seek treatment for drug-related and other health problems in separate, distinct settings (Gourevitch et al., 2007). Medical care is rarely provided as part of substance abuse treatment, with medical and addiction services generally being largely uncoordinated (Weisner, Mertens, Parthasarathy, Moore, & Lu, 2001)

The separation of services is further complicated by the fact that clinicians involved in the treatment of substance-abusing individuals frequently approach patients from diverging perspectives that reflect differences in training and background (Samet et al., 2001). Parallel, uncoordinated approaches to an individual's health and substance abuse problems fail to recognize that a patient's

problems are closely interrelated and therefore require collaboration for optimal treatment outcomes (Samet et al., 2001).

### **2.2.3 Strategies for Improving Population's Use of Health Services**

Because chronic drug users frequently suffer from a wide variety of health and social problems, it is generally agreed that successful treatment programs must work to address a variety of client needs (D'Aunno & Vaughn, 1995). This requires a broad range of services that act to promote health by emphasizing prevention, early diagnosis, and early intervention, and by recognizing the strong relationship between health and an individual's other needs (Chitwood et al., 2001).

Given their unique health needs and significant burden of illness, users of alcohol and other drugs are ideal candidates for interventions that improve their use of health services (Chitwood et al., 2001). Because this population can benefit greatly from interventions such as screening and early treatment for infectious diseases and vaccinations, improved effort should be made to increase linkages to comprehensive, longitudinal care (De Alba et al., 2004).

Improving substance abusers' use of health services requires multidimensional service delivery that includes health promotion and education for multiple groups, including drug users, health service providers, and policy makers, in order to encourage effective service utilization (McCoy et al., 2001). This multi-pronged approach, with the requisite continuity of care between providers, could provide significant opportunities for preventive, diagnostic, and therapeutic

interventions (De Alba et al., 2004). However, correcting the fragmentation of substance abuse and health care services may be difficult, and both structural and personal behaviours must be adequately addressed in order to ensure that drug users have appropriate access to a full range of health care services (McCoy et al., 2001).

A primary strategy for improving substance abusers' use of health services is collaboration and linkage between medical, substance abuse, and, where required, mental health services in order to improve the overall quality of care delivered to individuals with substance use problems (Samet et al., 2001). Because substance users are frequently not receiving medical care, linking such individuals to health services is an important part of improving their overall wellbeing (Samet et al., 2003). It has been suggested that substance abuse treatment should be viewed as an opportunity to link substance-abusing individuals to health services at a time when treating medical problems may act to encourage both recovery and health (Friedmann et al., 2001).

Linking users of alcohol and other drugs to medical services, and to primary care in particular, has been advocated as a method for reducing the enormous expenses—both human and financial—associated with addiction (Samet et al., 2003). While addressing the health and psychosocial complications frequently seen in users of alcohol and other drugs is important from a societal perspective, addressing these needs is an important part of reducing the probability of relapse for individual users (Friedmann et al., 2001). Linked care is particularly important for drug users because the nature of drug use often makes it difficult for individuals

with substance abuse problems to participate in the standard health care system (Chitwood et al., 2001).

Integration of health and addiction services is important because it may have positive effects on both health and addiction outcomes (Friedmann et al., 2003). The integration of primary care, in particular, provides an opportunity to provide early treatment for health problems and to address substance abuse and related medical complications, and may result in improved medical, substance use, and HIV behavioural outcomes, along with more efficient use of health and addiction services (Samet et al., 2003).

Treating an individual's drug abuse can potentially ameliorate problems with related issues, such as health, social functioning, criminal activity, and employment (Friedmann et al., 2001). Physicians may be able to better identify alcohol- and drug-related causes when making medical diagnoses, and improved linkage to addiction treatment may result in enhanced adherence to medical treatment, appointment keeping, and taking of necessary medication (Samet et al., 2001). Indeed, linked care has been associated with increased spending for outpatient medical care and decreased spending for costly emergency and inpatient care (Gourevitch et al., 2007). Linked care may allow patients to address previously unrecognized health problems and to obtain specialty health services, such as psychiatric or dental care (Samet et al., 2003). Linking health and addiction services may also provide an opportunity to address other behaviour-related medical issues, such as smoking or the spread of sexually transmitted infections (Samet et al., 2001).

At the same time, linking medical services to drug abuse treatment can improve a client's substance abuse treatment retention and outcomes (Samet et al., 2001; Friedmann et al, 2001). Medical services are particularly beneficial to addiction treatment outcomes when medical professionals are knowledgeable about substance use disorders and directly involved in treatment (Weisner et al., 2001). Health care providers must be aware of the unique health and social problems of substance-using individuals and should be prepared to provide comprehensive care to this population (Chitwood et al., 2001).

The integration of health and addiction services may result in improved treatment outcomes in several ways. Friedmann et al. (2003) suggest three mechanisms by which integrated health services may act to enhance an individual's drug treatment:

First, the primary care physician's focus on physical health problems, particularly sequelae of substance abuse, might add an important motivational element to substance abuse treatment...Second, the patient-physician relationship as a source of counselling or social support may add to the therapeutic milieu of the addiction treatment program...Third, the on-site primary care physician and medical staff might facilitate assessment and referral for psychosocial services that could improve addiction-related outcomes. (p. 7)

The linkage of addiction and health services can occur on a continuum, with extremes ranging from the market-based purchase of individual services to a fully coordinated, integrated, and centralized system of service delivery (Friedmann et al., 2000). Distributive linkage models work by linking patients to existing medical services, while integrative models work by providing medical services at the site of addiction treatment (Samet et al., 2003).

Many researchers and health system planners argue that integrated, multidimensional care is best achieved when health care and addiction treatment are offered at one physical site (Friedmann et al., 2001). Medical services delivered on-site with addiction services have been shown to result in increased health services utilization for the drug-using population (Friedmann et al., 2001). The availability of primary health care on-site in addiction treatment has also been associated with improvements in addiction severity, which is consistent with reports that substance-related outcomes can improve when patients receive integrated medical and addiction treatment (Friedmann et al., 2003).

However, it is possible that health and addiction outcomes may also be improved by more decentralized or informal linkage mechanisms, in which substance abuse clients are referred to an external health services provider. Because many providers of addiction services lack the funding and expertise to provide fully integrated services on site, they must frequently develop external arrangements, which may include programs such as transportation assistance, to link clients to off-site services (Friedmann et al., 2000). However, these other types of referral models vary greatly in the strength of linkage between addiction and health services providers (Friedmann et al., 2001). While less is known about other modes of service linkage, any method that may potentially improve health services utilization for substance-using individuals should be given serious consideration. Future research should examine the effects of program-level linkages to health care on individuals' health, social, and substance-use outcomes (Friedmann et al., 2001).



Methadone maintenance treatment may provide an ideal opportunity for linking substance-abusing individuals with other types of care. Methadone maintenance is frequently an important part of substance abuse treatment, and because it requires frequent, regular visits to a physician, it allows for convenient linkages with other health services (Gourevitch et al., 2007). The potential role of methadone maintenance as a linking mechanism is currently recognized in British Columbia, where all methadone-prescribing physicians are encouraged to refer clients to additional medical and social services (Anderson & Warren, 2004).

Despite the logic of offering integrated, multidimensional treatment, the integration of health services into drug treatment programs has “proceeded at a glacial pace,” in part because of the lack of empirical evidence supporting such integration (Gourevitch et al., 2007, p. 144). Relatively little is known about the medical services received during addiction treatment, and because studies have frequently used small, limited samples, it has been difficult to draw broad conclusions about the provision of such services (D’Aunno & Vaughn, 1995). While there is some evidence in support of on-site delivery of medical services, transportation assistance, and on-site case management, there is a need for greater research into the potential benefits of service linkage (Friedmann et al., 2000).

The potential for improved treatment outcomes as a result of integrated treatment is relevant to current health policy, and is something that must be better explored (Weisner et al., 2001). Although linking users of alcohol and other drugs to health services does not guarantee improved treatment outcomes, it is a necessary step to realizing potential benefits. Once substance use and medical treatment are

linked, it is possible to ask whether—and how—health care providers can improve the overall care of substance-abusing patients (Samet et al., 2003).

## **2.3 Drug Treatment Courts**

### **2.3.1 History and Purpose of Drug Treatment Courts**

The first drug treatment court opened in Dade County, Florida, in 1989, in an effort to address high rates of drug-fuelled recidivism and the growing number of incarcerated drug-involved offenders (Berman & Feinblatt, 2001; Turner et al., 2002). Although the drug court did provide some level of treatment services, its immediate goals were to reduce rates of recidivism, incarceration, and non-appearance at trial. While drug courts were a novel intervention at this time, they emerged from a long history of criminal justice treatment interventions, with the courts already managing drug-involved offenders for almost eighty years (Belenko, 2002).

Since the late 1980s, drug courts have spread across the United States as a response to overwhelmed state courts, rising rates of incarceration, and prison overcrowding, which have forced policymakers to re-evaluate existing approaches to drug crime (Berman & Feinblatt, 2001). Significant federal funding for drug courts also influenced their rapid spread in the United States (Belenko, 2001). The advent of drug courts signalled a paradigm shift away from a system designed for

speed and efficiency towards court practices aimed at preventing future crime by addressing the issues underlying ongoing criminal activity (Harrell, 2003). Since their inception, drug treatment courts have, in many ways, become the “court-based intervention of choice for linking drug-involved offenders with treatment” (Belenko, 2002, p. 1636). Drug courts have also become an important judicial intervention in Canada. The Government of Canada, under its National Anti-Drug Strategy, currently supports drug courts in Toronto, Vancouver, Edmonton, Winnipeg, Ottawa, and Regina (Government of Canada, 2008). Today, virtually all drug courts have the primary goal of reducing drug use and criminal recidivism (Belenko, 2001).

Drug courts generally treat drug possession as both a criminal justice and public health problem. Drug courts aim to get offenders whose addiction has resulted in criminal behaviour to stop using drugs by providing intensive, long-term treatment to individuals with histories of drug use and criminal involvement, as well as significant health and social problems (Harrell, 2003; Belenko, 2001). Drug courts generally emphasize treatment as a strategy for breaking the cycle of recidivism and are implemented with the physiological, psychological, and behavioural realities of addiction in mind (Casey & Rottman, 2000; Turner et al., 2002).

As part of drug court, offenders are provided with judicially supervised drug treatment as an alternative to incarceration or probation, and relapse is generally viewed as an obstacle rather than a failure (Watson, Hanrahan, Luchins, & Lurigio, 2001). Using active, intensive judicial supervision along with treatment and sanctions, drug courts emphasize rehabilitation, rather than rapid case processing

or punishment (Turner et al., 2002). Because of frequent contact between offenders, treatment providers, and the court, it is much harder for a drug court participant to “fall through the cracks” than it may be in more traditional courtroom processes (Cooper, 2003).

Individual drug courts differ in relation to who is eligible, how participants are selected, and what specific treatments are available (Harrell, 2003). However, drug courts have moved towards a common model, and although specific programs do exist, drug courts generally have five common elements: “Immediate intervention, a non-adversarial process, a hands-on judge, treatment programs with clearly defined goals and rules, and a team approach” (Watson et al. 2001, p. 477). Programs are also characterized by close judicial supervision, the appropriate use of sanctions and incentives, and case management (Belenko, 2002). In many cases, drug courts involve ancillary health and social services in addition to drug treatment (Wenzel et al., 2001). Overall, this structure represents a dramatic shift in criminal justice approaches to substance abuse and standard criminal courtroom practices.

The rehabilitative focus of drug treatment courts is connected to the legal philosophy of therapeutic jurisprudence, in which criminal justice is perceived as a therapeutic rather than merely punitive tool (Turner et al., 2002). As a concept, therapeutic jurisprudence reflects the idea that the law can act to promote an individual’s physical or psychological wellbeing and seeks to examine how the law works to impact the physical and mental health of those it affects (Steadman, Davidson, & Brown, 2001; Winick, 1997). This perspective posits that courts, while fulfilling their duty to apply the law fairly and properly, should act to promote the

wellbeing of those involved in the criminal justice system (Harrell, 2003). A therapeutic “lens” calls for an examination of how legal arrangements impact therapeutic outcomes and requires judges and lawyers to recognize that their decisions may have beneficial or harmful consequences (Watson et al., 2001; Casey & Rottman, 2000). Therapeutic jurisprudence asks how beneficial consequences can be maximized and harmful consequences minimized without compromising important justice values, such as due process (Casey & Rottman, 2000). However, as a perspective, it provides no framework for identifying a therapeutic outcome in any specific set of circumstances

It is, however, necessary to recall that, although drug courts embrace therapeutic jurisprudence as a method of reducing drug use and criminal behaviour, the courts are part of a criminal justice system that focuses on addressing criminality and improving public safety (Belenko, 2001). While the first drug court clearly had some therapeutic elements, its primary purpose was to promote public safety and improve supervision of individuals awaiting trial (Cooper, 2003). These courts were developed for pragmatic as well as altruistic reasons, meaning that while there is a desire to improve individual wellbeing, there is also significant focus on reducing recidivism, limiting the expanding prison population, and protecting the public from the high costs of crime (Anderson, 2001). Drug courts ultimately seek to advance public safety by preventing criminal behaviour among individuals at high risk of recidivism (Harrell, 2003).

Despite their potential benefits, the implementation of drug courts is not without challenges. More traditional judges and lawyers may not be comfortable

acting as problem solvers in a non-adversarial courtroom (Belenko, 2002). At the same time, many individuals believe that drug courts are coercive, act to reinforce the war on drugs, and detract from non-criminal justice addiction treatment (Belenko, 2002). Critics argue that drug courts may result in a system where specialized courts become the “preferred gateway to the treatment system” because there are not adequate resources for those who voluntarily seek services to address their addiction (Anderson, 2001, p. 473). Even those that support drug courts in theory frequently note that drug courts often do not utilize evidence-based program planning and implementation (Belenko, 2002).

### **2.3.2 Current State of Knowledge**

Drug courts have been in existence for some time and have achieved significant social and political support despite the fact that relatively little is known about their effectiveness. Although drug courts are generally accepted as a valuable, worthwhile endeavour, their popularity has grown without strong evidence regarding long-term benefits of participation (Belenko, 2002). While critical review of numerous drug court evaluations has shown a relative reduction in drug use and criminal activity while participants are in the drug court program, the long-term, post-program effects of drug courts are less clear (Belenko, 2001). Research does show that drug court participants are predominantly male, with poor educational and employment outcomes, extensive criminal histories, and previous failure with addiction treatment (Belenko, 2001).

While it is generally accepted that drug courts do have some benefit for those who participate, many evaluations have suffered from methodological shortcomings, meaning there is a continuing need for higher quality, long-term drug court evaluations (Belenko, 2001; Turner et al., 2002). Process evaluations have been most dominant, with a relatively small number of studies providing findings on long-term recidivism and other outcomes, and few studies using follow-up periods of more than one year (Turner et al., 2002; Belenko, 2002). Many studies have also failed to identify an appropriate comparison group, or any comparison group at all, while others have been unable to obtain data on characteristics such as behaviour and life circumstances of comparison group individuals, particularly over an extended period of time (Belenko, 2002). Like many other criminal justice interventions, research is further compromised by a lack of comprehensive data on both offenders and services (Belenko, 2002). Evaluations have tended to focus on concrete outcome measures, such as urinalysis test results, rather than on more abstract measures, such as family reintegration, improvements in employment, or actual post-program drug use (Turner et al., 2002).

While quality research on drug courts is lacking in general, the research deficit is most obvious when considering the relationship between drug court and health services for offenders (Wenzel, 2001). As Belenko (2002) notes:

Few drug treatment court evaluations have been able to incorporate detailed data on drug treatment and related health services. This reflects both an inattention to the importance of such data, as well as the lack of integrated client tracking systems and the focus on public safety issues in drug treatment court research. The need to collect multi- and cross-system data compound the problem. (p. 1644)

There is also a paucity of research regarding what components of a drug treatment court program are most effective at improving client outcomes (Belenko, 2002).

The lack of information regarding outcomes other than recidivism results from several factors. A major problem is that few criminal justice systems actually track social or health indicators, including employment and drug use, and collecting such data is generally expensive and time-consuming (Belenko, 2001). Additionally, because many evaluations are completed within a short period, it is often impossible to collect or use data that is not found within existing criminal justice records (Belenko, 2001).

Nevertheless, several drug court evaluations have considered health outcomes, at least to a minimal extent. For example, in Australia, the New South Wales Drug Court included a “Health, Well-Being and Participant Satisfaction” component as part of its evaluation (Freeman, 2002). This evaluation, while noting “most drug court evaluations have ignored health outcomes for participants,” used standardized interviews to examine the health of participants relative to other populations and to ascertain changes in health and wellbeing (Freeman, 2002, p. iii). Overall, the evaluation found strong evidence that the New South Wales Drug Court program reduced drug use and improved health and social functioning for individuals while they remained in the program, though the author acknowledged that high rates of termination from the drug court program challenged its overall effectiveness (Freeman, 2002).



Similarly, the Victoria Drug Court evaluation, also out of Australia, considered the health and wellbeing of participants (Alberti, Panjari, Ritter, & Swan, 2004). The evaluation found only minor improvements in mental health and slight increases in physical health of participants over time. It is important to note that during the six-month period of this evaluation, no participants had graduated from the drug court, and each of the twenty-eight participants involved in the research were still subject to the program. The *Final Report on the North Queensland Drug Court* also briefly considered improvements in participant health and social function (Payne, 2005). Using standardized surveys, this evaluation found improvements in health of participants across eight general areas, though the authors noted that because the surveys were administered as individuals progressed with the drug court, it could not examine the health and wellbeing of terminated participants who did not move forward with the program.

### **2.3.3 Relationship to Health Services**

As the number and quality of drug court evaluations grows, more will be understood about the potential relationship between drug courts and health services. However, the justice system has long been recognized as an opportunity to link offenders with health interventions, such as medical screening and care. Involvement with the criminal justice system can provide a unique opportunity to connect with vulnerable individuals that may otherwise be difficult to reach (Glaser & Greifinger, 1993). The justice system is particularly important as a point of

service contact for criminal offenders, as this group frequently lacks access to health care services (Wenzel et al., 2001). Periods of incarceration and community supervision have been specifically identified as important occasions for preventing and treating disease in this vulnerable population, though full advantage has yet to be taken of these unique opportunities to link individuals to care (Hammett, Gaiter, & Crawford, 1998).

Linking offenders to health services, however, may be easier in drug treatment courts than elsewhere in the criminal justice system. This is because the specialized subject matter of drug court creates a mutual understanding between the court and community professionals that may be difficult to foster in more traditional criminal justice processes (Casey & Rottman, 2000). Because addiction treatment is a specific goal of drug courts, addressing an individual's health needs can be seen as a necessary and legitimate aspect of recovery.

Indeed, addressing the health needs of drug court participants is important because these individuals, like drug-addicted offenders more generally, "often have other serious physical and mental health problems that can complicate both the treatment and recovery process" (Belenko, 2002, p. 1643). Health care is an important part of rehabilitation, and it is believed that criminal offenders who feel good about their health will view themselves more positively and will be less likely to engage in negative behaviours once they are no longer involved with the criminal justice system (Conklin, 1994). Additionally, by lowering the prevalence of infectious and communicable diseases, providing criminal offenders with medical

treatment may potentially benefit the health of the public as a whole (Conklin, 1994).

Several drug court evaluations have shown that individuals entering drug court are often in need of medical treatment, with many suffering from sexually transmitted infections or other chronic health problems (Belenko, 2001). The health problems seen in individuals coming into contact with drug treatment court, along with related problems such as substance abuse, poverty, and homelessness, mean that there is significant opportunity for the criminal justice system to collaborate with health services agencies and other community-based organizations to improve the health of this vulnerable, underserved population (Hammett et al., 1998).

Drug courts are, in many ways, already recognizing the importance of addressing participants' health needs. Almost all drug courts screen new clients for medical conditions, including HIV and tuberculosis, and refer them to medical services for treatment when required (Cooper, 2003). It has been suggested that drug courts represent "a promising bridge between the traditionally separate criminal justice and health services systems" (Wenzel et al., 2001, p. 251). By acting as a bridge and encouraging linkages between court, treatment, and health services, drug courts can act to address the intersection between drug abuse, crime, and the health needs of drug-abusing criminal offenders (Wenzel et al., 2001).

The potential role of drug courts is supported, to some extent, by research related to more general substance abuse treatment and patterns of health services

utilization. Research has shown a significant decline in inappropriate use of hospital services following treatment for individuals with substance use disorders (Parthasarathy, Weisner, Hu, & Moore, 2001). Other research has shown that the relationship between substance abuse treatment and health care costs will vary with age and maturation (Blose & Holder, 1991).

However, collaboration between drug courts and health services may, at times, be challenging, as it requires practitioners, researchers, and policy makers to understand and support different, and sometimes conflicting, philosophies and goals (Belenko, 2002). There may be some tension between the supervisory and rehabilitation objectives of drug courts that make building bridges and linkages to services difficult (Wenzel et al., 2001). In the context of limited resources, large caseloads, and a primary focus on rehabilitation, the delivery of a full range of services, including medical care, may not always be a priority for drug treatment courts (Wenzel et al., 2001).

In order to address the unique needs of participants, drug courts should act to assess individuals' health needs and link them to necessary medical services. Ultimately, a successful drug court and positive outcomes for participants will depend on successful collaboration between the criminal justice system, treatment providers, and health services (Wenzel et al., 2001). Indeed, a key component of improving treatment and prevention services in criminal justice settings is strengthening the links between criminal justice agencies, public health departments, and community-based organizations (Hammett et al., 1998).

Unfortunately, there is a significant lack of empirical evidence on this topic. Additionally, while there is a paucity of information regarding how drug courts link to health services, much remains unknown, even more generally, about the link between addiction treatment and health services (D'Aunno & Vaughn, 1995). Consequently, future research on linkages between drug courts and health services carries significant implications for improving service access and ultimately treatment outcomes for drug-abusing criminal offenders (Wenzel et al., 2001).

### **2.3.4 Drug Treatment Court of Vancouver**

The Drug Treatment Court of Vancouver, just the second of its kind in Canada, opened in 2001 to address high rates of heroin, cocaine, and crack-cocaine use in Vancouver, particularly in the city's Downtown Eastside (CCSA, 2007). Addicted individuals living in this area are recognized as facing a variety of health and social challenges. Initially, only individuals charged under the *Controlled Drugs and Substances Act* for possession, possession for the purposes of trafficking, or trafficking in a small amount of a controlled substance were eligible for participation. However, in January 2005, individuals that committed other drug-motivated offences, such as theft or break and enter, were also allowed to participate, given that they met other drug court criteria (CCENDU, 2007). In April 2006, responsibility for DTCV treatment was transferred from an independent contractor to the Vancouver Coastal Health Authority (Ministry of Public Safety and Solicitor General, 2006).

The ultimate goal of the DTCV is to reduce drug use among adult offenders charged with addiction-motivated offences. Public Safety Canada (2009) enumerates the expected outcomes of the DTCV program as:

- abstinence from drug use,
- reduced future contact with the criminal justice system,
- improvements in participant well-being,
- improved housing, employment and educational, [*sic*]
- pro-social use of time.

Participation in the DTCV program is completely voluntary. Once an individual has elected to participate, he or she must plead guilty to the offence in question and agree to attend treatment before being released on stringent bail conditions (CCENDU, 2007). The DTCV judge, working as part of a team, will work to monitor a participant's progress, and if an individual successfully completes the drug treatment court program, which involves approximately 265 hours of treatment over about a year, an individual will "graduate" and return to court for sentencing, which is most often a suspended sentence or short term of probation (CCENDU, 2007). If a participant is not successful with the DTCV program, through personal choice or because of lack of compliance with the program, they will be returned to the regular court process.

## **3: METHODS**

### **3.1 Data Sources**

Data was obtained from a linked Inter-Ministry database (the “IM Database”) containing integrated records of service utilization from British Columbia’s Ministries of Public Safety and Solicitor General, Employment and Income Assistance, and Health over a multi-year timeframe.<sup>1</sup> The IM Database contains no individual identifying information, but reflects all services provided by the three Ministries from April 1997 to September 2006. The current study focused on data from the Ministry of Public Safety and Solicitor General and Ministry of Health.

The methodology for linking the data was developed by the Simon Fraser University’s Faculty of Health Sciences (“FHS”). Before data was transferred to FHS, all identifying information was replaced with an anonymous study ID, which was used for matching data across the three Ministries.

Prior to beginning any analysis, research ethics approval was obtained from Simon Fraser University’s Office of Research Ethics.

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<sup>1</sup> British Columbia’s Ministry of Health has since been reorganized into two separate Ministries: The Ministry of Health Services and Ministry of Healthy Living and Sport. While the Ministry of Public Safety and Solicitor General remains unchanged, the Ministry of Employment and Income Assistance has since been reclassified as the Ministry of Housing and Social Development.

### 3.2 Study Population

This study examined 144 individuals processed by the DTCV between December 1, 2001 and March 31, 2004 who were successfully linked to Health data in the IM Database and for whom an eligible index offence for drug court involvement could be identified (the “DTCV Group”).

All individuals in Vancouver charged under the *Controlled Drugs and Substances Act* with possession, possession for the purposes of trafficking, or trafficking in small amounts of a controlled substance after December 1, 2001 were screened by Federal Crown prosecutors to determine their eligibility for the DTCV. Individuals could be deemed ineligible for a number of reasons, such as being motivated by profit alone, having a criminal history of violence, committing the offence near a school or park or with children present, or no apparent addiction.

Of the 435 individuals processed by the DTCV between December 1, 2001 and the end of available data in September 2006, 360 were located in the IM Database, which contains data for all individuals with Corrections contact between the fiscal years 1997/1998 and 2003/2004, with fiscal years ending on March 31. Of these 360 individuals, only 341 were successfully matched to Health and/or Income and Employment Assistance data, and of these 341 individuals, only 198 had contact with the DTCV between its inception on December 1, 2001 and March 31, 2004. Because the IM Database contained data up to and including the 2005/2006 fiscal year, March 31, 2004 was selected as an end date to allow for two years of follow-up for each participant.



Because individuals screened for DTCV participation must be charged with one of the three previously mentioned offences (possession, possession for the purposes of trafficking, or trafficking in small amounts of a controlled substance), it would be expected that one of these three offences (for the DTCV Group, the “Index Offence”) would be reflected in the IM Database prior to an individual’s first contact with the DTCV (for the DTCV Group, this date of first contact with the DTCV is considered the “Index Date,” the date representing the juncture between pre- and post-offence time). Individuals would be discharged from bail or remand in relation to the Index Offence. However, of the 198 individuals having contact with the DTCV between December 1, 2001 and March 31, 2004, only 149 had a discharge for an identifiable Index Offence represented in the IM Database during the 6 months preceding their first contact with the DTCV. Because an eligible Index Offence was required for the purposes of matching each DTCV participant with an appropriate control, only those 149 individuals with an identifiable Index Offence were deemed appropriate for this study.

Of the 149 individuals with an identifiable Index Offence, four died prior to achieving two years of follow up time after the Index Date. These four individuals were removed from the study population. An additional individual was removed because his or her matched control also died prior to achieving two years of follow up time. Consequently, a total of 144 individuals made up the DTCV Group for the purposes of this study.

### **3.3 Control Group Selection**

A control group was selected from non-DTCV participants found in the IM Database using propensity score matching, a method described in more detail below. For the purposes of this research, an ideal comparison group would consist of individuals charged with eligible DTCV events during the same time period and in the same location as DTCV participants and who matched participants on other characteristics, such as age, gender, and ethnicity, but who were not actually screened for the DTCV. However, such a control group is not possible because all individuals who committed eligible drug offences during the relevant time period (December 1, 2001 to March 31, 2004) were screened for DTCV eligibility and those who did not participate were either deemed ineligible or refused to participate. Individuals deemed ineligible for participation were deemed to be poor candidates for DTCV, while refusers were likely to differ with respect to motivation, meaning that in both cases, differences could result in significant bias. For this reason, comparison group individuals had to be selected from a different pool.

#### **3.3.1 Selecting a Comparison Pool**

As a first step in selecting an appropriate control group, four potential comparison pools were identified, each of which differed from the DTCV cohort in at least one significant way. Given that the DTCV participant cohort was defined by the nature of the Index Offence, when it was committed, and the sentencing court in which it was processed, the potential comparison pools were also defined using

these characteristics. The characteristics of the DTCV Group and the four comparison pools are summarized in the table below:

**Table 1: Characteristics of DTCV Group and Comparison Pool**

| <b>Group</b>      | <b>Index Offence</b> | <b>Date of Index Offence</b>                   | <b>Sentencing Court</b>    |
|-------------------|----------------------|--|----------------------------|
| DTCV Group        | Drug                 | Between December 1, 2001 and March 31, 2004    | Vancouver                  |
| Comparison Pool 1 | Theft                | Between December 1, 2001 and March 31, 2004    | Vancouver                  |
| Comparison Pool 2 | Drug                 | Between December 1, 2001 and March 31, 2004    | Surrey or New Westminister |
| Comparison Pool 3 | Drug                 | Between December 1, 1999 and November 30, 2001 | Vancouver                  |
| Comparison Pool 4 | Drug                 | Between December 1, 2001 and March 31, 2004    | Vancouver                  |

Individuals in Comparison Pool 1 were admitted to probation or custody for a theft offence in Vancouver during the same time period as drug court participants. Individuals in Comparison Pool 2 were charged with a drug-related offence during the same time period as drug court participants but were admitted into probation or custody in New Westminister or Surrey, where drug court was not available. Comparison Pool 3 was made up of individuals admitted to probation or custody for drug offences in Vancouver during the two years prior to the opening of the DTCV. Finally, Comparison Pool 4 consisted of individuals admitted to probation or custody for drug offences in Vancouver during the same time as DTCV participants but who were deemed ineligible or refused to participate in drug court.

Given the need for a comparison group that was most similar to DTCV participants in terms of health indicators, Comparison Pool 1—those admitted into probation or custody for a theft offence in Vancouver during the same two years as drug court participants—was selected for the control group pool. Theft has been used as an eligible drug court offence in other jurisdictions and has since become an eligible offence for participation in the DTCV.

Comparison Pool 1 was considered superior to the other comparison pools for a number of reasons. Although Comparison Pool 2 consisted of individuals charged with a drug offence, because the sentencing court was in Surrey or New Westminster, the health needs of this group and their access to health services may have differed significantly from DTCV participants. Comparison Pool 4 was deemed unsuitable because all individuals charged with a drug offence in Vancouver between December 1, 2001 and March 31, 2004 were considered for DTCV participation, meaning those who did not enter the DTCV were either deemed ineligible or refused to participate, and were likely systematically different from DTCV participants. Finally, while Comparison Pool 3 consisted of individuals charged with drug offences in Vancouver, the timing of the offence (prior the opening of the DTCV) resulted in a significant problem. Individuals from this pool who committed another drug offence after November 30, 2001 ultimately ended up in Comparison Pool 4 or even in the DTCV cohort itself. Removing re-offenders to account for overlap with these other groups would leave Comparison Pool 3 only with individuals who did not re-offend, while keeping re-offenders in Comparison Pool 3 would result in the same problem seen in Comparison Pool 4 (individuals

were later considered for DTCV participation but were either deemed ineligible for or refused to participate). In either case, individuals in Comparison Pool 3 would be notably different from DTCV participants.

For all of these reasons, Comparison Pool 1 was selected for this study. Initially, this pool consisted of 1130 individuals. However, 24 of the discharges from custody were to a federal penitentiary, one was to outside of the province, and another was for a mental health evaluation. Dropping these 26 custody discharges resulted in the pool size decreasing by 25 people, as one individual had both a probation and custody admission, and consequently stayed in the comparison pool. An additional 24 individuals were removed from the pool because their discharge date was after March 31, 2004. A further 57 individuals were excluded because they could not be successfully matched to other data in the IM Database. Consequently, the final size of this pool was 1024 individuals.

### **3.3.2 Propensity Score Matching**

From Comparison Pool 1, the most appropriate controls were selected using propensity score matching. This method is used to determine which potential comparison individuals were most similar to those in the DTCV Group and to construct a comparison group of defendants that are as similar as possible to those participating in drug court. Propensity score matching attempts to account for unobservable factors, such as motivation to succeed, that may define what type of individuals participate in drug treatment court. A propensity score represents the

conditional probability of participating in the drug treatment court program, given a number of measured variables.

Propensity score matching is an ideal method for making comparisons in a retrospective observational study where random assignment is not possible for practical or ethical reasons. A propensity score, a concept first introduced in 1983 by Rosenbaum and Rubin, is the conditional probability that an individual will be assigned to a particular treatment, given a number of observed covariates. Propensity scores are necessary because in nonrandomized experiments, individuals exposed to one treatment may systematically differ from individuals exposed to another treatment, making direct comparisons biased or misleading (Rosenbaum & Rubin, 1983). The propensity score ranges from 0 to 1 and works to predict treatment group membership without regard for treatment outcomes (Cavuto, Bravi, Grassi, & Apolone, 2006).

Propensity score matching has been successfully used in the evaluation of several drug courts. Both the Washington State adult drug court evaluation (Barnoski & Aos, 2003), which examined six drug courts located in Washington State, and the New York State adult drug court evaluation (Rempel et al., 2003), which evaluated six courts located in New York State, employed propensity score matching in the selection of comparison group defendants. The Suffolk County Drug Court Evaluation, which considered four adult drug courts in Suffolk County, Massachusetts, also employed propensity score matching (Rhodes, Kling & Shively, 2006). Characteristics considered for propensity scoring in these evaluations included age, gender, ethnicity, prior criminal history, and the specific nature of

each defendant's current offence. However, like much drug court research, these evaluations focused on criminal justice outcomes, such as rates of re-arrest or incarceration, rather than on health outcomes.

Propensity score matching has also been used in the evaluation of other judicial interventions. In the evaluation of several family treatment drug courts, which work with substance-abusing parents involved in the child welfare system, propensity score matching was used to examine a range of treatment, child welfare, and court outcomes (Worcel, Green, Furrer, Burrus, & Finigan, 2007). Similarly, this method was used to evaluate the impact of intensive judicial monitoring for domestic violence offenders in the Bronx, New York (Rempel, Labriola, & Davis, 2008). Propensity score matching was also employed in the evaluation the San Francisco mental health court, with results indicating an association between mental health court participation and reduced recidivism and violence (McNeil & Binder, 2007).

Given the successful use of propensity score matching in the evaluation of other drug courts and judicial interventions, propensity scores were an ideal method for developing a comparison group for the evaluation of the Drug Treatment Court of Vancouver. This is particularly true given the availability of diverse administrative data in the IM Database that could be used for matching. Using a sample matched using propensity score matching helped to account for changes in the DTCV Group that may have actually reflected overall trends in health services utilization.

In the current study, propensity scores helped adjust for the lack of a randomized control group by matching controls that were similar, based on a broad range of characteristics, to individuals in the DTCV Group. This method provided some control over differences between individuals in the DTCV Group and comparison offenders. Here, propensity scores were based on a broad range of factors including demographic variables such as age, gender, ethnicity, and education level, as well as variables based on data from the Ministry of Health, Ministry of Public Safety and Solicitor General, and Ministry of Income and Employment Assistance. For each participant in the DTCV Group an appropriate control was selected using 1:1 matching, whereby a control with the closest available propensity score was matched to each participant. While this initially resulted in the selection of 145 control group individuals, it was later found that one control individual died prior to obtaining two-years of follow up. Consequently, this individual and his or her matched DTCV participant were removed from the data, leaving 144 comparison individuals (together, the “Theft Group”) and 144 matched pairs.

For individuals in the Theft Group, the Index Date was defined as the start of a community sentence or the end of a custodial sentence related to theft offence defined as their Index Offence. This was necessary to ensure that individuals in the Theft Group had equal opportunity to reoffend, given that DTCV participants receive treatment in the community, and therefore have the opportunity to reoffend.



### 3.4 Preparing Data and Defining Variables

Baseline data were available for individuals in the DTCV Group for several years prior to contact with the DTCV and for at least two years following contact with the DTCV. Analysis focused on variables representing frequency of service utilization, as reflected in MSP and inpatient hospitalization data, and reasons for treatment prior to and following the Index Date. Changes in these measures over the two years preceding the Index Date and two years following the Index Date were compared. Data were organized and prepared in conjunction with experts from FHS specifically trained in analysis of information from the IM Database.

Health data were stored in a SQL-Server database as a series of service event records, with each line representing one health service event for one individual. SQL queries were used to count the number of events of interest for each individual. For both MSP and hospitalization records, events related to the care of a neonate (as coded using the International Statistical Classification of Diseases and Related Health Problems, 9<sup>th</sup> Edition or “ICD-9”) that were coded on the mother’s record were excluded. A determination of what codes to exclude was made using visual inspection of the codes and the *ICD-9-CM Official Guidelines for Coding and Reporting* (Centers for Medicare and Medicaid Services & The National Center for Health Statistics, 2007). For a summary of codes representing care of a neonate that were excluded from the mother’s record, refer to Appendix A.

Before proceeding with analysis, several changes were made to the data. Codes related to reproduction and childbirth were separated from other MSP and hospitalization records, as it was decided that it would be inappropriate to include

such codes in an examination of changes in health service utilization patterns. Again, a determination of what codes to separate was made using visual inspection of the codes and the *ICD-9-CM Official Guidelines for Coding and Reporting* (Centers for Medicare and Medicaid Services & The National Center for Health Statistics, 2007). For a summary of codes related to reproduction and childbirth, refer to Appendix B. Additionally, MSP visits coded with the MSP “Additional Diagnostic Code 01L-Laboratory” were separated from the data because it was determined that their high frequency and vague descriptive nature would add little to the analysis and mask other variables of interest. Finally, a total of 45 service events were excluded from the data because they were associated with an ICD-9 code that does not exist.

In order to facilitate the examination of more specific reasons for MSP visits and inpatient hospitalizations, the overall frequency of each type of care was subdivided into several categories. For MSP visits, data was subdivided into: Visits for methadone treatment (“Methadone Claims”); other visits for substance use disorders, excluding methadone (“SUD Claims”); visits related to mental disorders (“MD Claims”); and other visits unrelated to substance use or mental disorders (“Non-Psych Claims”), excluding reproduction- and childbirth-related codes and Additional Diagnostic Code 01L-Laboratory, as described above. For a breakdown of what was considered an SUD Claim and what was considered a MD Claim, refer to Appendix C.

Methadone Claims were identified in the data using MSP fee item 39, the MSP fee-for-service code employed by physicians for methadone treatment. When this

fee item was found in an individual's record, the service event was considered a methadone treatment visit, regardless of any other associated diagnostic code. The pattern of methadone visits was confirmed by visual inspection of the data, which showed multiple regular visits and a frequency characteristic of methadone treatment.

For hospitalizations, SUD Claims and Non-Psych Claims (again excluding reproduction and childbirth related codes) were considered separately. Methadone Claims are not found in hospitalization discharge records, as this is a fee item associated with MSP services but not with hospitalizations. Similarly, Additional Diagnostic Code 01L-Laboratory is a MSP diagnostic code and did not occur in hospitalization records. MD Claims were not considered for hospitalizations because no hospitalizations for mental disorders were found in the records of any members of the DTCV Group in the 2 years preceding their Index Date. This is likely because individuals with a serious mental disorder are considered ineligible for DTCV participation. Consequently, by definition, all selected individuals in the Theft Group also had no record of hospitalization for mental disorders in the two years preceding their Index Date.

For the purposes of examining specific reasons for treatment, this study examined the ICD-9 code associated with each MSP visit or hospitalization. Each MSP service event record lists only one ICD-9 Code. However, it is necessary to note that hospitalizations were recorded from discharge records, and that while numerous diagnoses may be listed, this study considered only the single code listed as the "most responsible" diagnosis recorded on the hospitalization discharge

record. Specific diagnoses considered were grouped into broader categories. The categories examined in this study were Injury and Poisoning; HIV; Pneumonia and Influenza; Neoplasms; and Endocrine, Nutritional and Metabolic Diseases and Immunity Disorders. These categories were selected to represent a range of potential diagnoses that could be found in the DTCV and Theft Groups. For a complete list of ICD-9 codes contained in each category, refer to Appendix D.

After SQL queries were used to create a table of counts for all variables of interest, this data was exported to Microsoft Access to put data in a useable form, as data cannot be exported directly from SQL Server to SPSS. Data was then imported to SPSS for analysis.

Once data was imported to SPSS, a “Change Score” was calculated for each variable of interest for all individuals in both the Theft Group and the DTCV Group. Each Change Score represented the change in frequency for the specific variable of interest between the two years following and two years preceding the Index Date for each individual (post-Index Date value minus pre-Index Date value). The purpose of the Change Score was to allow for comparisons of how different individuals changed over time.

### **3.5 Analysis**

Analysis focused on both descriptive variables and whether participants exhibited changes in patterns of health services utilization and reasons for treatment prior to and following involvement with the DTCV. All statistical analysis

was completed using data analysis software SPSS (Windows 16.0 version).

Additionally, visual representations of changes in means were graphed using

Microsoft Excel (Mac 2008 Version).

### **3.5.1 Descriptive Statistics**

For both the DTCV Group and the Theft Group, descriptive analysis was completed for several variables, as outlined below:

*Age:* Age was defined as an individual's age at the Index Date and given as a numeric value. Minimum, maximum, mean, and standard deviation were all calculated and a frequency breakdown and histogram were generated.

*Gender:* Gender was defined as male or female. A frequency breakdown and bar chart were generated.

*Ethnicity:* Ethnicity was defined as Caucasian, Aboriginal, or Other, with Other representing all other ethnicities grouped into one category. This grouping was done because of the relatively low frequency of non-Caucasian, non-Aboriginal ethnicities reported in the data. A frequency breakdown and bar chart were generated.

*Education Level:* Education level, referring to the highest education level completed by an individual, was defined as less than grade 7, grade 7-8, grade 9-10, grade 11-12, university, or unknown. A frequency breakdown and bar chart were generated.

*Vocational Training:* Vocational training, referring to whether or not an individual had received any vocational training, was defined as yes or no. A frequency breakdown and bar chart were generated.

*Graduation Status:* Graduation status, referring to whether or not an individual successfully completed Drug Court, was defined as yes or no and was considered in two different ways: First, whether an individual graduated in relation to the Index Offence and second, whether an individual graduated in relation to any offence, at any time. A frequency breakdown and bar chart were generated. This variable was only examined for DTCV participants.

### **3.5.2 Comparison of Means**

In order to examine changes in patterns of health services utilization, mean values of variables of interest were compared in several ways. For each variable of interest, five separate but related paired t-tests were performed. These t-tests examined:

1. Differences in matched scores between the DTCV and Theft Groups in the period preceding the Index Date;
2. Differences in matched scores between the DTCV and Theft Groups in the period following the Index Date;
3. Differences in the matched Change Scores between the DTCV and Theft Groups;

4. Differences between scores preceding and following the Index Date for the DTCV Group; and
5. Differences between scores preceding and following the Index Date for the Theft Group.

First considered were variables representing the total frequency of MSP claims and inpatient hospitalizations during each of the two years preceding and two years following an individual's Index Date. Total MSP Claims represented the sum of all MSP Methadone Claims, SUD Claims, MD Claims, and Non-Psych Claims. Total Hospitalizations represented the sum of all Hospital SUD Claims and Non-Psych Claims. Next, the breakdown of both MSP Claims and Hospitalizations was considered. For MSP Claims, the frequency of visits for each of the Methadone Claims, SUD Claims, MD Claims, and Non-Psych Claims were considered separately. Total SUD Claims, representing MSP visits for both Methadone and other SUD Claims were also examined. For Hospitalizations, the frequency of SUD Claims and Non-Psych Claims were considered separately.

Finally, changes in the frequency of MSP visits for several specific diagnoses were examined. As outlined above, the specific diagnoses considered were Injury and Poisoning; HIV; Pneumonia and Influenza; Neoplasms; and Endocrine, Nutritional and Metabolic Diseases and Immunity Disorders. Because the overall frequency of hospitalizations is quite low, it was not possible to perform such a breakdown using the hospitalization data.

### **3.5.3 Intent to Treat Analysis**

In order to better reflect the real-life effectiveness of the DTCV program, analysis compared all individuals in the DTCV Group with those in the Theft Group without distinguishing those who successfully completed the DTCV program from those who did not.



## **4: RESULTS**

This study examined changes in patterns of health services utilization for DTCV participants and matched controls. Findings from data analysis are presented below, beginning with descriptive statistics outlining characteristics of both the DTCV and Theft Groups.

### **4.1 Descriptive Statistics**

For each descriptive characteristic considered below, SPSS output showing the relevant statistics and an appropriate visual representation showing the distribution of data for the DTCV and Theft Groups can be found in Appendix E.

#### **4.1.1 Age**

The mean age at the time of the Index Date was computed for individuals in both the DTCV and Theft Groups. Minimum, maximum and standard deviation were also computed to understand the variability of ages within each group. Overall, the DTCV and Theft Groups were quite similar.

For the 144 individuals in the DTCV Group, the mean age at the time of the Index Date was 31.35, with a standard deviation of 8.08 years (N=144, M=31.35, SD=8.08). Age at Index Date ranged between a minimum of 18 years and a

maximum of 58 years. For the 144 individuals in the Theft Group, the mean age at the time of the Index Date was 32.74, with a standard deviation of 8.807 years (N=144, M=32.74, SD=8.807). Age at Index Date ranged between a minimum of 18 years and a maximum of 62 years.

#### **4.1.2 Gender**

A frequency breakdown of gender was computed for individuals in both the DTCV and Theft Groups. Overall, the Theft Group contained slightly more females than the DTCV Group.

Of the 144 individuals in the DTCV group, 62 (43.1%) were female while 82 (56.9%) were male. Of the 144 individuals in the Theft group, 67 (46.5%) were female while 77 (53.5%) were male.

#### **4.1.3 Ethnicity**

A frequency breakdown of ethnicity was computed for individuals in both the DTCV and Theft Groups. Overall, while the two groups contained a similar percentage of Aboriginal participants they differed slightly in their makeup of Caucasian participants and participants of “Other” ethnicities

Of the 144 individuals in the DTCV Group, 66 were Caucasian, (45.8%), 58 (40.3 %) were Aboriginal, and 20 (13.9%) were of other ethnicities. Of the 144

individuals in the Theft Group, 75 were Caucasian, (52.1%), 60 (41.7 %) were Aboriginal, and 9 (6.3%) were of other ethnicities.

#### **4.1.4 Education Level**

A frequency breakdown of highest education level attained was computed for individuals in both the DTCV and Theft Groups. Overall, the Theft Group was slightly more educated than the DTCV Group, with a greater number of participants in the Theft Group having completed grade 11-12 or university and more individuals in the DTCV Group having completed only Grade 7-8 or 9-10.

Of the 144 individuals in the DTCV Group, 13 (9%) completed grade 7-8, 53 (36.8%) completed grade 9-10, 75 (52.1%) completed grade 11-12, and 3(2.1%) completed university. Of the 144 individuals in the Theft Group, 11 (7.6%) completed grade 7-8, 38 (26.4%) completed grade 9-10, 80 (55.6%) completed grade 11-12, 13(9%) completed university, and for 2 (1.4%), the highest education level attained was unknown.

#### **4.1.5 Vocational Training**

A frequency breakdown of vocational training status was computed for individuals in both the DTCV and Theft Groups. Overall, a slightly greater number of individuals in the Theft Group had vocational training in comparison to individuals in the DTCV Group, though this difference was relatively small.

Of the 144 individuals in the DTCV Group, 13 (9%) had received vocational training, while 131 (91%) had not. Of the 144 individuals in the Theft Group, 15 (10.4%) had received vocational training, while 129 (89.6%) had not.

#### **4.1.6 Graduation Status**

A frequency breakdown of graduation status, in relation to both the Index Offence and any offence, was computed for individuals in both the DTCV and Theft Groups.

Of the 144 individuals in the DTCV Group, 31 (21.5%) graduated in relation to the index offence, while 113 (78.5%) did not. An additional 5 individuals graduated in relation to another offence at some point in time, meaning a total of 36 (25%) graduated in relation to the any offence, while 108 (75%) did not. It is important to note that despite the relatively low graduation rates, in relation to both the index offence and any offence, all DTCV participants were considered in the following analyses because of the intent-to-treat design employed in the current study.

#### **4.1.7 Summary of Descriptive Characteristics**

The following table summarizes the descriptive characteristics considered in the current study.

**Table 2: Demographic Characteristic Summary Table**

| <b>Characteristic</b>                |             | <b>DTCV Group</b> | <b>Theft Group</b> |
|--------------------------------------|-------------|-------------------|--------------------|
| Age at Index Date (years)            | Mean        | 31.35             | 32.74              |
| Gender (%)                           | Male        | 56.9              | 53.5               |
|                                      | Female      | 43.1              | 46.5               |
| Ethnicity (%)                        | Caucasian   | 45.8              | 52.1               |
|                                      | Aboriginal  | 40.3              | 41.7               |
|                                      | Other       | 13.9              | 6.3                |
| Education Level Completed (%)        | Grade 7-8   | 9.0               | 7.6                |
|                                      | Grade 9-10  | 36.8              | 26.4               |
|                                      | Grade 11-12 | 52.1              | 55.6               |
|                                      | University  | 2.1               | 9.0                |
|                                      | Unknown     | 0.0               | 1.4                |
| Vocational Training (%)              | No          | 91.0              | 89.6               |
|                                      | Yes         | 9.0               | 10.4               |
| Graduation Status- Index Offence (%) | No          | 78.5              | N/A                |
|                                      | Yes         | 21.5              | N/A                |
| Graduation Status- Any Offence (%)   | No          | 75.0              | N/A                |
|                                      | Yes         | 25.0              | N/A                |

## **4.2 Overall Frequencies of Service Use**

Changes in the overall frequencies of services use, based on MSP Claim and Hospitalization records, are examined below. As outlined in Chapter 3, for each variable of interest, five separate but related paired t-tests were performed. For these t-tests, the pairs considered were:

Pair 1. Differences in matched scores between the DTCV and Theft Groups in the period preceding the Index Date;

Pair 2. Differences in matched scores between the DTCV and Theft Groups in the period following the Index Date;

Pair 3. Differences in the matched Change Scores between the DTCV and Theft Groups;

Pair 4. Differences between scores preceding and following the Index Date for the DTCV Group; and

Pair 5. Differences between scores preceding and following the Index Date for the Theft Group.

For each variable considered below, SPSS output showing paired sample statistics can be found in Appendix F.

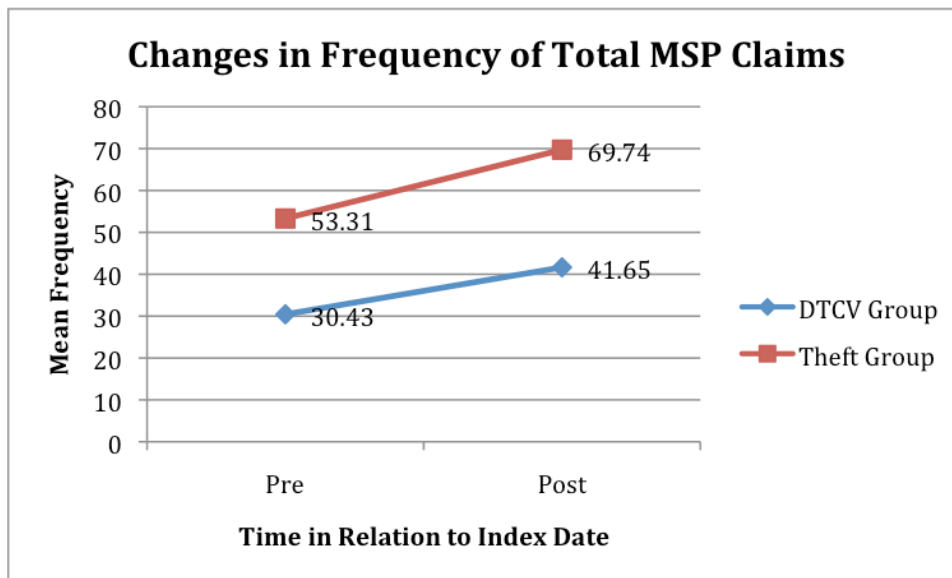
#### **4.2.1 Total MSP Claims**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of Total MSP Claims. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of Total MSP Claims for each group.

**Table 3: Paired T-Tests for Total MSP Claims**

|        | Paired Differences |                |                 |   |        | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|--------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |        |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper  |       |     |                 |
| Pair 1 | 22.875             | 86.403         | 7.200           | 8.642                                     | 37.108 | 3.177 | 143 | .002            |
| Pair 2 | 28.083             | 109.352        | 9.113           | 10.070                                    | 46.096 | 3.082 | 143 | .002            |
| Pair 3 | 5.208              | 89.341         | 7.445           | -9.508                                    | 19.925 | .700  | 143 | .485            |
| Pair 4 | 11.222             | 62.587         | 5.216           | .913                                      | 21.532 | 2.152 | 143 | .033            |
| Pair 5 | 16.431             | 60.834         | 5.070           | 6.410                                     | 26.451 | 3.241 | 143 | .001            |

**Figure 1: Changes in Frequency of Total MSP Claims**



There was a significant difference in the mean frequency of Total MSP Claims preceding the Index Date between the DTCV Group (M=30.43, SD=59.984) and Theft Group (M=53.31, SD= 63.938);  $t(143)=3.177$ ,  $p=0.002$ . There was also a significant difference in the mean frequency of Total MSP Claims following the Index Date between the DTCV Group (M=41.65, SD=61.449) and Theft Group (M=69.74, SD=

86.91);  $t(143)=3.082$ ,  $p=0.002$ . Additionally, while the DTCV Group [ $t(143)=2.152$ ,  $p=0.033$ ] and Theft Group [ $t(143)=3.241$ ,  $p=0.001$ ] both experienced a significant change in mean frequency of Total MSP Claims between the two years preceding and two years following the Index Date, there was not a significant difference in Change Scores between the DTCV Group ( $M=11.22$ ,  $SD= 62.587$ ) and Theft Group ( $M=16.43$ ,  $SD=60.834$ );  $t(143)=0.700$ ,  $p=0.485$ . These results suggest that, while the mean frequency of Total MSP Claims did increase for both groups, the DTCV Group and Theft Group changed in similar ways.

#### **4.2.2 Total Hospitalizations**

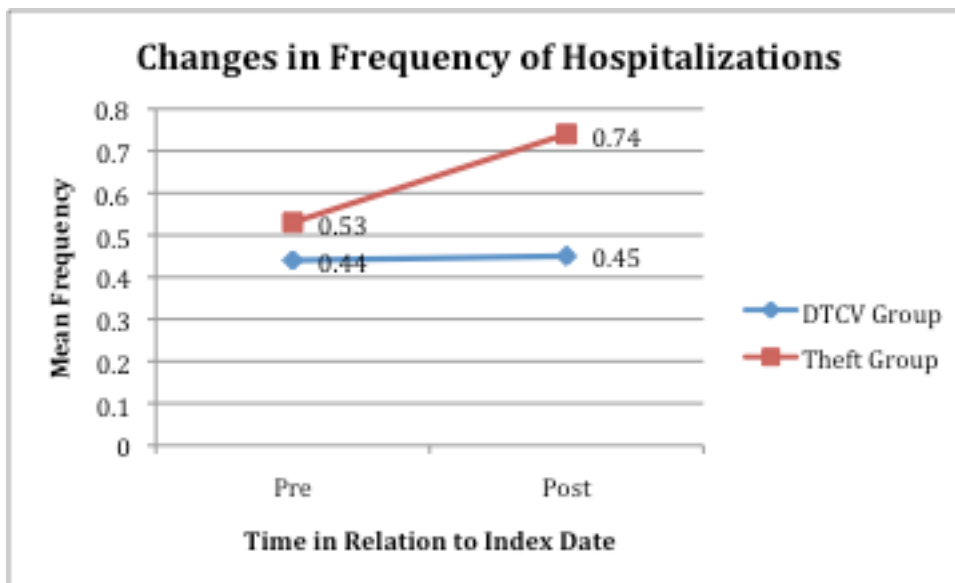
Five paired-samples t-tests were conducted to examine differences and changes in the frequency of Total Hospitalizations. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of Total Hospitalizations for each group.



**Table 4: Paired T-Tests for Total Hospitalizations**

|        | Paired Differences |                |                 |   |       | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |       |     |                 |
| Pair 1 | .090               | 1.625          | .135            | -.177                                     | .358  | .666  | 143 | .506            |
| Pair 2 | .292               | 1.954          | .163            | -.030                                     | .613  | 1.792 | 143 | .075            |
| Pair 3 | .201               | 2.101          | .175            | -.145                                     | .547  | 1.150 | 143 | .252            |
| Pair 4 | .014               | 1.071          | .089            | -.163                                     | .190  | .156  | 143 | .877            |
| Pair 5 | .215               | 1.731          | .144            | -.070                                     | .500  | 1.493 | 143 | .138            |

**Figure 2: Changes in Frequency of Total Hospitalizations**



There was no significant difference in the mean frequency of Total Hospitalizations preceding the Index Date between the DTCV Group (M=0.44, SD=1.022) and Theft Group (M=0.53, SD= 1.268);  $t(143)=0.666, p=0.506$ . There was also no significant difference in the mean frequency of Total Hospitalizations following Index Date between the DTCV Group (M=0.45, SD=1.121) and Theft Group

(M=0.74, SD= 1.671);  $t(143)=1.792$ ,  $p=0.075$ . Additionally, neither the DTCV Group [ $t(143)=0.156$   $p=0.877$ ] nor the Theft Group [ $t(143)=1.493$ ,  $p=0.138$ ] experienced a significant change in mean frequency of Total Hospitalizations between the two years preceding and two years following the Index Date, and there was no significant difference in Change Scores between the DTCV Group (M=0.01, SD= 1.071) and Theft Group (M=0.22, SD=1.731);  $t(143)=1.150$ ,  $p=0.252$ . These results suggest that the mean frequency of Total Hospitalizations did not change in a significant way for either group and that the two groups behaved in similar ways.

### **4.3 Breakdown of Service Use by Category**

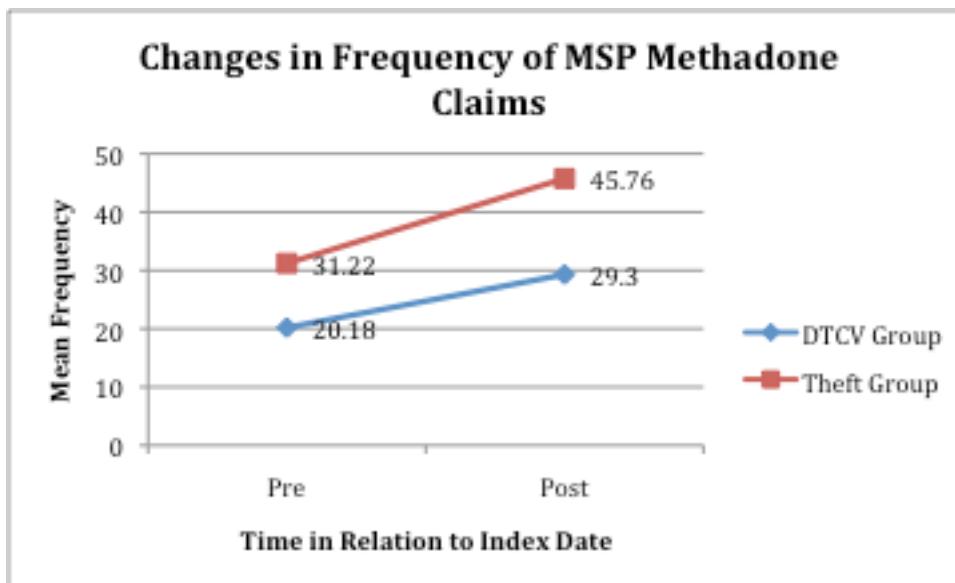
#### **4.3.1 MSP-Methadone Claims**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP Methadone Claims. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of MSP Methadone Claims for each group.

**Table 5: Paired T-Tests for MSP Methadone Claims**

|        | Paired Differences |                |                 |   |          | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|----------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |          |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper    |       |     |                 |
| Pair 1 | 11.042             | 75.225         | 6.269           | -1.350                                    | 23.433   | 1.761 | 143 | .080            |
| Pair 2 | 16.458             | 93.758         | 7.813           | 1.014                                     | 31.903   | 2.106 | 143 | .037            |
| Pair 3 | 5.41667            | 78.52535       | 6.54378         | -7.51837                                  | 18.35170 | .828  | 143 | .409            |
| Pair 4 | 9.118              | 56.252         | 4.688           | -.148                                     | 18.384   | 1.945 | 143 | .054            |
| Pair 5 | 14.535             | 51.349         | 4.279           | 6.076                                     | 22.993   | 3.397 | 143 | .001            |

**Figure 3: Changes in Frequency of MSP Methadone Claims**



There was no significant difference in the mean frequency of MSP Methadone Claims preceding the Index Date between the DTCV Group (M=20.18, SD=50.610) and Theft Group (M=31.22, SD= 55.782);  $t(143)=1.761$ ,  $p=0.08$ . However, there was a significant difference in the mean frequency of MSP Methadone Claims following Index Date between the DTCV Group (M=29.30, SD=55.073) and Theft Group

( $M=45.76$ ,  $SD=74.765$ );  $t(143)=2.106$ ,  $p=0.037$ . Additionally, while the Theft Group experienced a significant change in MSP Methadone Claims between the two years preceding and two years following the Index Date [ $t(143)=3.397$ ,  $p=0.001$ ], the DTCV Group did not [ $t(143)=1.945$ ,  $p=0.054$ ]. There was not a significant difference in Change Scores between the DTCV Group ( $M=9.1181$ ,  $SD= 56.25224$ ) and Theft Group ( $M=14.53$ ,  $SD=51.349$ );  $t(143)=0.828$ ,  $p=0.409$ . These results suggest that in relation to the mean frequency of MSP Methadone Claims, the DTCV Group and Theft Group behaved in similar ways.

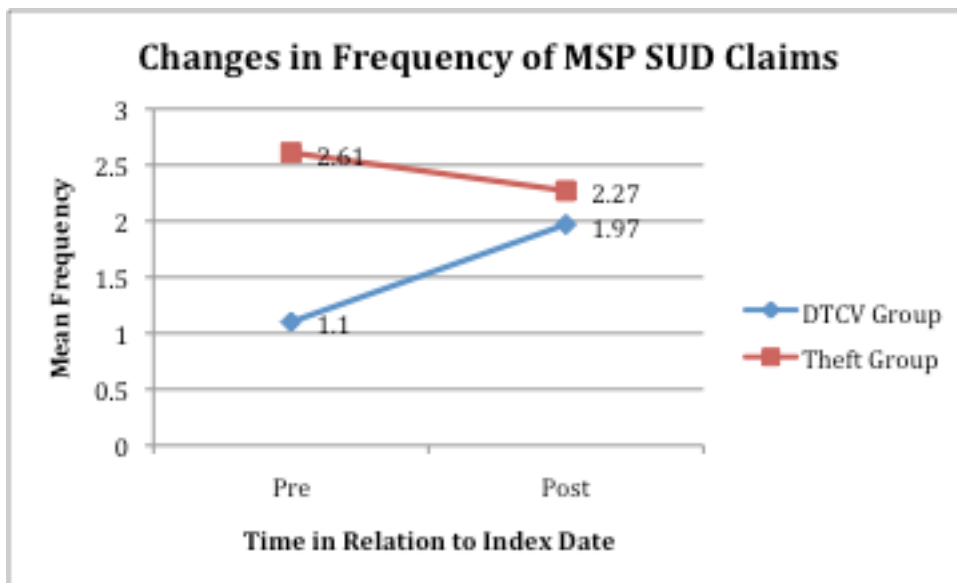
#### **4.3.2 MSP-SUD Claims**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP SUD Claims. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of MSP SUD Claims for each group.

**Table 6: Paired T-Tests for MSP SUD Claims**

|        | Paired Differences |                |                 |   |       | t      | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|--------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |        |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |        |     |                 |
| Pair 1 | 1.507              | 5.900          | .492            | .535                                      | 2.479 | 3.065  | 143 | .003            |
| Pair 2 | .299               | 5.280          | .440            | -.571                                     | 1.168 | .679   | 143 | .498            |
| Pair 3 | -1.208             | 6.964          | .580            | -2.356                                    | -.061 | -2.082 | 143 | .039            |
| Pair 4 | .868               | 3.406          | .284            | .307                                      | 1.429 | 3.059  | 143 | .003            |
| Pair 5 | -.340              | 6.102          | .508            | -1.345                                    | .665  | -.669  | 143 | .504            |

**Figure 4: Changes in Frequency of MSP SUD Claims**



There was a significant difference in the mean frequency of MSP SUD Claims preceding the Index Date between the DTCV Group (M=1.10, SD=2.128) and Theft Group (M=2.261, SD=5.302);  $t(143)=3.065$ ,  $p=0.003$ . However, there was no significant difference in the mean frequency of MSP SUD Claims following the Index Date between the DTCV Group (M=1.97, SD=3.189) and Theft Group (M=2.27,

SD=4.165);  $t(143)=0.679$ ,  $p=0.498$ . Additionally, while the DTCV Group experienced a significant change in mean frequency of MSP SUD Claims between the two years preceding and two years following the Index Date [ $t(143)=3.059$ ,  $p=0.003$ ], the Theft Group did not [ $t(143)=-0.669$ ,  $p=0.504$ ]. Overall, there was a significant difference in Change Scores between the DTCV Group ( $M=0.87$ ,  $SD= 3.406$ ) and Theft Group ( $M=-0.34$ ,  $SD=6.102$ );  $t(143)=-2.082$ ,  $p=0.039$ . These results suggest that the mean frequency of MSP SUD Claims for the DTCV and Theft Groups changed in significantly different ways.

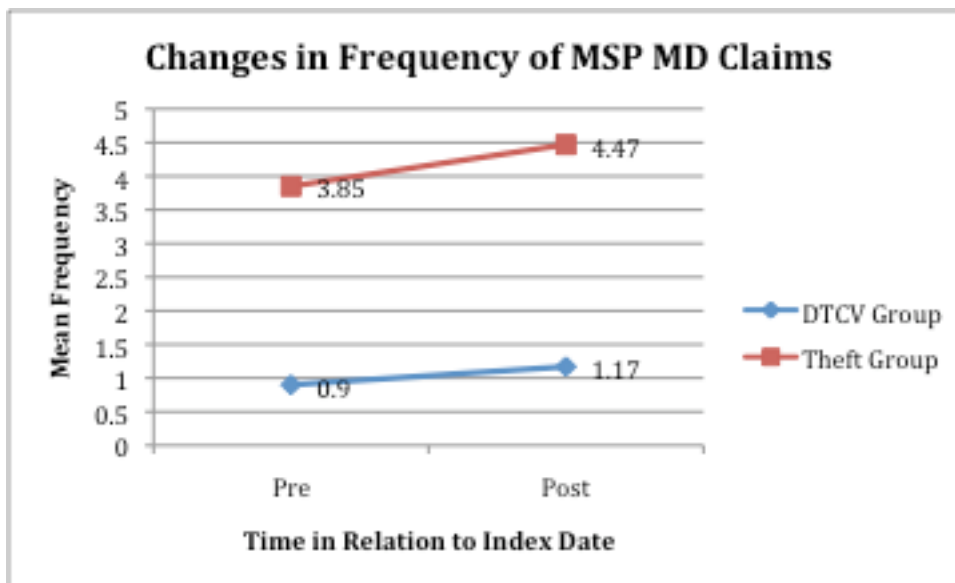
#### **4.3.3 MSP-MD Claims**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP MD Claims. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of MSP MD Claims for each group.

**Table 7: Paired T-Tests for MSP MD Claims**

|        | Paired Differences |                |                 |   |       | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |       |     |                 |
| Pair 1 | 2.951              | 8.246          | .687            | 1.593                                     | 4.310 | 4.295 | 143 | .000            |
| Pair 2 | 3.299              | 8.963          | .747            | 1.822                                     | 4.775 | 4.416 | 143 | .000            |
| Pair 3 | .347               | 6.972          | .581            | -.801                                     | 1.496 | .598  | 143 | .551            |
| Pair 4 | .264               | 3.476          | .290            | -.309                                     | .836  | .911  | 143 | .364            |
| Pair 5 | .611               | 6.310          | .526            | -.428                                     | 1.651 | 1.162 | 143 | .247            |

**Figure 5: Changes in Frequency of MSP MD Claims**



There was a significant difference in the mean frequency of MSP MD Claims preceding the Index Date between the DTCV Group (M=0.90, SD=2.929) and Theft Group (M=3.85, SD= 7.609);  $t(143)=4.295$ ,  $p=0.000$ . There was also a significant difference in the mean frequency of MSP MD Claims following Index Date between the DTCV Group (M=1.17, SD=2.596) and Theft Group (M=4.47, SD= 8.631);

$t(143)=4.416, p=0.000$ . Additionally, neither the DTCV Group [ $t(143)=0.911, p=0.364$ ] nor the Theft Group [ $t(143)=1.162, p=0.247$ ] experienced a significant change in mean frequency of MSP MD Claims between the two years preceding and two years following the Index Date. There was no significant difference in Change Scores between the DTCV Group ( $M=0.26, SD= 3.476$ ) and Theft Group ( $M=0.61, SD=6.310$ );  $t(143)=0.598, p=0.551$ . These results suggest that the mean frequency of MSP MD Claims did not change in a significant way for either group and that the two groups behaved in similar ways.

#### **4.3.4 MSP-Non-Psych Claims**

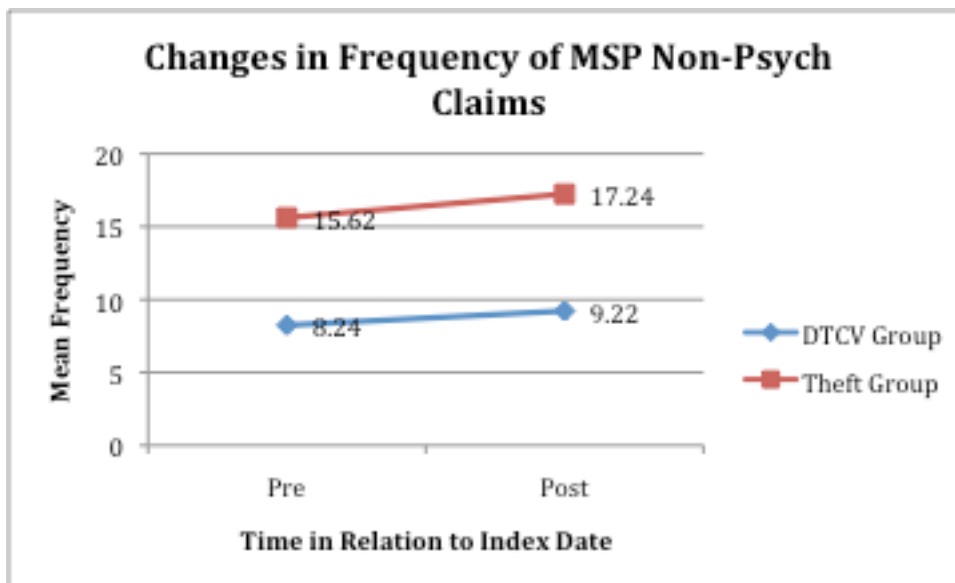
Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP Non-Psych Claims. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of MSP Non-Psych Claims for each group.



**Table 8: Paired T-Tests for MSP Non-Psych Claims**

|        | Paired Differences |                |                 |   |        | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|--------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |        |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper  |       |     |                 |
| Pair 1 | 7.375              | 28.952         | 2.413           | 2.606                                     | 12.144 | 3.057 | 143 | .003            |
| Pair 2 | 8.028              | 27.331         | 2.278           | 3.526                                     | 12.530 | 3.525 | 143 | .001            |
| Pair 3 | .653               | 26.039         | 2.170           | -3.636                                    | 4.942  | .301  | 143 | .764            |
| Pair 4 | .972               | 16.632         | 1.386           | -1.767                                    | 3.712  | .701  | 143 | .484            |
| Pair 5 | 1.625              | 19.159         | 1.597           | -1.531                                    | 4.781  | 1.018 | 143 | .310            |

**Figure 6: Changes in Frequency of MSP Non-Psych Claims**



There was a significant difference in the mean frequency of MSP Non-Psych Claims preceding the Index Date between the DTCV Group (M=8.24, SD=18.960) and Theft Group (M=15.62, SD= 21.501);  $t(143)=3.057$ ,  $p=0.003$ . There was also a significant difference in the mean frequency of MSP Non-Psych Claims following Index Date between the DTCV Group (M=9.22, SD=14.097) and Theft Group

( $M=17.24$ ,  $SD=23.670$ );  $t(143)=3.525$ ,  $p=0.001$ . Additionally, neither the DTCV Group [ $t(143)=0.701$ ,  $p=0.484$ ] nor the Theft Group [ $t(143)=1.018$ ,  $p=0.310$ ] experienced a significant change in mean frequency of MSP Non-Psych Claims between the two years preceding and two years following the Index Date. There was no significant difference in Change Scores between the DTCV Group ( $M=0.97$ ,  $SD=16.632$ ) and Theft Group ( $M=1.63$ ,  $SD=19.159$ );  $t(143)=0.301$ ,  $p=0.764$ . These results suggest that the frequency of MSP Non-Psych Claims did not change in a significant way for either group and that the two groups behaved in similar ways.

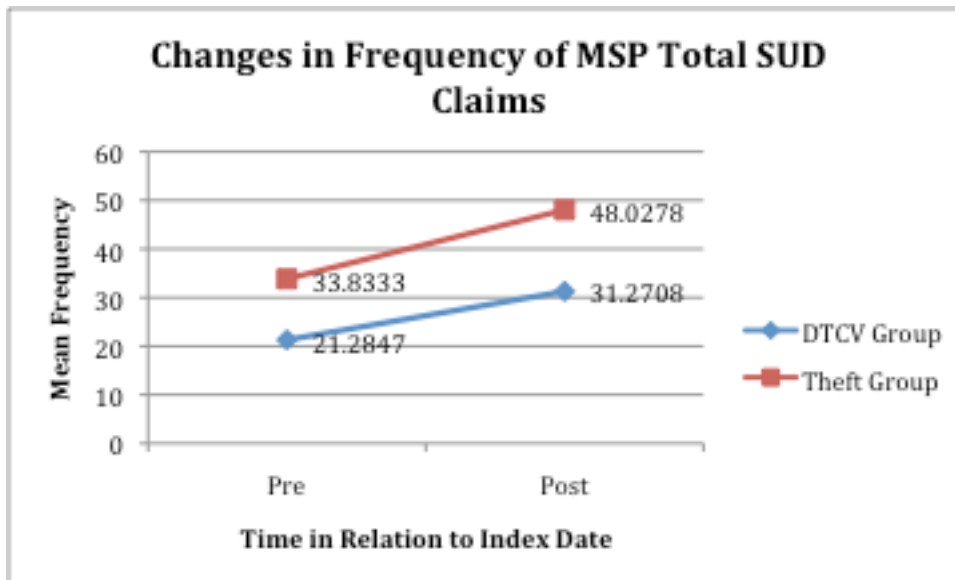
#### **4.3.5 MSP-Total SUD Claims**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP Total SUD Claims. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of MSP Total SUD Claims for each group.

**Table 9: Paired T-Tests for MSP Total SUD Claims**

|        | Paired Differences |                |                 |   |          | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|----------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |          |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper    |       |     |                 |
| Pair 1 | 12.54861           | 76.41429       | 6.36786         | -.03868                                   | 25.13591 | 1.971 | 143 | .051            |
| Pair 2 | 16.75694           | 95.04855       | 7.92071         | 1.10013                                   | 32.41376 | 2.116 | 143 | .036            |
| Pair 3 | 4.20833            | 79.47097       | 6.62258         | -8.88247                                  | 17.29914 | .635  | 143 | .526            |
| Pair 4 | 9.98611            | 56.88450       | 4.74037         | .61585                                    | 19.35637 | 2.107 | 143 | .037            |
| Pair 5 | 14.19444           | 52.21208       | 4.35101         | 5.59384                                   | 22.79505 | 3.262 | 143 | .001            |

**Figure 7: Changes in Frequency of MSP Total SUD Claims**



There was no significant difference in the mean frequency of MSP Total SUD Claims preceding the Index Date between the DTCV Group (M=21.2847, SD=51.39857) and Theft Group (M=33.8333, SD= 56.73284);  $t(143)=1.971$ ,  $p=0.051$ . However, there was a significant difference in the mean frequency of MSP Total SUD Claims following Index Date between the DTCV Group (M=31.2708,

SD=56.06193) and Theft Group (M=48.0278, SD= 75.57999);  $t(143)=2.116$ ,  $p=0.036$ . Additionally, while the DTCV Group [ $t(143)=2.107$ ,  $p=0.037$ ] and Theft Group [ $t(143)=3.262$ ,  $p=0.001$ ] both experienced a significant change in mean frequency of MSP Total SUD Claims between the two years preceding and two years following the Index Date, there was not a significant difference in Change Scores between the DTCV Group (M=9.9861, SD= 56.88450) and Theft Group (M=14.1944, SD=52.21208);  $t(143)=0.635$ ,  $p=0.526$ . These results suggest that while the mean frequency of MSP Total SUD Claims did increase for both groups, the DTCV Group and Theft Group changed in similar ways.

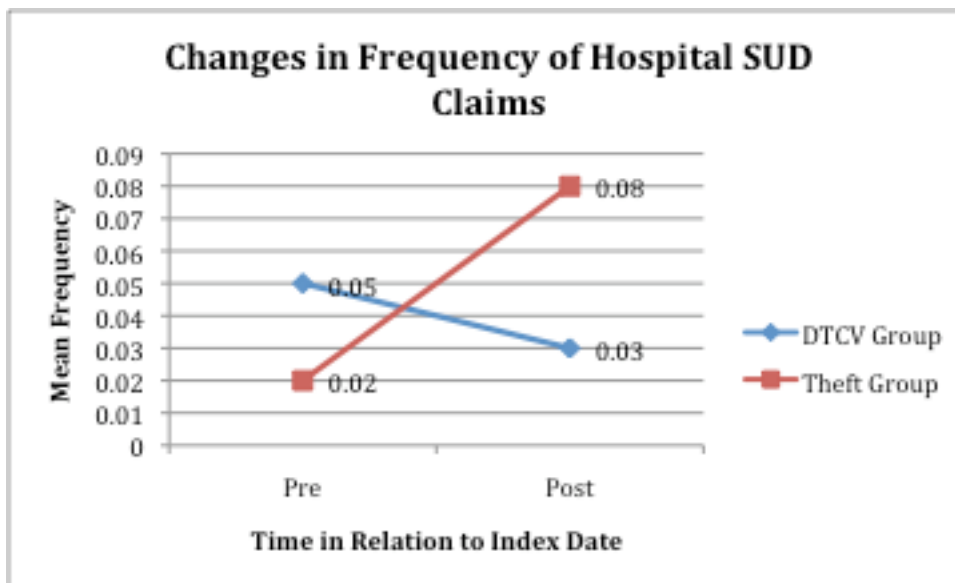
#### **4.3.6 Hospitalizations-SUD Claims**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of Hospital SUD Claims. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of Hospital SUD Claims for each group.

**Table 10: Paired T-Tests for Hospital SUD Claims**

|        | Paired Differences |                |                 |   |       | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |       |     |                 |
| Pair 1 | -.028              | .391           | .033            | -.092                                     | .037  | -.852 | 143 | .396            |
| Pair 2 | .049               | .463           | .039            | -.028                                     | .125  | 1.260 | 143 | .210            |
| Pair 3 | .076               | .556           | .046            | -.015                                     | .168  | 1.650 | 143 | .101            |
| Pair 4 | -.021              | .344           | .029            | -.078                                     | .036  | -.726 | 143 | .469            |
| Pair 5 | .056               | .439           | .037            | -.017                                     | .128  | 1.519 | 143 | .131            |

**Figure 8: Changes in Frequency of Hospital SUD Claims**



There was no significant difference in the mean frequency of Hospital SUD Claims preceding the Index Date between the DTCV Group (M=0.05, SD=0.361) and Theft Group (M=0.02, SD=0.143);  $t(143)=-.852, p=0.396$ . There was also no significant difference in the mean frequency of Hospital SUD Claims following the Index Date between the DTCV Group (M=0.03, SD=0.203) and Theft Group (M=0.08,

SD= 0.411);  $t(143)=1.1260$ ,  $p=0.210$ . Additionally, neither the DTCV Group [ $t(143)=-0.726$ ,  $p=0.469$ ] nor the Theft Group [ $t(143)=1.519$ ,  $p=0.131$ ] experienced a significant change in mean frequency of Hospital SUD Claims between the two years preceding and two years following the Index Date. There was also no significant difference in Change Scores between the DTCV Group ( $M=-0.02$ ,  $SD=0.344$ ) and Theft Group ( $M=0.06$ ,  $SD=0.438$ );  $t(143)=1.650$ ,  $p=0.101$ . These results suggest that there was no significant change in the mean frequency of Hospital SUD Claims for either group. However, a non-significant crossover interaction can be observed for Hospital SUD Claims.

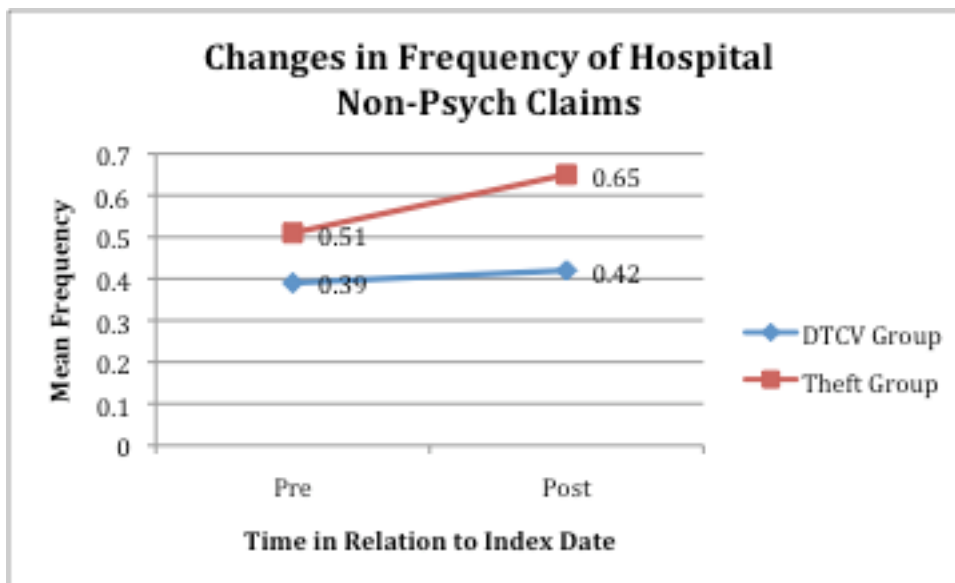
#### **4.3.7 Hospitalizations-Non-Psych Claims**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of Hospital Non-Psych Claims. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of Hospital Non-Psych Claims for each group.

**Table 11: Paired T-Tests for Hospital Non-Psych Claims**

|        | Paired Differences |                |                 |   |       | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |       |     |                 |
| Pair 1 | .118               | 1.544          | .129            | -.136                                     | .372  | .917  | 143 | .360            |
| Pair 2 | .222               | 1.875          | .156            | -.087                                     | .531  | 1.422 | 143 | .157            |
| Pair 3 | .104               | 2.030          | .169            | -.230                                     | .439  | .616  | 143 | .539            |
| Pair 4 | .035               | 1.060          | .088            | -.140                                     | .209  | .393  | 143 | .695            |
| Pair 5 | .139               | 1.696          | .141            | -.140                                     | .418  | .983  | 143 | .327            |

**Figure 9: Changes in Frequency of Hospital Non-Psych Claims**



There was no significant difference in the mean frequency of Hospital Non-Psych Claims preceding the Index Date between the DTCV Group (M=0.39, SD=0.917) and Theft Group (M=0.51, SD=1.263);  $t(143)=0.917$ ,  $p=0.360$ . There was also no significant difference in the mean frequency of Hospital Non-Psych Claims following the Index Date between the DTCV Group (M=0.42, SD=1.088) and Theft

Group ( $M=0.65$ ,  $SD=1.615$ );  $t(143)=1.1422$ ,  $p=0.157$ . Additionally, neither the DTCV Group [ $t(143)=0.393$ ,  $p=0.695$ ] nor the Theft Group [ $t(143)=0.983$ ,  $p=0.327$ ] experienced a significant change in mean frequency of Hospital Non-Psych Claims between the two years preceding and two years following the Index Date. There was also no significant difference in Change Scores between the DTCV Group ( $M=0.03$ ,  $SD=1.060$ ) and Theft Group ( $M=0.14$ ,  $SD=1.696$ );  $t(143)=0.616$ ,  $p=0.539$ . These results suggest that there was no significant change in the mean frequency of Hospital Non-Psych Claims for either group and that the groups behaved in similar ways.

#### **4.4 Frequency of MSP Claims for Specific Diagnoses**

The frequencies of MSP claims for specific diagnoses are considered below. While full results are presented for MSP Injury and Poisoning Claims, paired t-test results and a visual representation of the data for all other specific diagnoses, which showed no significant between-group differences, can be found in Appendix G.

##### **4.4.1 Injury and Poisoning**

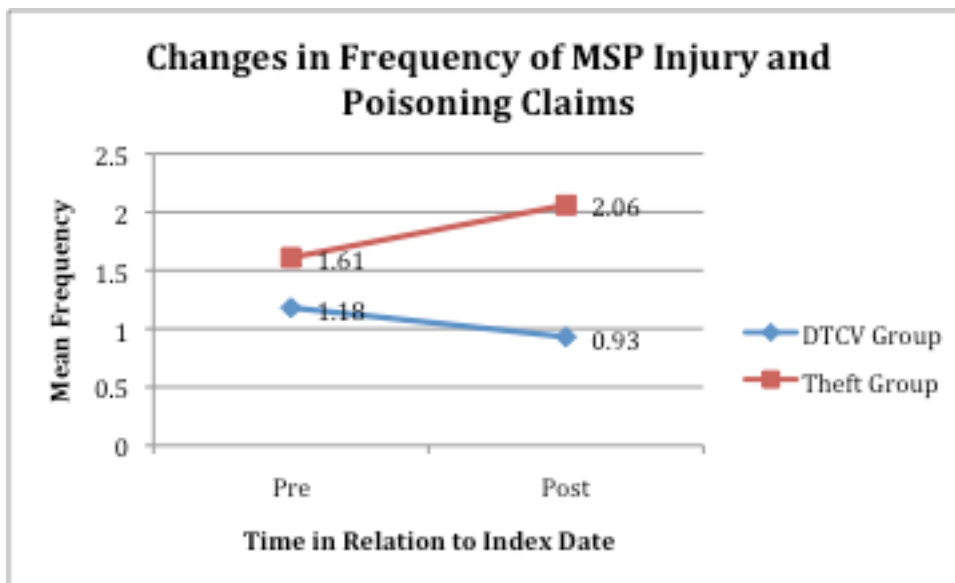
Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP Injury and Poisoning Claims. Paired t-test results are presented below, along with a figure visually representing the change in mean frequency of MSP Injury and Poisoning Claims for each group.



**Table 12: Paired T-Tests for MSP Injury and Poisoning Claims**

|        | Paired Differences |                |                 |   |       | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |       |     |                 |
| Pair 1 | .431               | 5.049          | .421            | -.401                                     | 1.262 | 1.023 | 143 | .308            |
| Pair 2 | 1.125              | 5.144          | .429            | .278                                      | 1.972 | 2.624 | 143 | .010            |
| Pair 3 | .694               | 5.889          | .491            | -.276                                     | 1.664 | 1.415 | 143 | .159            |
| Pair 4 | -.250              | 3.501          | .292            | -.827                                     | .327  | -.857 | 143 | .393            |
| Pair 5 | .444               | 4.568          | .381            | -.308                                     | 1.197 | 1.168 | 143 | .245            |

**Figure 10: Changes in Frequency of MSP Injury and Poisoning Claims**



There was no significant difference in the mean frequency of MSP Injury and Poisoning Claims preceding the Index Date between the DTCV Group (M=1.18, SD=3.833) and Theft Group (M=1.61, SD=3.297);  $t(143)=1.023$ ,  $p=0.308$ . However, there was a significant difference in the mean frequency of MSP Total Injury and Poisoning Claims following Index Date between the DTCV Group (M=0.93,

SD=2.527) and Theft Group (M=2.06, SD=4.583);  $t(143)=2.624, p=0.010$ .

Additionally, neither the DTCV Group [ $t(143)=-0.857, p=0.393$ ] nor the Theft Group [ $t(143)=1.168, p=0.245$ ] experienced a significant change in mean frequency of MSP Injury and Poisoning Claims between the two years preceding and two years following the Index Date, and there was no significant difference in Change Scores between the DTCV Group (M=-0.25, SD= 3.501) and Theft Group (M=0.44 SD=4.568);  $t(143)=1.415, p=0.159$ . These results suggest that there was no significant change in the mean frequency of MSP Injury and Poisoning Claims for either group.

#### **4.4.2 HIV**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP HIV Claims. There was no significant difference in the mean frequency of MSP HIV Claims preceding the Index Date between the DTCV Group (M=0.31 SD=2.029) and Theft Group (M=0.40, SD=1.678);  $t(143)=0.404, p=0.686$ . There was also no significant difference in the mean frequency of MSP HIV Claims following Index Date between the DTCV Group (M=0.93, SD=6.275) and Theft Group (M=0.63, SD=2.631);  $t(143)= -0.520, p=0.604$ . Additionally, neither the DTCV Group [ $t(143)=1.595, p=0.113$ ] nor the Theft Group [ $t(143)=1.661, p=0.099$ ] experienced a significant change in mean frequency of MSP HIV Claims between the two years preceding and two years following the Index Date, and there was no significant difference in Change Scores between the DTCV Group (M=0.63,

SD=4.702) and Theft Group (M=0.24 SD=1.706);  $t(143)=-0.927$   $p=0.355$ . These results suggest that there was no significant change in the mean frequency of MSP HIV Claims for either group.

#### **4.4.3 Pneumonia and Influenza**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP Pneumonia and Influenza Claims. There was no significant difference in the mean frequency of MSP Pneumonia and Influenza Claims preceding the Index Date between the DTCV Group (M=0.18, SD=0.921) and Theft Group (M=0.35, SD=2.546);  $t(143)=0.770$ ,  $p=0.443$ . There was also no significant difference in the mean frequency of MSP Pneumonia and Influenza Claims following Index Date between the DTCV Group (M=0.41, SD=1.657) and Theft Group (M=0.38, SD=1.487);  $t(143)=-0.149$ ,  $p=0.882$ . Additionally, while the DTCV Group experienced a significant change in mean frequency of MSP Pneumonia and Influenza Claims between the two years preceding and two years following the Index Date [ $t(143)=2.340$ ,  $p=0.021$ ], the Theft Group did not [ $t(143)=0.115$ ,  $p=0.909$ ]. There was no significant difference in Change Scores between the DTCV Group (M=0.23, SD=1.175) and Theft Group (M=0.03, SD=2.911);  $t(143)=-0.780$   $p=0.437$ . These results suggest that although the DTCV group did experience a significant change in the mean frequency of MSP Pneumonia and Influenza Claims, this change was itself not significantly different than that experienced by the Theft Group.

#### **4.4.4 Neoplasms**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP Neoplasm Claims. There was no significant difference in the mean frequency of MSP Neoplasm Claims preceding the Index Date between the DTCV Group (M=0.03 SD=0.203) and Theft Group (M=0.03 SD=0.203);  $t(143)=0.000$ ,  $p=1.000$ . There was also no significant difference in the mean frequency of MSP Neoplasm Claims following Index Date between the DTCV Group (M=0.10, SD=0.463) and Theft Group (M=0.04, SD=0.287);  $t(143)=-1.208$ ,  $p=0.229$ . Additionally, neither the DTCV Group [ $t(143)=1.727$ ,  $p=0.086$ ] nor the Theft Group [ $t(143)=0.533$ ,  $p=0.595$ ] experienced a significant change in mean frequency of MSP Neoplasm Claims between the two years preceding and two years following the Index Date, and there was no significant difference in Change Scores between the DTCV Group (M=0.07, SD=0.483) and Theft Group (M=0.01 SD=0.313);  $t(143)=-1.132$ ,  $p=0.259$ . These results suggest that there was no significant change in the mean frequency of MSP Neoplasm Claims for either group and that the groups behaved in similar ways.

#### **4.4.5 Endocrine, Nutritional and Metabolic Diseases and Immunity Disorders**

Five paired-samples t-tests were conducted to examine differences and changes in the frequency of MSP Endocrine, Nutritional and Metabolic Disease and Immunity Disorder Claims. There was no significant difference in the mean frequency of MSP Endocrine, Nutritional and Metabolic Disease and Immunity

Disorder Claims preceding the Index Date between the DTCV Group ( $M=0.10$ ,  $SD=0.629$ ) and Theft Group ( $M=0.17$ ,  $SD=1.450$ );  $t(143)=0.576$ ,  $p=0.566$ . There was also no significant difference in the mean frequency of MSP Endocrine, Nutritional and Metabolic Disease and Immunity Disorder Claims following Index Date between the DTCV Group ( $M=0.03$ ,  $SD=0.165$ ) and Theft Group ( $M=0.12$ ,  $SD=0.609$ );  $t(143)=1.704$ ,  $p=0.091$ . Additionally, neither the DTCV Group [ $t(143)=-1.419$ ,  $p=0.158$ ] nor the Theft Group [ $t(143)=-0.503$ ,  $p=0.616$ ] experienced a significant change in mean frequency of MSP Endocrine, Nutritional and Metabolic Disease and Immunity Disorder Claims, and there was no significant difference in Change Scores between the DTCV Group ( $M=-0.07$ ,  $SD=0.587$ ) and Theft Group ( $M=-0.06$ ,  $SD=1.326$ );  $t(143)=0.115$ ,  $p=0.909$ . These results suggest that there was no significant change in the mean frequency of MSP Endocrine, Nutritional and Metabolic Disease and Immunity Disorder Claims for either group and that the two groups behaved in similar ways.

## **5: DISCUSSION**

Overall, results show that the DTCV Group may have been poorly engaged with health services, both prior to and following involvement with the drug treatment court. However, several specific results indicate that the DTCV may have had some impact on the way in which participants use health services.

Building on previous sections, this chapter discusses key findings in the context of what is known about substance abuse, treatment, and health services. Where appropriate, potential explanations for results are explored. Following a discussion of results, the chapter turns to limitations of the project and directions for future research.

### **5.1 Key Findings**

#### **5.1.1 Descriptive Statistics**

Overall, the DTCV Group was quite similar to the Theft Group across a range of descriptive characteristics.<sup>2</sup> However, it is also necessary to consider descriptive

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<sup>2</sup> Given that DTCV Group individuals were matched with Theft Group individuals using propensity score matching, which matches on a broad range of variables rather than on any one characteristic, it is unsurprising that there were some small differences in descriptive statistics between the two groups. Because such differences are to be expected with this method of matching, between-group differences were not examined for statistical significance.

characteristics of the DTCV Group in relation to the more general corrections population in British Columbia.

Previous research with the IM Database provides information on demographic characteristics for all individuals involved with the BC Corrections System between 1997 and 2004 (Somers et al., 2008). The current study reveals that with an average age of 31.35 years, the DTCV Group was only slightly younger than the provincial corrections average (32.7 years). In terms of education, with 54.2% of DTCV participants completing either grade 11-12 or university, the DTCV Group is also quite similar to the general corrections population, where 54.4% of individuals have achieved the same level of education. However, it is necessary to note that of these individuals, a greater percentage of the general corrections population (6.5%) completed university than seen in the DTCV Group (2.1%). A slightly greater proportion of DTCV participants (9%) had received vocational training than seen in the provincial corrections population (6.2%).

However, the DTCV Group was noticeably different from the overall corrections population with respect to both gender and ethnicity. While the DTCV group consisted of 56.9% males and 43.1% females, the provincial corrections populations consisted of 84.8% males and 15.2% females, meaning females were overrepresented in the DTCV in comparison to the overall corrections population. While "Other" ethnic minorities made up a similar proportion of the DTCV and overall corrections populations (13.9% and 14.1%, respectively), Aboriginal people were dramatically overrepresented in the DTCV Group. While Aboriginal people made up 14.9% of the overall corrections population, they accounted for 40.3% of

participants in the DTCV Group. This is particularly noteworthy given the fact that Aboriginal people are already overrepresented in the corrections population in comparison to the general population of British Columbia (Somers et al., 2008).

The overrepresentation of both females and Aboriginals, in comparison to the overall provincial corrections population, is particularly noteworthy because these two characteristics are associated with increased vulnerability and disadvantage. These groups may be overrepresented because of criteria for drug court participation, or because of the range of services offered to those who participate. However, why such individuals are overrepresented in the DTCV population—and implications for the drug court’s success—is something that should be explored in more detail in further research.

## **5.1.2 Health Services Utilization Patterns**

### **5.1.2.1 Overall Care**

The DTCV Group showed a significantly lower frequency of Total MSP Claims than the Theft Group both prior to and following involvement with the DTCV. These results indicate that, overall, individuals in the DTCV Group were less well engaged with physician-based health services than matched controls in the Theft Group. Though not statistically significant, a similar pattern could be observed for Total Hospitalizations, with the Theft Group receiving more inpatient hospital care than the DTCV Group in the periods preceding and following the Index Date.



This pattern is noteworthy for several reasons. It indicates that, considering overall levels of care, the DTCV Group may have been alienated from health care services in a way that even matched controls were not. While this finding is in line with existing research on patterns of health services utilization among individuals with substance abuse problems (McCoy et al., 2001; Samet et al., 2003; Chitwood et al., 2001), it shows that those who participated in the DTCV may have been particularly vulnerable, given that their overall frequency of service use fell below a group of matched controls who were similar across a range of other characteristics. Results indicate that alienation from health services may have continued even after involvement with the DTCV, meaning that the DTCV may not have done enough to link participants to health care during the period examined in the current study.

#### **5.1.2.2 SUD-Related Care**

MSP SUD Claims was the only variable to show a statistically significant difference in Change Scores when comparing values for the DTCV and Theft Groups in the periods preceding and following the Index Date. While the two groups began with significantly different mean frequencies of claims, the number of claims seen in each group moved in opposite directions in the period following the Index Date. This indicates that the two groups behaved differently with respect to MSP SUD Claims. The increase seen in the DTCV Group, which was statistically significant, is perhaps unsurprising given the fact that the primary goal of the DTCV is to address substance abuse. Results indicate that, following involvement with the DTCV,

participants were better engaged with outpatient physician-based services for their substance use disorders.

A different pattern can be seen in relation to Hospital SUD Claims. While results are not statistically significant here, possibly because of the low frequency of Hospital SUD Claims, visual representation of the data shows that, while the Theft Group's use of hospital-based SUD services increased over time, the DTCV Group's Hospital SUD Claims actually decreased. These results are particularly interesting because they show a pattern opposite to MSP SUD Claims, which is in line with theories that substance abuse treatment may increase outpatient primary care while decreasing costly inpatient hospitalizations (Parthasarathy et al., 2001; Gourevitch et al., 2007).

The pattern exhibited for MSP Methadone Claims, which is closely related to substance abuse, is also interesting. The Theft Group exhibited a higher frequency of methadone claims than the DTCV Group both prior to, and following, the Index Date, with the difference in the post-Index Date period being statistically significant. Both prior to- and following- the Index Date, individuals in the DTCV group received only about two-thirds as much methadone treatment as those in the Theft Group. This raises the question of why the DTCV Group—a cohort defined, in large part, by addiction—received less methadone treatment both before and after involvement with the Drug Court.

That the DTCV Group continued to receive less methadone treatment than the Theft Group is particularly unfortunate given the fact that methadone treatment

has been specifically recognized as an ideal opportunity for linking substance-abusing individuals with other health services (Gourevitch et al., 2007). While alienation from the medical system and uncontrolled addiction may help explain pre-Index Date differences, post-Index Date results suggest that the DTCV did not do enough to link individuals to methadone treatment, despite its mandate to treat substance abuse in its participants. Because Methadone Claims made up the vast majority of MSP Total SUD Claims, the same pattern could be observed for this variable.

#### **5.1.2.3 MD-Related Care**

As with Total MSP Claims, the DTCV Group exhibited a significantly lower frequency of MSP MD Claims than the Theft Group both before and after the Index Date. During both periods considered, individuals in the Theft Group received nearly four times as much outpatient physician-based care for mental disorders than individuals in the DTCV Group.

This is particularly noteworthy because of what is known about the frequency of co-occurring disorders in both the substance abusing and corrections populations (Dennison, 2005; Ogloff et al., 2004; Somers et al. 2008). Again, because the DTCV Group was defined, in large part, by addiction, it would be expected that they would have experienced a relatively high frequency of mental disorders and exhibited a greater use of services. The fact that they received significantly less outpatient physician care for mental disorders than matched controls, both before

and after involvement with the DTCV, indicates that they may have been alienated from mental health services and that the DTCV failed to take adequate action to link these individuals to primary care for mental disorders.

#### **5.1.2.4 Physical Health-Related Care**

As seen with other categories of care, individuals in the DTCV Group received significantly less care for MSP Non-Psych Claims than individuals in the Theft Group, both prior to and following involvement with the DTCV. Before and after the Index Date, individuals in the DTCV Group were responsible for only about half as many MSP Non-Psych Claims as the Theft Group. While not statistically significant, a similar pattern can be seen for Hospital Non-Psych Claims.

These results are in line with findings for Total MSP Claims and Total Hospitalizations. Again, while it may be expected that the DTCV Group would show a lower frequency of care prior to drug court involvement, the fact that they received significantly less care for Non-Psych Claims, even after participation in the DTCV, indicates that the drug court may not have done enough, overall, to address physical health needs and to link individuals to care.

Several specific physical-health related claims were also considered in the current study. The decrease seen in the frequency of MSP Injury and Poisoning Claims among DTCV Group individuals, in contrast to the increase seen among Theft Group individuals, though not statistically significant, is in line with changes that would be expected following substance abuse treatment. Injuries and poisoning are

frequently associated with behavioural consequences of substance abuse, which include violence and risk-taking behaviour (Adrian & Barry, 2003; Boles & Miotto, 2003). It is, therefore, logical that injury and poisoning claims would decrease following substance abuse treatment, when substance abuse, and related negative behaviours, may be controlled. Again, the relatively low frequency of MSP Injury and Poisoning Claims may help explain why results were not statistically significant.

Interesting, though non-significant, results could be seen in relation to MSP Claims for HIV and pneumonia and influenza. For both measures, the DTCV Group experienced a greater increase in the frequency of claims than the Theft Group and ended with a greater number of claims than the Theft Group in the post-Index Date period. Given that both of these health problems have been associated with substance use, these results provide some evidence that, by acting to control an individual's substance abuse problem, the DTCV may have also acted to link individuals to medical care for related health issues. Though not as closely associated with substance abuse, a similar, non-significant pattern of change could be seen for Neoplasm Claims. Overall, the pattern seen in these physical-health related variables is consistent with the idea that substance abuse treatment can result in increased use of primary care and improved treatment for existing conditions (Parthasarathy et al., 2001; Samet et al., 2001). However, it is important to note that the DTCV did not have the same effect on all conditions, with the DTCV group continuing to make fewer MSP Endocrine, Nutritional and Metabolic Disease and Immunity Disorder Claims following involvement with the drug treatment court.

### 5.1.3 Overall Trends and Potential Explanations

While there was only one statistically significant difference in Change Scores in the current study, as well as several non-significant patterns of change, it is important to recall that the observed findings occurred despite the intent to treat analysis employed. This means that although the majority of participants did not graduate from the DTCV, individuals who engaged with the drug court may have experienced some health benefits, even if they did not complete the entire program.

However, as noted above, for the majority of variables considered in the current study, there was no observable difference in the way the two groups behaved. Consequently, it is necessary to consider why the DTCV did not have a greater impact on participants' use of health services.

A potential problem with the DTCV, which could help explain the lack of change in patterns of health services utilization, was the informal or relatively weak nature of the link between the drug court and health care services during the period examined in the current study. Informal linkage mechanisms, where care is not offered on site and the burden of seeking and obtaining care remains with the individual patient, have been shown to be less effective than more formal linkage mechanisms (Friedmann et al., 2001). Indeed, it has been noted that "achieving linkage of substance abusers to primary care has been elusive, unless an integrative approach was taken" (Samet et al., 2003, p. 510). Because of the chaotic lifestyle frequently associated with substance abuse, factors such as disorganization and financial constraints may act as significant barriers to behaviour change and service delivery (Friedmann et al., 2001). Because the DTCV did not offer on-site care or

transportation assistance, the linkage to medical services may not have been strong enough to significantly influence patterns of health services utilization.

A second possible explanation is that the DTCV did not do enough to address other complicating issues in the lives of its participants. While the DTCV does act to link participants to other services, its ultimate focus remains substance abuse and resulting criminal justice consequences. However, the physical and mental health problems associated with addiction are exacerbated by the poor conditions in which many substance abusers subsist, meaning that interventions must also be directed at the social conditions in which an individual lives (Adrian & Barry, 2003). Substance abuse should be seen as one of the numerous individual and systemic factors that must be addressed as barriers to effective health interventions (Adrian & Barry, 2003).

## **5.2 Limitations**

Although the data utilized in the present study represent a relatively complete account of the overlap between health and correctional services in British Columbia, not all relevant services were represented in the available data. Of particular importance is the absence of emergency room services, which are provided directly by local health authorities and not included in the Ministry of Health's administrative data. This is particularly noteworthy because health services research has suggested that much of the excess use of medical services seen in individuals with substance use disorders can be attributed to costly emergency

room care (Parthasarathy et al., 2001). Forensic Psychiatric Services, which are provided through the Provincial Health Services Authority, are also not included in the Ministry of Health data, and therefore could not be included in this study's analyses. The omission of these services means that the full range of health services available in British Columbia could not be considered in the current analyses.

Also of note is the under-representation of certain conditions in the available data. It is necessary to acknowledge that administrative data only contains information on diagnosed conditions, and many conditions are frequently under-diagnosed by physicians (Virnig & McBean, 2001). Additionally, there are no diagnostic codes corresponding directly to conditions such as Fetal Alcohol Spectrum Disorder, developmental disabilities, or organic and acquired brain injuries, conditions known to be highly prevalent in the corrections population (Ogloff et al., 2005). Such conditions may have significant ramifications for both correction- and health-related outcomes, meaning their absence from the data is a noteworthy limitation.

Administrative data is also limited in that it provides little or no information on issues that may have been discussed and considered, but not actually adopted by either the patient or the health care provider (Virnig & McBean, 2001). Consequently, the IM Database may have under represented the amount and type of care provided by individuals considered in the current study.

As a limitation more specific to the data used in the current study, it is also important to note that a significant number of drug court participants (49



individuals or 25% of participants) were excluded from the final DTCV Group due to data problems with the existing IM Database. Reasons for these problems have not been identified, and it is therefore possible that identification of the DTCV Group was biased in some way.

Although a random assignment research design would have best controlled for differences between DTCV Group individuals and Theft Group individuals, such a design was not possible in this retrospective observational study, where all eligible individuals were given the opportunity to participate in drug court, as required by law. While propensity score matching was used to minimize differences between the DTCV and Theft Groups, it is possible that not all differences could be addressed using this method. Although propensity score matching can help account for known bias, unlike randomization, it cannot remove hidden, unmeasured bias (Cavuto et al., 2006).

Another potential problem with this type of study is “regression to the mean,” or the fact that individuals with unusually high utilization patterns or costs will move towards average levels of use, regardless of treatment (Parthasarathy et al., 2001, p. 96). While using a group of control individuals would have helped to minimize this problem, this is a particularly noteworthy limitation with respect to the results for MSP SUD Claims, where the DTCV Group and Theft Group both moved closer to a central mean. Additionally, it is necessary to acknowledge the risk of Type I Error in the study’s results because of the number of paired t-tests run in this study (five tests for each of 14 variables of interest).

It is also necessary to note that because an intent-to-treat analysis was used in this study, all individuals who entered the Vancouver Drug Treatment Court Program were included in the analyses. The study does not consider the effects of completing the program or length of retention in the DTCV as predictors of outcome, factors which are known to impact health care utilization patterns and costs (Parthasarathy et al., 2001).

Nevertheless, the IM Database utilized in the current study has a number of strengths. Perhaps most importantly, it integrates health and corrections data for a large number of individuals over multiple years, something that has been significantly lacking in prior drug court research. Although, as noted above, some important information is not included, the database does contain a great deal of information on criminal offenders' use of health care services.

### **5.3 Future Directions**

While this study adds to what is known about the relationship between drug courts and health services, it also raises numerous questions that could be explored in future research. Using existing data in the IM Database, it would be useful to perform the same analyses used here to examine changes in the other three comparison pools set out in Chapter 3. Similar trends across these pools would support the results of the current analyses, while discrepancies in findings would provide possible insight into alternative explanations for this study's results. Existing data could also be used to break down the two years of follow up for the

DTCV and Theft Groups, as this may reveal different patterns of health services utilization during different time periods (e.g. in early stages of drug court participation, immediately following drug court, or one year after program completion).

Additional analyses that accounted for characteristics such as graduation status, gender, age and other demographic variables would provide insight into specific subpopulations and characteristics that may influence the relationship between drug court and health services. Examining the impact of graduation status may be particularly useful in determining whether or not certain health benefits may occur for all DTCV participants and not merely those who complete the drug court program. Analyses that consider specific participant characteristics, such as drug of abuse, treatment retention and completion, and severity of addiction, would also provide greater understanding of how different groups are influenced by drug court participation. It may also be useful to examine how the DTCV impacts quality of care for pregnant women, as pregnancy- and childbirth-related care was not considered in the current study.

With the ultimate goal of drug courts remaining a reduction in criminal recidivism, it is important to investigate the relationship between criminal justice and health outcomes. It would be useful to examine whether health-related benefits occurred independently of positive criminal justice outcomes, or if benefits in the two realms were significantly correlated.

Because data were only available until 2006, the current study considered only individuals who began drug court between December 1, 2001 and March 31, 2004. Consequently, it would be useful to examine more recent data, collected once the DTCV was more established and when more individuals could be considered. It would be particularly interesting to examine data collected after April 10, 2006, when funding for the DTCV was renewed and responsibility for treatment was transferred from independent contractors to the Vancouver Coastal Health Authority (Ministry of Public Safety and Solicitor General, 2006). At this point in time, the relationship between the DTCV and health was more clearly acknowledged, with a government press release stating that the involvement of Vancouver Coastal Health would “allow people in the program to deal with their addictions while getting help for other health issues” (Ministry of Public Safety and Solicitor General, 2006).

The findings of the current study validate the Ministry’s decision to transfer treatment responsibility to Vancouver Coastal Health, as broader engagement with health services is clearly necessary for the vulnerable individuals who participate in drug court. However, it is necessary for future research to examine whether the more formal linkage to Vancouver Coastal Health actually resulted in improved health services utilization outcomes for DTCV participants.

Because analyses in the current study are based on raw data and require significant inferences and interpretation, much could be gained from additional qualitative research on the relationship between the DTCV and health services. Qualitative research, such as focus groups and interviews, along with surveys, could

act to inform and add to the quantitative analyses performed in the current study. Such research could involve both DTCV participants and service providers and could explore such concepts as participants' feelings about their health and access to services, relationships with physicians and other care providers, barriers to effective service use, and structures that act to promote better health and improved use of health care services. At an even broader level, qualitative research with individuals in decision making roles could provide insight into what linkages are being made between the DTCV and health services and what structures are being employed to promote health in this high-risk population.

A cost-benefit analysis of the DTCV that took into account changes in health services utilization would also be useful. Such an analysis could explore changes in costs associated with any changes in health services, and how such changes related to overall costs of running the DTCV. Because it speaks in financial terms, such an analysis would be particularly useful when making policy decisions about the DTCV.

Moving beyond the DTCV alone, it would be useful to perform similar analyses on other drug courts in Canada. Examining additional drug courts would potentially allow for increased ability to find statistically significant changes in the use of health services, particularly in relation to diagnoses that are relatively rare, including conditions that were not specifically considered in the current study. Additionally, if other drug courts showed different results, it would be possible to explore potential explanations for these discrepancies that may help to explain which drug court structures act to promote health and link participants to health services.

Additionally, it would be interesting to examine the potential health benefits of drug courts from an ethical perspective. Drug courts have frequently been criticized for their coercive nature, and it is necessary to ask not only *if* drug courts act to link participants to health services, but also whether drug courts *should* be used to link individuals to care. It is also necessary to consider whether the potential health role of drug courts signals a failure of the health system, more generally, to reach this high-risk population, and what the health system could do to better serve these individuals prior to their involvement with drug court.

While this study has focused on how criminal justice policies may act to improve health outcomes in substance abusing individuals, future research should also consider how criminal justice policies act to create health disparities in this population. By alienating drug users from medical services and by driving the acquisition and use of illegal drugs underground, criminal justice policies may actually work to create many of the health problems that the DTCV, and other drug courts, must work to address. Future research should examine not only how new and improved policies can ameliorate health disparities, but also how existing policies may contribute to many of the health problems seen in drug-abusing criminal offenders.

Similarly, future research should consider whether drug courts are actually an appropriate tool for addressing the health needs of substance-abusing individuals. Drug courts are necessary because of the criminalization of drug use, and it is important to consider whether decriminalization, as a policy, would act to move drug use, along with related medical complications, out of the criminal justice

sphere and into the realm of health, where many would argue it more appropriately belongs. How drug courts fit with existing harm reduction policies is another important issue for future consideration.

The findings of the current study highlight the need for additional research regarding drug courts, the criminal justice system, and health services. More research on drug courts that examines the potential benefits of presenting drug court as a health intervention, or of the consequences of providing an onsite physician or designated transportation to health services could help both new and existing drug courts promote the health of participants. At the same time, information from other criminal justice-based interventions, including community courts, mental health courts, and custody-based programs, could be used to strengthen links between drug courts and health services.

Any research that could provide further insight into potential health benefits of drug courts and the need for increased collaboration between the health and criminal justice systems would be extremely valuable. However, it is necessary to recall that individuals with substance use disorders who are involved in the criminal justice system experience a broad range of complex problems that may result in or exacerbate existing health issues. Further research into the relationship between criminal justice and health services should take into account the unique social realities that define the lives of this high-risk group of individuals.

## **6: CONCLUSION**

Individuals who suffer from substance abuse problems and who are involved in the criminal justice system make up a vulnerable population with numerous complex health needs. Health problems arise from both drug use itself and from the chaotic lifestyle and high-risk behaviours that frequently accompany addiction. Drug- and alcohol-dependent individuals suffer from a broad range of health problems, but exhibit particularly high rates of mental illness, infectious diseases such as HIV, Hepatitis, and other STIs, and treatment for injury and poisoning. A number of other conditions, including skin and soft-tissue damage, pulmonary and cardiovascular complications, and overall abnormalities in immune functioning are also frequently seen in this population.

Despite their need for health care services, individuals with substance use problems often do not receive adequate medical care. This population frequently lacks primary preventive health care, and because individuals who abuse alcohol and other drugs often ignore health problems until treatment is absolutely necessary, this population tends to overuse inefficient and expensive hospital services. Failure to seek medical treatment is particularly problematic because an individual's unaddressed medical needs may act to interfere with his or her addiction treatment and recovery.



Failure to seek medical care may result from the lifestyle associated with addiction, perceptions about stigmatization and discrimination in treatment settings, and the lack of comprehensive, coordinated services for individuals with both substance use and medical problems. Many have argued that multidimensional service delivery, which links together necessary medical, mental health, and addiction services, is the key to improving substance abusers' use of health services and overall health. Linked care may positively impact both health and addiction outcomes and may also help individuals address related issues, such as social functioning and employment. However, there is an overall need for greater research into the benefits of service linkage.

Drug courts have been proposed as one method of linking the criminal justice and health care systems, and drug courts may provide a unique opportunity to intervene with a population that may not otherwise seek medical care. Since the opening of the first drug court in Florida in 1989, drug courts have become an increasingly popular method of linking offenders with addiction services and addressing criminality outside the confines of the traditional, more adversarial, court-based system. In addition to addiction treatment, drug courts frequently involve additional health and social services. Nevertheless, drug courts remain part of a justice system that is focused on addressing criminal behaviour and increasing public safety, meaning that health goals tend to be secondary to goals related to criminality.

Despite their popularity, there remains a relative lack of strong empirical evidence regarding the effectiveness of drug courts and this paucity of evidence is

particularly obvious in relation to health services use for drug court participants. However, the criminal justice system has long been recognized as an opportunity to link offenders with health care services. The potential role of the drug court is supported by research on other forms of addiction treatment, which have been shown to impact the way in which substance-using individuals use health services.

The Drug Treatment Court of Vancouver opened in 2001 in response to high rates of drug use and criminality in Vancouver, particularly in the city's Downtown Eastside, where many of the health complications associated with addiction are common. The current study used data from a linked Inter-Ministry Database to examine changes in health services utilization for individuals processed by the DTCV between December 1, 2001 and March 31, 2004. The IM Database reflected all services provided by the Ministry of Health and Ministry of Public Safety and Solicitor General from April 1997 to September 2006. A total of 144 DTCV participants, along with 144 matched controls, were examined across a range of variables related to health services utilization in the two years preceding and two years following their Index Date.

Overall, analyses showed no significant difference in changes in overall frequency of health services utilization between the two groups, as reflected in MSP and inpatient hospitalization data. Indeed, much of the results indicated that DTCV participants were alienated from health services, and remained so, even after involvement with the drug court. However, when considering specific categories of treatment, the DTCV and comparison groups changed in significantly different ways with respect to MSP treatment for substance use disorders. While there were no

other statistically significant results, a pattern of difference was visible for inpatient hospitalizations for substance use disorders, which showed a trend opposite to that of SUD-related physician visits. Patterns of difference were also visible for several specific diagnostic codes associated with MSP treatment, including injury and poisoning, HIV, pneumonia and influenza, and neoplasms. Additionally, the DTCV and comparison groups were similar across a range of descriptive characteristics, though the DTCV Group included more females and more Aboriginal people than found in the general corrections population.

While these results may provide no definitive answer to the current study's broader question of "Does the DTCV change patterns of health-services utilization for drug-addicted criminal offenders?" they do, together, seem to indicate that the DTCV has potential to change the way in which individuals use health care services. Although there were no significant differences in patterns of change for total outpatient physician visits or total inpatient hospitalizations, there was a statistically significant difference for MSP treatment for substance use disorders, and non-statistically significant trends seen for several other variables. Together, these results suggest that the DTCV may impact the way in which drug-involved criminal offenders use health services and the reasons for which they seek care.

At the same time, however, the results raise the question: During the time period examined, did the DTCV do enough to link participants to health services? For the majority of variables examined, the DTCV Group received less care than the Theft Group prior to the Index Date and continued to make significantly less treatment-related claims, even after DTCV involvement. It is possible that the need

for more formal linkages to services was recognized, with the Vancouver Coastal Health Authority taking over operations of the DTCV in 2006. Examining whether this more direct link to medical care influenced patterns of health services utilization for participants who began the DTCV program after the time period considered here is a key question for future research on the DTCV.

While the current study adds to the relatively scarce literature on the relationship between drug courts and health care utilization patterns, it also highlights the need for more research in this area. It also indicates that drug courts must recognize that successful recovery will require more than drug treatment alone. Much remains unknown about the relationship between drug courts and health services, and the potential role that drug courts may play in improving the health of drug-involved criminal offenders, a vulnerable population with complex health needs. However, it is well accepted that managing medical problems and linking substance-abusing individuals to health services is an important part of stabilizing addiction. Because stabilizing addiction is a key component of reducing drug-related criminality, addressing participants' unmet health needs may be an important and necessary step towards meeting the ultimate goal of the Drug Treatment Court of Vancouver.

## APPENDICES

### Appendix A: Diagnostic Codes Representing Care of Neonate Excluded from Mother's Record

| ICD-9 Category   | ICD-9 3-Digit Code | Description  |
|--|--------------------|--|
| Certain Conditions Originating in the Perinatal Period | 760                | Fetus or newborn affected by maternal conditions which may be unrelated to present pregnancy |
|  | 761                | Fetus or newborn affected by maternal complications of pregnancy                             |
|  | 762                | Fetus or newborn affected by complications of placenta, cord, and membranes                  |
|  | 763                | Fetus or newborn affected by other complications of labor and delivery                       |
|  | 764                | Slow fetal growth and fetal malnutrition   |
|  | 765                | Disorders relating to short gestation and unspecified low birthweight                        |
|  | 766                | Disorders relating to long gestation and high birthweight                                    |
|  | 767                | Birth trauma   |
|  | 768                | Intrauterine hypoxia and birth asphyxia  |
|  | 769                | Respiratory distress syndrome  |
|  | 770                | Other respiratory conditions of fetus and newborn  |
|  | 771                | Infections specific to the perinatal period  |
|  | 772                | Fetal and neonatal hemorrhage  |
|  | 773                | Hemolytic disease of fetus or newborn, due to isoimmunization                                |

|  |     |   |
|--|-----|---|
|  | 774 | Other perinatal jaundice  |
|  | 775 | Endocrine and metabolic disturbances specific to the fetus and newborn              |
|  | 776 | Hematological disorders of fetus and newborn  |
|  | 777 | Perinatal disorders of digestive system   |
|  | 778 | Conditions involving the integument and temperature regulation of fetus and newborn |
|  | 779 | Other and ill-defined conditions originating in the perinatal period                |
| Supplementary Classification of Factors Influencing Health Status and Contact with Health Services | V20 | Health supervision of infant or child   |
|  | V21 | Constitutional states in development  |
|  | V29 | Observation and evaluation of newborns for suspected condition not found            |
|  | V30 | Single liveborn   |
|  | V31 | Twin, mate liveborn   |
|  | V32 | Twin, mate stillborn  |
|  | V33 | Twin, unspecified   |
|  | V34 | Other multiple, mates all liveborn  |
|  | V35 | Other multiple, mates all stillborn   |
|  | V36 | Other multiple, mates live- and stillborn   |
|  | V37 | Other multiple, unspecified   |
|  | V39 | Unspecified   |
| Additional Diagnostic Codes (Used by MSP)  | 05A | Growth and development  |
|  | 08A | Healthy newborn care  |

## Appendix B: Diagnostic Codes Related to Reproduction and Childbirth

| ICD-9 Category   | ICD-9 3-Digit Code                       | Description   |
|--|--|---|
| Complications of Pregnancy, Childbirth, and the Puerperium | 630                                      | Hydatidiform mole   |
|  | 631                                      | Other abnormal product of conception  |
|  | 632                                      | Missed abortion   |
|  | 633                                      | Ectopic pregnancy   |
|  | 634                                      | Spontaneous abortion  |
|  | 635                                      | Legally induced abortion  |
|  | 636                                      | Illegally induced abortion  |
|  | 637                                      | Unspecified abortion  |
|  | 638                                      | Failed attempted abortion   |
|  | 639                                      | Complications following abortion and ectopic and molar pregnancies  |
|  | 640                                      | Hemorrhage in early pregnancy   |
|  | 641                                      | Antepartum hemorrhage, abruptio placentae, and placenta previa  |
|  | 642                                      | Hypertension complicating pregnancy, childbirth, and the puerperium   |
|  | 643                                      | Excessive vomiting in pregnancy   |
|  | 644                                      | Early or threatened labor   |
|  | 645                                      | Prolonged pregnancy   |
|  | 646                                      | Other complications of pregnancy, not elsewhere classified  |
|  | 647                                      | Infectious and parasitic conditions in the mother classifiable elsewhere, but complicating pregnancy, childbirth, or the puerperium |
|  | 648                                      | Other current conditions in the mother classifiable elsewhere, but complicating pregnancy, childbirth, or the the puerperium        |
|  | 650                                      | Delivery in a completely normal case  |
| 651  | Multiple gestation                       |   |
| 652  | Malposition and malpresentation of fetus |   |

|  |     |  |
|--|-----|--|
|  | 653 | Disproportion  |
|  | 654 | Abnormality of organs and soft tissues of pelvis   |
|  | 655 | Known or suspected fetal abnormality affecting management of mother                                |
|  | 656 | Other fetal and placental problems affecting management of mother                                  |
|  | 657 | Polyhydramnios   |
|  | 658 | Other problems associated with amniotic cavity and membranes                                       |
|  | 659 | Other indications for care or intervention related to labor and delivery, not elsewhere classified |
|  | 660 | Obstructed labor   |
|  | 661 | Abnormality of forces of labor   |
|  | 662 | Long labor   |
|  | 663 | Umbilical cord complications   |
|  | 664 | Trauma to perineum and vulva during delivery   |
|  | 665 | Other obstetrical trauma   |
|  | 666 | Postpartum hemorrhage  |
|  | 667 | Retained placenta without hemorrhage   |
|  | 668 | Complications of the administration of anesthetic or other sedation in labor and delivery          |
|  | 669 | Other complications of labor and delivery, not elsewhere classified                                |
|  | 670 | Major puerperal infection  |
|  | 671 | Venous complications in pregnancy and the puerperium   |
|  | 672 | Pyrexia of unknown origin during the puerperium  |
|  | 673 | Obstetrical pulmonary embolism   |
|  | 674 | Other and unspecified complications of the puerperium, not elsewhere classified                    |
|  | 675 | Infections of the breast and nipple associated with childbirth                                     |
|  | 676 | Other disorders of the breast associated with childbirth and disorders of lactation                |



|  |  |  |
|--|--|--|
|  | 677  | Late effect of complication of pregnancy, childbirth, and the puerperium   |
| Supplementary Classification of Factors Influencing Health Status and Contact with Health Services | V22<br>V23<br>V24<br>V25<br>V26<br>V27<br>V28                                    | Normal pregnancy<br>Supervision of high-risk pregnancy<br>Postpartum care and examination<br>Encounter for contraceptive management<br>Procreative management<br>Outcome of delivery<br>Antenatal Screening  |
| Additional Diagnostic Codes (Used by MSP)  | 06A<br>07A<br>17B<br>30B<br>31B<br>32B<br>33B<br>34B<br>35B<br>36B<br>37B<br>38B | Feeding and management talk/anxiety of mother<br>Feeding problem (other than newborn)<br>Consultation re abortion<br>Prenatal care<br>Hypertrophy of breast, mammary gland, nipple arising during pregnancy<br>Erosion and inflammation of cervix (uteri) arising during pregnancy<br>Leukorrhea, vaginal discharge not otherwise specified arising during pregnancy<br>Hypertensive disease arising during pregnancy<br>False labour<br>Pregnancy, examination pregnancy unconfirmed<br>Premature rupture of membranes<br>Threatened abortion |

**Appendix C: Breakdown of ICD-9 Diagnostic and Additional MSP Codes for Non-Methadone Substance Use Disorder Claims (“SUD Claims”) and Mental Disorder Claims (“MD Claims”)**

| <b>Diagnostic Category</b> | <b>ICD-9 Diagnosis</b>             | <b>Description</b>   |
|----------------------------|------------------------------------|--|
| SUD Claims                 | 291                                | Alcoholic psychoses  |
|                            | 292                                | Drug psychoses   |
|                            | 303                                | Alcohol dependence syndrome  |
|                            | 304                                | Drug dependence  |
|                            | 305                                | Nondependent abuse of drugs  |
| MD Claims                  | 290                                | Senile and presenile organic psychotic conditions                  |
|                            | 293                                | Transient organic psychotic conditions                             |
|                            | 294                                | Other organic psychotic conditions (chronic)                       |
|                            | 295                                | Schizophrenic disorders  |
|                            | 296                                | Affective psychoses  |
|                            | 297                                | Paranoid states  |
|                            | 298                                | Other nonorganic psychoses   |
|                            | 299                                | Psychoses with origin specific to childhood                        |
|                            | 300                                | Neurotic disorders   |
|                            | 301                                | Personality disorders  |
|                            | 302                                | Sexual deviations and disorders                                    |
|                            | 306                                | Physiological malfunction arising from mental factors              |
|                            | 307                                | Special symptoms or syndromes, not elsewhere classified            |
|                            | 308                                | Acute reaction to stress   |
|                            | 309                                | Adjustment reaction  |
|                            | 310                                | Specific nonpsychotic mental disorders due to organic brain damage |
|                            | 311                                | Depressive disorder, not elsewhere classified                      |
|                            | 312                                | Disturbance of conduct, not elsewhere classified                   |
|                            | 313                                | Disturbances of emotions specific to childhood and adolescence     |
| 314                        | Hyperkinetic syndrome of childhood |  |

| <b>Diagnostic Category</b> | <b>ICD-9 Diagnosis</b> | <b>Description</b>                               |
|----------------------------|------------------------|--|
|                            | V61                    | Other family circumstances                       |
|                            | V62                    | Other psychosocial circumstances                 |
|                            | 04A                    | General psychiatric examination-no care required |
|                            | 50B                    | Anxiety/depression                               |

## Appendix D: Categories of Specific Diagnostic Codes Considered

| Category for Analysis         | Classification              | ICD-9 Code   | ICD-9 Description   |
|-------------------------------|-----------------------------|--|---|
| <b>Injuries and Poisoning</b> | Fracture of Skull           | 800  | Fracture of vault of skull  |
|                               |                             | 801  | Fracture of base of skull   |
|                               |                             | 802  | Fracture of face bones  |
|                               |                             | 803  | Other and unqualified skull fractures   |
|                               |                             | 804  | Multiple fractures involving skull or face with other bones                           |
|                               | Fracture of Spine and Trunk | 805  | Fracture of vertebral column without mention of spinal cord injury                    |
|                               |                             | 806  | Fracture of vertebral column with spinal cord injury                                  |
|                               |                             | 807  | Fracture of rib(s), sternum, larynx, and trachea                                      |
|                               |                             | 808  | Fracture of pelvis  |
|                               |                             | 809  | Ill-defined fractures of bones of trunk   |
|                               | Fracture of Upper Limb      | 810  | Fracture of clavicle  |
|                               |                             | 811  | Fracture of scapula   |
|                               |                             | 812  | Fracture of humerus   |
|                               |                             | 813  | Fracture of radius and ulna   |
|                               |                             | 814  | Fracture of carpal bone(s)  |
|                               |                             | 815  | Fracture of metacarpal bone(s)  |
|                               |                             | 816  | Fracture of one or more phalanges of hand   |
|                               |                             | 817  | Multiple fractures of hand bones  |
|                               |                             | 818  | Ill-defined fractures of upper limb   |
|                               |                             | 819  | Multiple fractures involving both upper limbs, and upper limb with rib(s) and sternum |
| Fracture of Lower Limb        | 820                         | Fracture of neck of femur                                |   |
|                               | 821                         | Fracture of other and unspecified parts of femur         |   |
|                               | 822                         | Fracture of patella                                      |   |
|                               | 823                         | Fracture of tibia and fibula                             |   |
|                               | 824                         | Fracture of ankle  |   |
|                               | 825                         | Fracture of one or more tarsal and metatarsal bones      |   |
|                               | 826                         | Fracture of one or more phalanges of foot                |   |
|                               | 827                         | Other, multiple, and ill-defined fractures of lower limb |   |

| Category for Analysis | Classification   | ICD-9 Code | ICD-9 Description   |
|-----------------------|--|------------|---|
|                       |  | 828        | Multiple fractures involving both lower limbs, lower with upper limb, and lower limb(s) with rib(s) and sternum |
|                       |  | 829        | Fracture of unspecified bones   |
|                       | Dislocation  | 830        | Dislocation of jaw  |
|                       |  | 831        | Dislocation of shoulder   |
|                       |  | 832        | Dislocation of elbow  |
|                       |  | 833        | Dislocation of wrist  |
|                       |  | 834        | Dislocation of finger   |
|                       |  | 835        | Dislocation of hip  |
|                       |  | 836        | Dislocation of knee   |
|                       |  | 837        | Dislocation of ankle  |
|                       |  | 838        | Dislocation of foot   |
|                       |  | 839        | Other, multiple, and ill-defined dislocations   |
|                       | Sprains and Strains of Joints and Adjacent Muscles       | 840        | Sprains and strains of shoulder and upper arm   |
|                       |  | 841        | Sprains and strains of elbow and forearm  |
|                       |  | 842        | Sprains and strains of wrist and hand   |
|                       |  | 843        | Sprains and strains of hip and thigh  |
|                       |  | 844        | Sprains and strains of knee and leg   |
|                       |  | 845        | Sprains and strains of ankle and foot   |
|                       |  | 846        | Sprains and strains of sacroiliac region  |
|                       |  | 847        | Sprains and strains of other and unspecified parts of back  |
|                       |  | 848        | Other and ill-defined sprains and strains   |
|                       | Intracranial Injury Excluding those with Skull Fractures | 850        | Concussion  |
|                       |  | 851        | Cerebral laceration and contusion   |
|                       |  | 852        | Subarachnoid, subdural, and extradural hemorrhage, following injury   |
|                       |  | 853        | Other and unspecified intracranial hemorrhage following injury  |
|                       |  | 854        | Intracranial injury of other and unspecified nature   |
|                       | Internal Injury of Chest, Abdomen, and Pelvis            | 860        | Traumatic pneumothorax and hemothorax   |
|                       |  | 861        | Injury to heart and lung  |
|                       |  | 862        | Injury to other and unspecified   |

| Category for Analysis | Classification                     | ICD-9 Code   | ICD-9 Description   |
|-----------------------|------------------------------------|--|---|
|                       |                                    | 863<br>864<br>865<br>866<br>867<br>868<br>869                      | intrathoracic organs<br>Injury to gastrointestinal tract<br>Injury to liver<br>Injury to spleen<br>Injury to kidney<br>Injury to pelvic organs<br>Injury to other intra-abdominal organs<br>Internal injury to unspecified or ill-defined organs  |
|                       | Open Wound of Head, Neck and Trunk | 870<br>871<br>872<br>873<br>874<br>875<br>876<br>877<br>878<br>879 | Open wound of ocular adnexa<br>Open wound of eyeball<br>Open wound of ear<br>Other open wound of head<br>Open wound of neck<br>Open wound of chest (wall)<br>Open wound of back<br>Open wound of buttock<br>Open wound of genital organs (external), including traumatic amputation<br>Open wound of other and unspecified sites, except limbs  |
|                       | Open Wound of Upper Limb           | 880<br>881<br>882<br>883<br>884<br>885<br>886<br>887               | Open wound of shoulder and upper arm<br>Open wound of elbow, forearm, and wrist<br>Open wound of hand except finger(s) alone<br>Open wound of finger(s)<br>Multiple and unspecified open wound of upper limb<br>Traumatic amputation of thumb (complete) (partial)<br>Traumatic amputation of other finger(s) (complete) (partial)<br>Traumatic amputation of arm and hand (complete) (partial) |
|                       | Open Wound of Lower Limb           | 890<br>891<br>892  | Open wound of hip and thigh<br>Open wound of knee, leg [except thigh], and ankle<br>Open wound of foot except toe(s) alone  |

| Category for Analysis | Classification  | ICD-9 Code  | ICD-9 Description  |
|-----------------------|---|---|--|
|                       |   | 893<br>894<br>895<br>896<br>897                             | Open wound of toe(s)<br>Multiple and unspecified open wound of lower limb<br>Traumatic amputation of toe(s) (complete) (partial)<br>Traumatic amputation of foot (complete) (partial)<br>Traumatic amputation of leg(s) (complete) (partial)   |
|                       | Injury to Blood Vessels   | 900<br>901<br>902<br>903<br>904                             | Injury to blood vessels of head and neck<br>Injury to blood vessels of thorax<br>Injury to blood vessels of abdomen and pelvis<br>Injury to blood vessels of upper extremity<br>Injury to blood vessels of lower extremity and unspecified sites   |
|                       | Late Effects of Injuries, Poisonings, Toxic Effects and Other External Causes | 905<br>906<br>907<br>908<br>909                             | Late effects of musculoskeletal and connective tissue injuries<br>Late effects of injuries to skin and subcutaneous tissues<br>Late effects of injuries to the nervous system<br>Late effects of other and unspecified injuries<br>Late effects of other and unspecified external causes   |
|                       | Superficial Injury  | 910<br>911<br>912<br>913<br>914<br>915<br>916<br>917<br>918 | Superficial injury of face, neck, and scalp except eye<br>Superficial injury of trunk<br>Superficial injury of shoulder and upper arm<br>Superficial injury of elbow, forearm, and wrist<br>Superficial injury of hand(s) except finger(s) alone<br>Superficial injury of finger(s)<br>Superficial injury of hip, thigh, leg, and ankle<br>Superficial injury of foot and toe(s)<br>Superficial injury of eye and adnexa |

| Category for Analysis | Classification                                   | ICD-9 Code   | ICD-9 Description   |
|-----------------------|--|--|---|
|                       |  | 919  | Superficial injury of other, multiple, and unspecified sites  |
|                       | Contusion with Intact Skin Surface               | 920<br>921<br>922<br>923<br>924                                    | Contusion of face, scalp, and neck except eye(s)<br>Contusion of eye and adnexa<br>Contusion of trunk<br>Contusion of upper limb<br>Contusion of lower limb and of other and unspecified sites  |
|                       | Crushing Injury                                  | 925<br>926<br>927<br>928<br>929                                    | Crushing injury of face, scalp, and neck<br>Crushing injury of trunk<br>Crushing injury of upper limb<br>Crushing injury of lower limb<br>Crushing injury of multiple and unspecified sites   |
|                       | Effects of Foreign Body Entering Through Orifice | 930<br>931<br>932<br>933<br>934<br>935<br>936<br>937<br>938<br>939 | Foreign body on external eye<br>Foreign body in ear<br>Foreign body in nose<br>Foreign body in pharynx and larynx<br>Foreign body in trachea, bronchus, and lung<br>Foreign body in mouth, esophagus, and stomach<br>Foreign body in intestine and colon<br>Foreign body in anus and rectum<br>Foreign body in digestive system, unspecified<br>Foreign body in genitourinary tract |
|                       | Burns  | 940<br>941<br>942<br>943<br>944<br>945<br>946<br>947<br>948<br>949 | Burn confined to eye and adnexa<br>Burn of face, head, and neck<br>Burn of trunk<br>Burn of upper limb, except wrist and hand<br>Burn of wrist(s) and hand(s)<br>Burn of lower limb(s)<br>Burns of multiple specified sites<br>Burn of internal organs<br>Burns classified according to extent of body surface involved<br>Burn, unspecified  |
|                       | Injury to Nerves and Spinal Cord                 | 950<br>951   | Injury to optic nerve and pathways<br>Injury to other cranial nerve(s)  |



| Category for Analysis | Classification  | ICD-9 Code   | ICD-9 Description  |
|-----------------------|---|--|--|
|                       |   | 952<br>953<br>954<br>955<br>956<br>957   | Spinal cord injury without evidence of spinal bone injury<br>Injury to nerve roots and spinal plexus<br>Injury to other nerve(s) of trunk, excluding shoulder and pelvic girdles<br>Injury to peripheral nerve(s) of shoulder girdle and upper limb<br>Injury to peripheral nerve(s) of pelvic girdle and lower limb<br>Injury to other and unspecified nerves   |
|                       | Certain Traumatic Complications and Unspecified Injuries  | 958<br>959   | Certain early complications of trauma<br>Injury, other and unspecified   |
|                       | Poisoning by Drugs, Medicaments and Biological Substances | 960<br>961<br>962<br>963<br>964<br>965<br>966<br>967<br>968<br>969<br>970<br>971<br>972<br>973<br>974<br>975 | Poisoning by antibiotics<br>Poisoning by other anti-infectives<br>Poisoning by hormones and synthetic substitutes<br>Poisoning by primarily systemic agents<br>Poisoning by agents primarily affecting blood constituents<br>Poisoning by analgesics, antipyretics, and antirheumatics<br>Poisoning by anticonvulsants and anti-Parkinsonism drugs<br>Poisoning by sedatives and hypnotics<br>Poisoning by other central nervous system depressants and anesthetics<br>Poisoning by psychotropic agents<br>Poisoning by central nervous system stimulants<br>Poisoning by drugs primarily affecting the autonomic nervous system<br>Poisoning by agents primarily affecting the cardiovascular system<br>Poisoning by agents primarily affecting the gastrointestinal system<br>Poisoning by water, mineral, and uric acid metabolism drugs<br>Poisoning by agents primarily acting on the smooth and skeletal muscles |

| Category for Analysis | Classification  | ICD-9 Code   | ICD-9 Description  |
|-----------------------|---|--|--|
|                       |   | 976<br>977<br>978<br>979   | and respiratory system<br>Poisoning by agents primarily affecting skin and mucous membrane, ophthalmological, otorhinolaryngological, and dental drugs<br>Poisoning by other and unspecified drugs and medicinal substances<br>Poisoning by bacterial vaccines<br>Poisoning by other vaccines and biological substances  |
|                       | Toxic Effects of Substances Chiefly Nonmedical as to Source         | 980<br>981<br>982<br>983<br>984<br>985<br>986<br>987<br>988<br>989 | Toxic effect of alcohol<br>Toxic effect of petroleum products<br>Toxic effect of solvents other than petroleum based<br>Toxic effect of corrosive aromatics, acids, and caustic alkalis<br>Toxic effect of lead and its compounds (including fumes)<br>Toxic effect of other metals<br>Toxic effect of carbon monoxide<br>Toxic effect of other gases, fumes, or vapors<br>Toxic effect of noxious substances eaten as food<br>Toxic effect of other substances, chiefly nonmedicinal as to source |
|                       | Other and Unspecified Effects of External Causes                    | 990<br>991<br>992<br>993<br>994<br>995                             | Effects of radiation, unspecified<br>Effects of reduced temperature<br>Effects of heat and light<br>Effects of air pressure<br>Effects of other external causes<br>Certain adverse effects not elsewhere classified  |
|                       | Complications of Surgical and Medical Care Not Elsewhere Classified | 996<br>997<br>998<br>999   | Complications peculiar to certain specified procedures<br>Complications affecting specified body systems, not elsewhere classified<br>Other complications of procedures, NEC<br>Complications of medical care, not elsewhere classified  |

| <b>Category for Analysis</b>   | <b>Classification</b>                                 | <b>ICD-9 Code</b>  | <b>ICD-9 Description</b>  |
|--------------------------------|---|--|---|
| <b>HIV</b>                     | Human Immunodeficiency Virus                          | 042  | Human Immunodeficiency Virus (HIV) infection with specified conditions          |
|                                |   | 043  | Human Immunodeficiency Virus (HIV) infection causing other specified conditions |
|                                |   | 044  | Other Human Immunodeficiency Virus (HIV) infection                              |
| <b>Pneumonia and Influenza</b> | Pneumonia and Influenza                               | 480  | Viral pneumonia   |
|                                |   | 481  | Pneumococcal pneumonia [Streptococcus pneumoniae pneumonia]                     |
|                                |   | 482  | Other bacterial pneumonia   |
|                                |   | 483  | Pneumonia due to other specified organism                                       |
|                                |   | 484  | Pneumonia in infectious diseases classified elsewhere                           |
|                                |   | 485  | Bronchopneumonia, organism unspecified  |
|                                |   | 486  | Pneumonia, organism unspecified   |
|                                |   | 487  | Influenza   |
| <b>Neoplasms</b>               | Malignant Neoplasm of Lip, Oral Cavity and Pharynx    | 140  | Malignant neoplasm of lip   |
|                                |   | 141  | Malignant neoplasm of tongue  |
|                                |   | 142  | Malignant neoplasm of major salivary glands                                     |
|                                |   | 143  | Malignant neoplasm of gum   |
|                                |   | 144  | Malignant neoplasm of floor of mouth  |
|                                |   | 145  | Malignant neoplasm of other and unspecified parts of mouth                      |
|                                |   | 146  | Malignant neoplasm of oropharynx  |
|                                |   | 147  | Malignant neoplasm of nasopharynx   |
|                                |   | 148  | Malignant neoplasm of hypopharynx   |
|                                | 149   | Malignant neoplasm of other and ill-defined sites within the lip, oral cavity, and pharynx |   |
|                                | Malignant Neoplasm of Digestive Organs and Peritoneum | 150  | Malignant neoplasm of esophagus   |
|                                |   | 151  | Malignant neoplasm of stomach   |
|                                |   | 152  | Malignant neoplasm of small intestine, including duodenum                       |
|                                |   | 153  | Malignant neoplasm of colon   |
|                                |   | 154  | Malignant neoplasm of rectum, rectosigmoid junction, and anus                   |
| 155                            |   | Malignant neoplasm of liver and  |   |

| Category for Analysis | Classification   | ICD-9 Code | ICD-9 Description  |
|-----------------------|--|------------|--|
|                       |  | 156        | intrahepatic bile ducts  |
|                       |  | 157        | Malignant neoplasm of gallbladder and extrahepatic bile ducts  |
|                       |  | 158        | Malignant neoplasm of pancreas   |
|                       |  | 159        | Malignant neoplasm of retroperitoneum and peritoneum   |
|                       |  | 159        | Malignant neoplasm of other and ill-defined sites within the digestive organs and peritoneum             |
|                       | Malignant Neoplasm of Respiratory and Intrathoracic Organs     | 160        | Malignant neoplasm of nasal cavities, middle ear, and accessory sinuses                                  |
|                       |  | 161        | Malignant neoplasm of larynx   |
|                       |  | 162        | Malignant neoplasm of trachea, bronchus, and lung  |
|                       |  | 163        | Malignant neoplasm of pleura   |
|                       |  | 164        | Malignant neoplasm of thymus, heart, and mediastinum   |
|                       |  | 165        | Malignant neoplasm of other and ill-defined sites within the respiratory system and intrathoracic organs |
|                       | Malignant Neoplasm of Bone, Connective Tissue, Skin and Breast | 170        | Malignant neoplasm of bone and articular cartilage   |
|                       |  | 171        | Malignant neoplasm of connective and other soft tissue   |
|                       |  | 172        | Malignant melanoma of skin   |
|                       |  | 173        | Other malignant neoplasm of skin   |
|                       |  | 174        | Malignant neoplasm of female breast  |
|                       |  | 175        | Malignant neoplasm of male breast  |
|                       | Malignant Neoplasm of Genitourinary Organs                     | 179        | Malignant neoplasm of uterus, part unspecified   |
|                       |  | 180        | Malignant neoplasm of cervix uteri   |
|                       |  | 181        | Malignant neoplasm of placenta   |
|                       |  | 182        | Malignant neoplasm of body of uterus   |
|                       |  | 183        | Malignant neoplasm of ovary and other uterine adnexa   |
|                       |  | 184        | Malignant neoplasm of other and unspecified female genital organs  |
|                       |  | 185        | Malignant neoplasm of prostate   |
|                       |  | 186        | Malignant neoplasm of testis   |
|                       |  | 187        | Malignant neoplasm of penis and other male genital organs  |
|                       |  | 188        | Malignant neoplasm of bladder  |

| Category for Analysis | Classification  | ICD-9 Code   | ICD-9 Description   |
|-----------------------|---|--|---|
|                       |   | 189  | Malignant neoplasm of kidney and other and unspecified urinary organs   |
|                       | Malignant Neoplasm of Other and Unspecified Sites         | 190<br>191<br>192<br>193<br>194<br><br>195<br>196<br>197<br>198<br>199 | Malignant neoplasm of eye<br>Malignant neoplasm of brain<br>Malignant neoplasm of other and unspecified parts of nervous system<br>Malignant neoplasm of thyroid gland<br>Malignant neoplasm of other endocrine glands and related structures<br>Malignant neoplasm of other and ill-defined sites<br>Secondary and unspecified malignant neoplasm of lymph nodes<br>Secondary malignant neoplasm of respiratory and digestive systems<br>Secondary malignant neoplasm of other specified sites<br>Malignant neoplasm without specification of site |
|                       | Malignant Neoplasm of Lymphatic and Haematopoietic Tissue | 200<br>201<br>202<br>203<br>204<br>205<br>206<br>207<br>208            | Lymphosarcoma and reticulosarcoma<br>Hodgkin's disease<br>Other malignant neoplasms of lymphoid and histiocytic tissue<br>Multiple myeloma and immunoproliferative neoplasms<br>Lymphoid leukemia<br>Myeloid leukemia<br>Monocytic leukemia<br>Other specified leukemia<br>Leukemia of unspecified cell type  |
|                       | Benign Neoplasm   | 210<br>211<br>212<br>213<br>214<br>215                                 | Benign neoplasm of lip, oral cavity, and pharynx<br>Benign neoplasm of other parts of digestive system<br>Benign neoplasm of respiratory and intrathoracic organs<br>Benign neoplasm of bone and articular cartilage<br>Lipoma<br>Other benign neoplasm of connective and other soft tissue   |

| Category for Analysis | Classification                   | ICD-9 Code   | ICD-9 Description  |
|-----------------------|----------------------------------|--|--|
|                       |                                  | 216<br>217<br>218<br>219<br>220<br>221<br>222<br>223<br>224<br>225<br>226<br>227<br>228<br>229 | Benign neoplasm of skin<br>Benign neoplasm of breast<br>Uterine leiomyoma<br>Other benign neoplasm of uterus<br>Benign neoplasm of ovary<br>Benign neoplasm of other female genital organs<br>Benign neoplasm of male genital organs<br>Benign neoplasm of kidney and other urinary organs<br>Benign neoplasm of eye<br>Benign neoplasm of brain and other parts of nervous system<br>Benign neoplasm of thyroid glands<br>Benign neoplasm of other endocrine glands and related structures<br>Hemangioma and lymphangioma, any site<br>Benign neoplasm of other and unspecified sites |
|                       | Carcinoma in Situ                | 230<br>231<br>232<br>233<br>234  | Carcinoma in situ of digestive organs<br>Carcinoma in situ of respiratory system<br>Carcinoma in situ of skin<br>Carcinoma in situ of breast and genitourinary system<br>Carcinoma in situ of other and unspecified sites  |
|                       | Neoplasms of Uncertain Behaviour | 235<br>236<br>237<br>238   | Neoplasm of uncertain behavior of digestive and respiratory systems<br>Neoplasm of uncertain behavior of genitourinary organs<br>Neoplasm of uncertain behavior of endocrine glands and nervous system<br>Neoplasm of uncertain behavior of other and unspecified sites and tissues  |
|                       | Neoplasms of Unspecified Nature  | 239  | Neoplasms of unspecified nature  |

| Category for Analysis   | Classification                     | ICD-9 Code   | ICD-9 Description   |
|---|------------------------------------|--|---|
| <b>Endocrine, Nutritional and Metabolic Diseases and Immunity Disorders</b> | Disorders of Thyroid Gland         | 240  | Simple and unspecified goiter                                 |
|   |                                    | 241  | Nontoxic nodular goiter                                       |
|   |                                    | 242  | Thyrotoxicosis with or without goiter                         |
|   |                                    | 243  | Congenital hypothyroidism                                     |
|   |                                    | 244  | Acquired hypothyroidism                                       |
|   |                                    | 245  | Thyroiditis   |
|   |                                    | 246  | Other disorders of thyroid                                    |
|   | Diseases of Other Endocrine Glands | 250  | Diabetes mellitus   |
|   |                                    | 251  | Other disorders of pancreatic internal secretion              |
|   |                                    | 252  | Disorders of parathyroid gland                                |
|   |                                    | 253  | Disorders of the pituitary gland and its hypothalamic control |
|   |                                    | 254  | Diseases of thymus gland                                      |
|   |                                    | 255  | Disorders of adrenal glands                                   |
|   |                                    | 256  | Ovarian dysfunction   |
|   |                                    | 257  | Testicular dysfunction  |
|   |                                    | 258  | Polyglandular dysfunction and related disorders               |
|   |                                    | 259  | Other endocrine disorders                                     |
|   | Nutritional Deficiencies           | 260  | Kwashiorkor   |
|   |                                    | 261  | Nutritional marasmus  |
|   |                                    | 262  | Other severe protein-calorie malnutrition                     |
|   |                                    | 263  | Other and unspecified protein-calorie malnutrition            |
|   |                                    | 264  | Vitamin A deficiency  |
|   |                                    | 265  | Thiamine and niacin deficiency states                         |
|   |                                    | 266  | Deficiency of B-complex components                            |
|   |                                    | 267  | Ascorbic acid deficiency                                      |
|   |                                    | 268  | Vitamin D deficiency  |
|   |                                    | 269  | Other nutritional deficiencies                                |
| Other Metabolic Disorders and Immunity Disorders                            | 270                                | Disorders of amino-acid transport and metabolism   |   |
|   | 271                                | Disorders of carbohydrate transport and metabolism |   |
|   | 272                                | Disorders of lipid metabolism                      |   |
|   | 273                                | Disorders of plasma protein metabolism             |   |
|   | 274                                | Gout   |   |
|   | 275                                | Disorders of mineral metabolism                    |   |
|   | 276                                | Disorders of fluid, electrolyte, and               |   |

| Category for Analysis | Classification | ICD-9 Code        | ICD-9 Description   |
|-----------------------|----------------|-------------------|---|
|                       |                | 277<br>278<br>279 | acid-base balance<br>Other and unspecified disorders of metabolism<br>Obesity and other hyperalimentation<br>Disorders involving the immune mechanism |



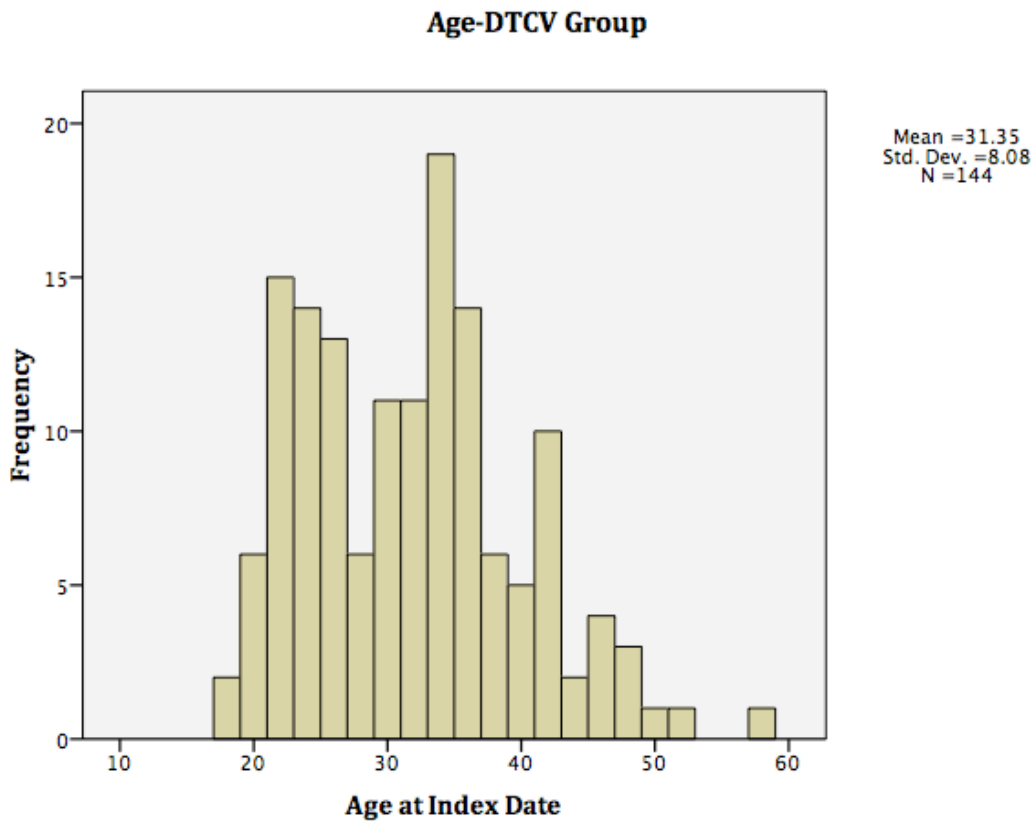
## Appendix E: Descriptive Characteristics of the DTCV and Theft Groups

### E.1 Age

**Table 13: Age at Index Date Statistics for DTCV Group**

|                   | N   | Minimum | Maximum | Mean  | Std. Deviation |
|-------------------|-----|---------|---------|-------|----------------|
| Age at Index Date | 144 | 18      | 58      | 31.35 | 8.080          |

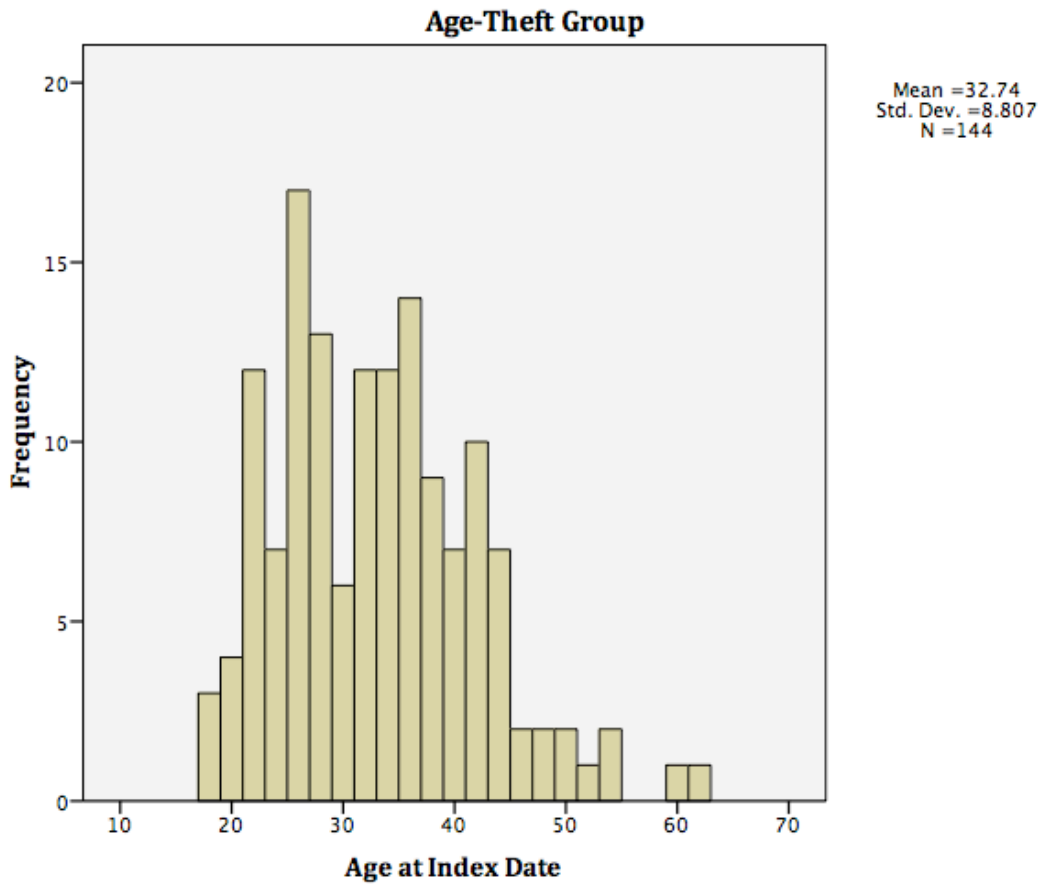
**Figure 11: Frequency Breakdown of Age at Index Date for DTCV Group**



**Table 14: Age at Index Date Statistics for Theft Group**

|                   | N   | Minimum | Maximum | Mean  | Std. Deviation |
|-------------------|-----|---------|---------|-------|----------------|
| Age at Index Date | 144 | 18      | 62      | 32.74 | 8.807          |

**Figure 12: Frequency Breakdown of Age at Index Date for DTCV Group**

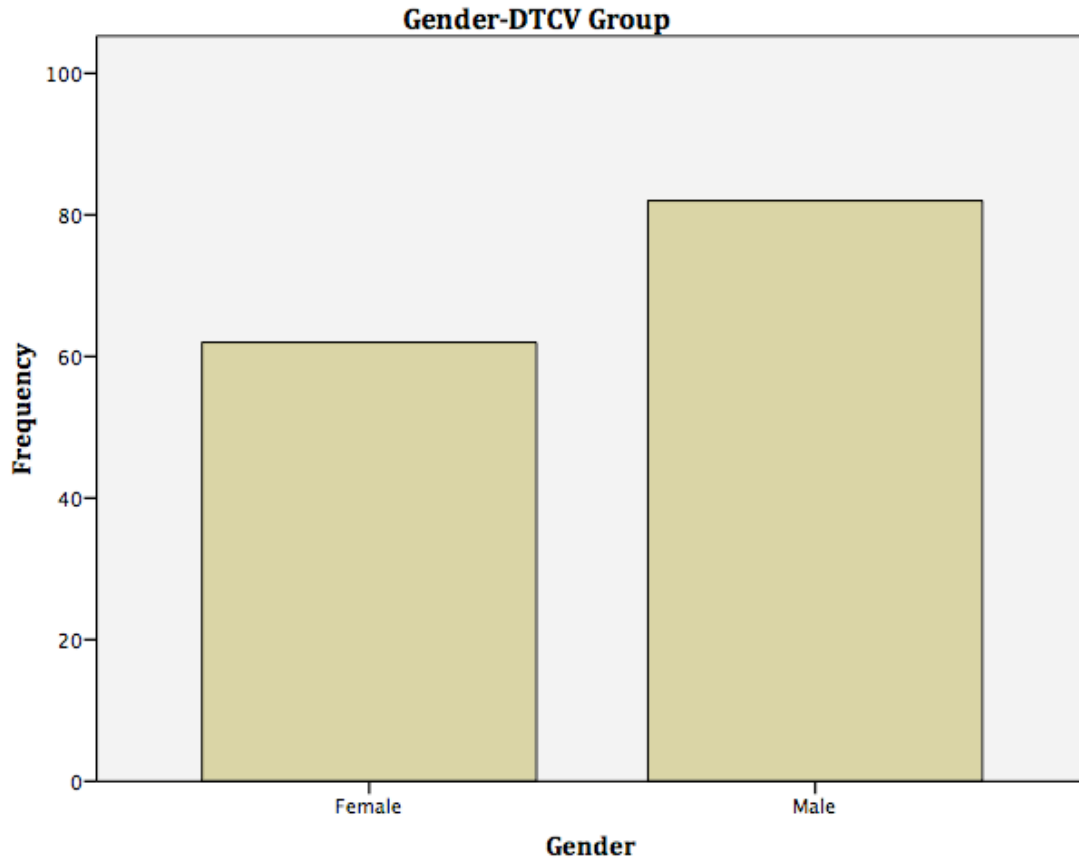


## E.2 Gender

**Table 15: Frequency Breakdown of Gender for DTCV Group**

|              | Frequency | Percent | Valid Percent | Cumulative Percent |
|--------------|-----------|---------|---------------|--------------------|
| Valid Female | 62        | 43.1    | 43.1          | 43.1               |
| Male         | 82        | 56.9    | 56.9          | 100.0              |
| Total        | 144       | 100.0   | 100.0         |                    |

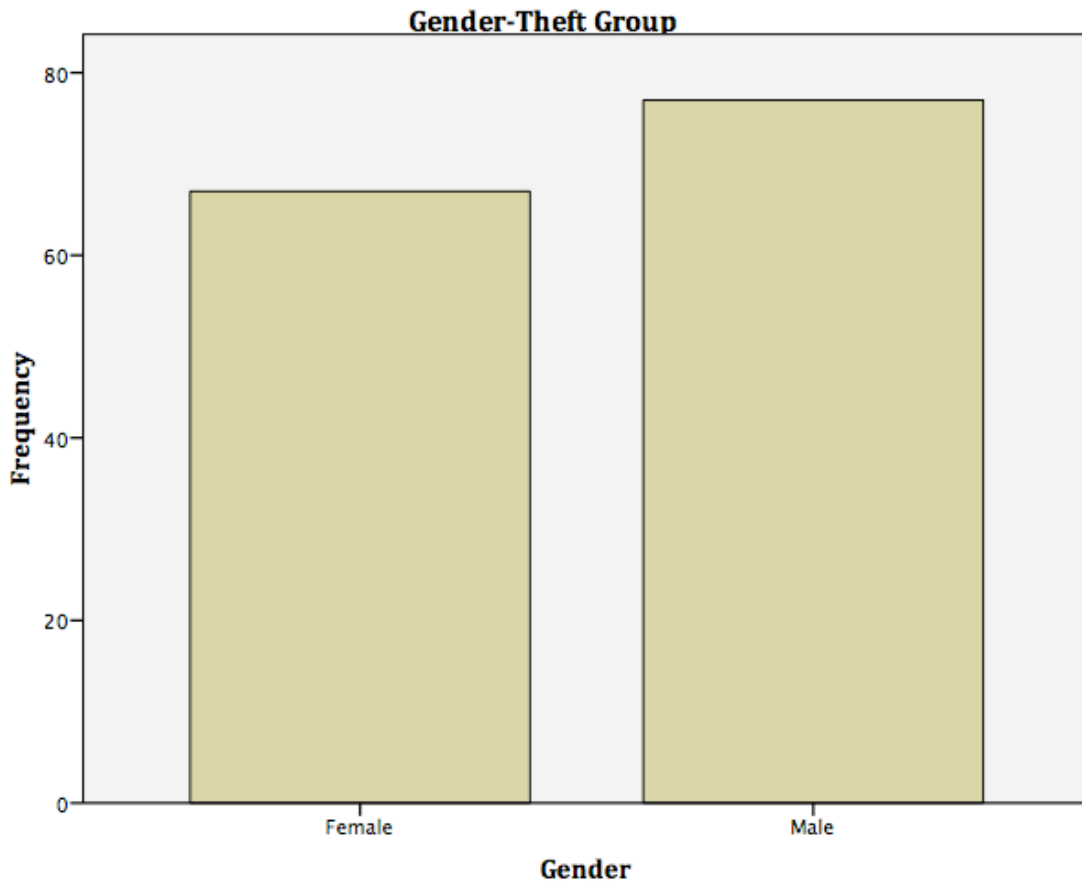
**Figure 13: Frequency Breakdown of Gender for DTCV Group**



**Table 16: Frequency Breakdown of Gender for Theft Group**

|              | Frequency | Percent | Valid Percent | Cumulative Percent |
|--------------|-----------|---------|---------------|--------------------|
| Valid Female | 67        | 46.5    | 46.5          | 46.5               |
| Male         | 77        | 53.5    | 53.5          | 100.0              |
| Total        | 144       | 100.0   | 100.0         |                    |

**Figure 14: Frequency Breakdown of Gender for Theft Group**

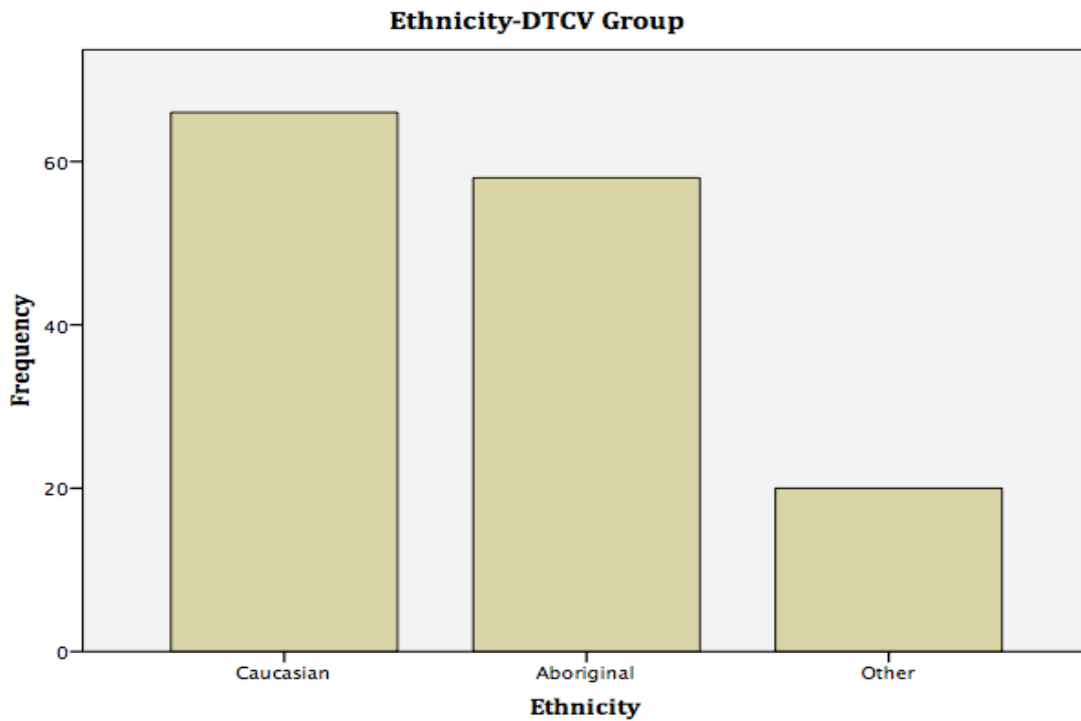


### E.3 Ethnicity

**Table 17: Frequency Breakdown of Ethnicity for DTCV Group**

|                 | Frequency | Percent | Valid Percent | Cumulative Percent |
|-----------------|-----------|---------|---------------|--------------------|
| Valid Caucasian | 66        | 45.8    | 45.8          | 45.8               |
| Aboriginal      | 58        | 40.3    | 40.3          | 86.1               |
| Other           | 20        | 13.9    | 13.9          | 100.0              |
| Total           | 144       | 100.0   | 100.0         |                    |

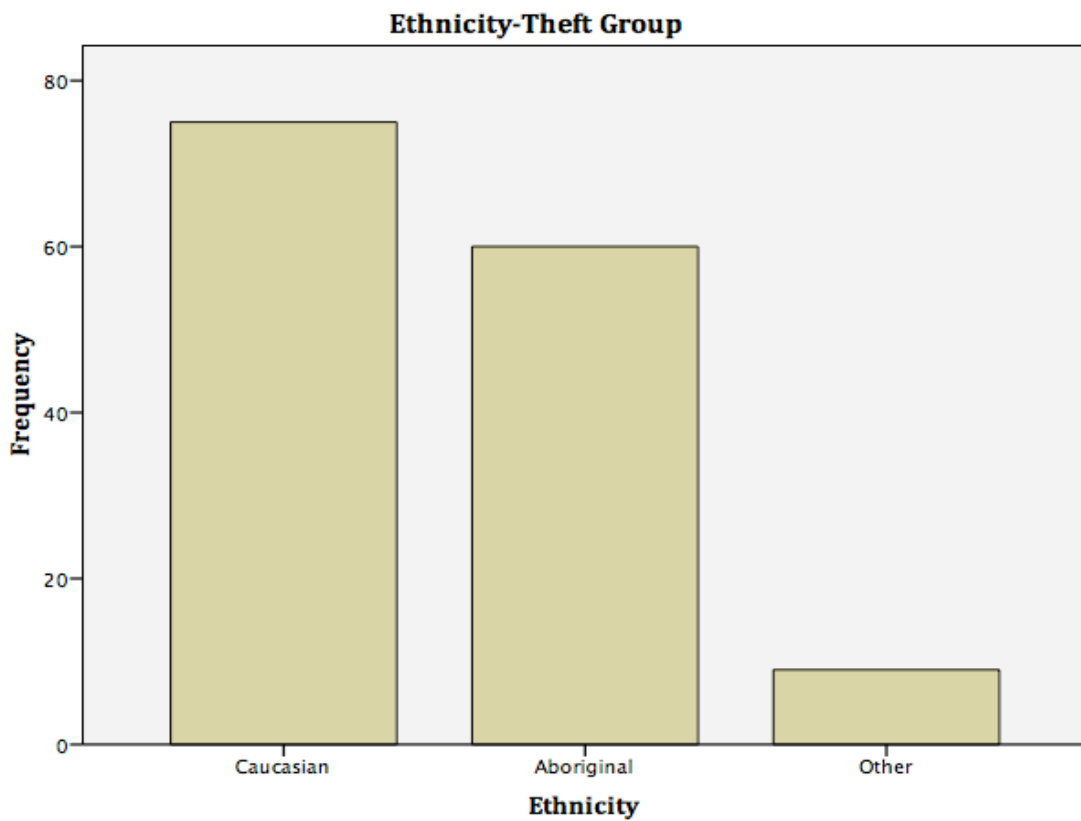
**Figure 15: Frequency Breakdown of Ethnicity for DTCV Group**



**Table 18: Frequency Breakdown of Ethnicity for Theft Group**

|       |            | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|------------|-----------|---------|---------------|--------------------|
| Valid | Caucasian  | 75        | 52.1    | 52.1          | 52.1               |
|       | Aboriginal | 60        | 41.7    | 41.7          | 93.8               |
|       | Other      | 9         | 6.3     | 6.3           | 100.0              |
|       | Total      | 144       | 100.0   | 100.0         |                    |

**Figure 16: Frequency Breakdown of Ethnicity for DTCV Group**

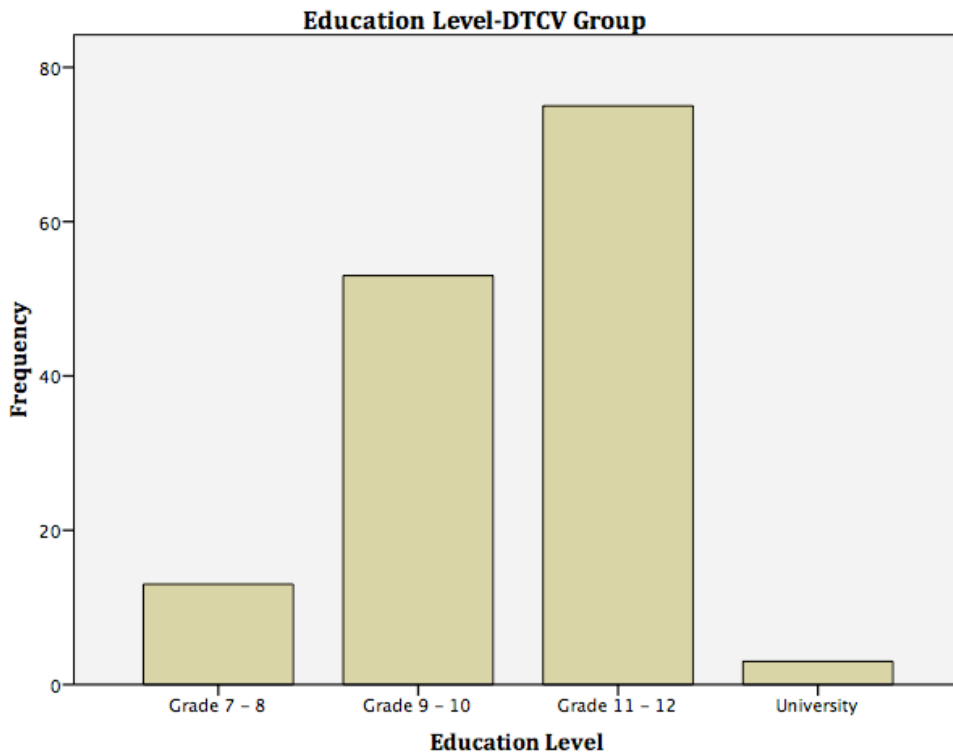


## E.4 Education Level

**Table 19: Frequency Breakdown of Education Level for DTCV Group**

|                   | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------------------|-----------|---------|---------------|--------------------|
| Valid Grade 7 - 8 | 13        | 9.0     | 9.0           | 9.0                |
| Grade 9 - 10      | 53        | 36.8    | 36.8          | 45.8               |
| Grade 11 - 12     | 75        | 52.1    | 52.1          | 97.9               |
| University        | 3         | 2.1     | 2.1           | 100.0              |
| Total             | 144       | 100.0   | 100.0         |                    |

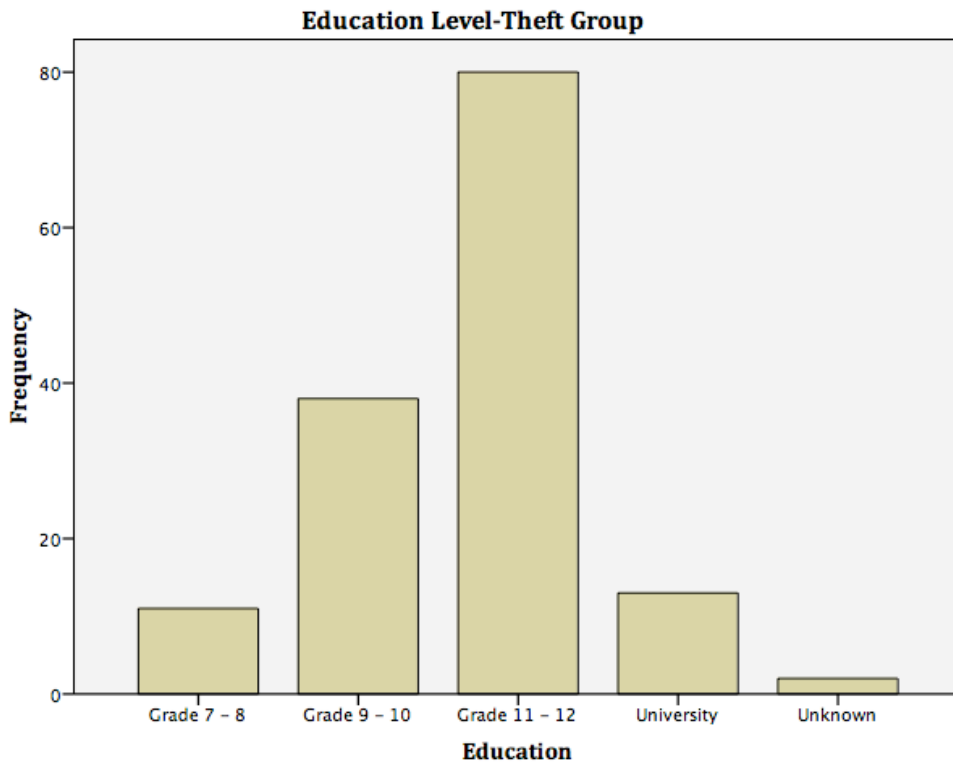
**Figure 17: Frequency Breakdown of Education Level for DTCV Group**



**Table 20: Frequency Breakdown of Education Level for Theft Group**

|                   | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------------------|-----------|---------|---------------|--------------------|
| Valid Grade 7 - 8 | 11        | 7.6     | 7.6           | 7.6                |
| Grade 9 - 10      | 38        | 26.4    | 26.4          | 34.0               |
| Grade 11 - 12     | 80        | 55.6    | 55.6          | 89.6               |
| University        | 13        | 9.0     | 9.0           | 98.6               |
| Unknown           | 2         | 1.4     | 1.4           | 100.0              |
| Total             | 144       | 100.0   | 100.0         |                    |

**Figure 18: Frequency Breakdown of Education Level for Theft Group**



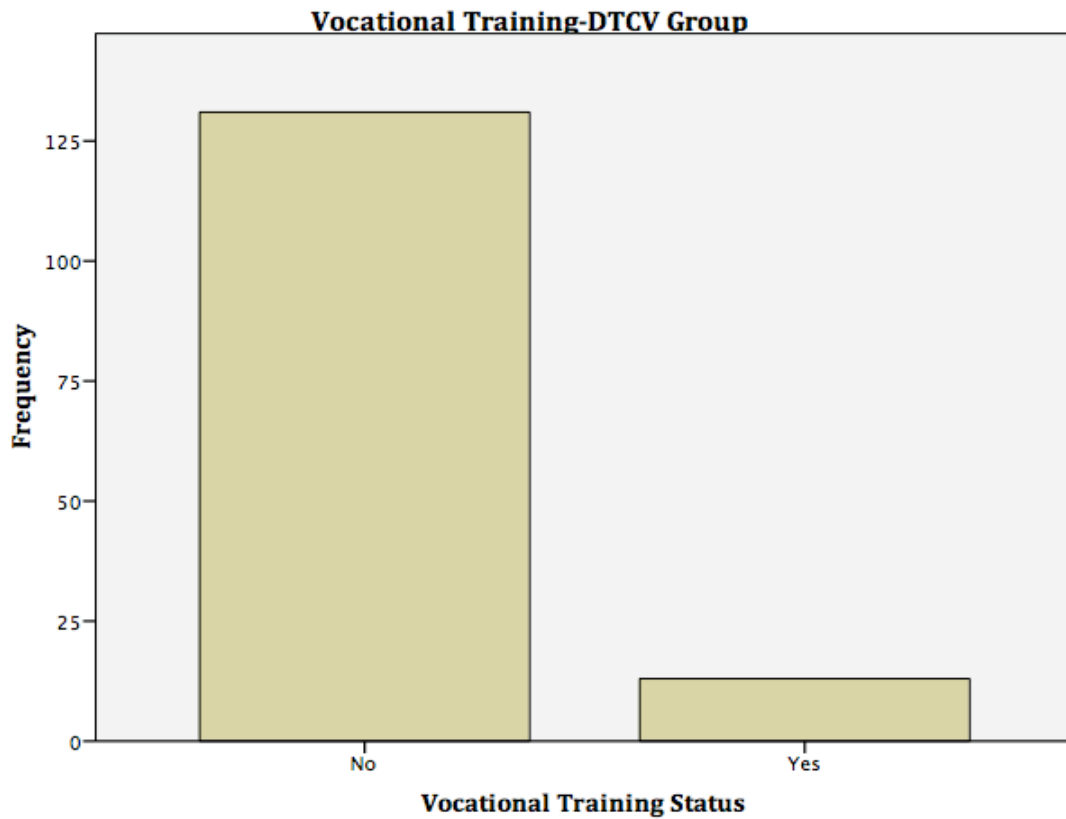


## E.5 Vocational Training

**Table 21: Frequency Breakdown of Vocational Training for DTCV Group**

|       |       | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-------|-----------|---------|---------------|--------------------|
| Valid | No    | 131       | 91.0    | 91.0          | 91.0               |
|       | Yes   | 13        | 9.0     | 9.0           | 100.0              |
|       | Total | 144       | 100.0   | 100.0         |                    |

**Figure 19: Frequency Breakdown of Vocational Training for DTCV Group**



**Table 22: Frequency Breakdown of Vocational Training for Theft Group**

|       |       | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-------|-----------|---------|---------------|--------------------|
| Valid | No    | 129       | 89.6    | 89.6          | 89.6               |
|       | Yes   | 15        | 10.4    | 10.4          | 100.0              |
|       | Total | 144       | 100.0   | 100.0         |                    |

**Figure 20: Frequency Breakdown of Vocational Training for Theft Group**



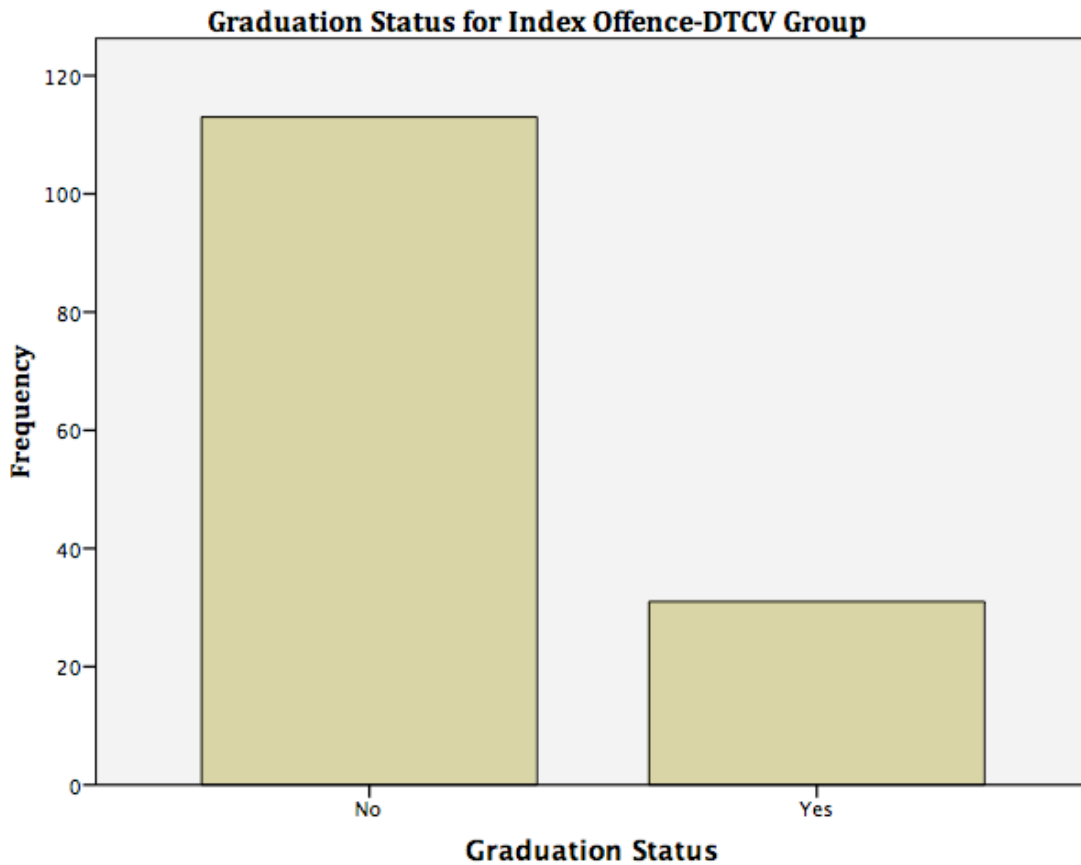
## E.6 Graduation Status

### *Graduation in Relation to Index Offence*

**Table 23: Frequency Breakdown of Graduation Status for Index Offence for DTCV Group**

|          | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------|-----------|---------|---------------|--------------------|
| Valid No | 113       | 78.5    | 78.5          | 78.5               |
| Yes      | 31        | 21.5    | 21.5          | 100.0              |
| Total    | 144       | 100.0   | 100.0         |                    |

**Figure 21: Frequency Breakdown of Graduation Status for Index Offence for DTCV Group**

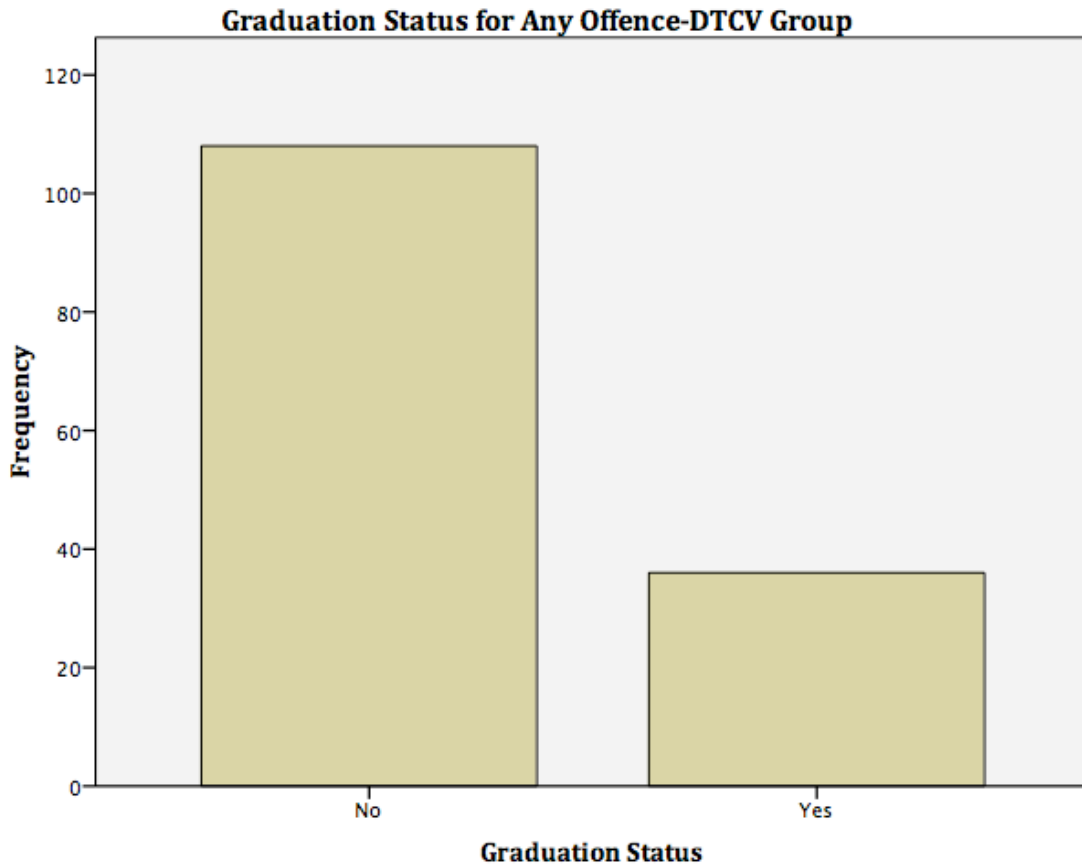


***Graduation in Relation to Any Offence***

**Table 24: Frequency Breakdown of Graduation Status for Any Offence for DTCV Group**

|       |       | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-------|-----------|---------|---------------|--------------------|
| Valid | No    | 108       | 75.0    | 75.0          | 75.0               |
|       | Yes   | 36        | 25.0    | 25.0          | 100.0              |
|       | Total | 144       | 100.0   | 100.0         |                    |

**Figure 22: Frequency Breakdown of Graduation Status for Any Offence for DTCV Group**



## Appendix F: Paired Sample Statistics

### F.1 Total MSP Claims

**Table 25: Paired Sample Statistics for Total MSP Claims**

|                                     | Mean  | N   | Std. Deviation | Std. Error Mean |
|-------------------------------------|-------|-----|----------------|-----------------|
| Pair 1 Theft_TotalMSP_preIndexDate  | 53.31 | 144 | 63.938         | 5.328           |
| DTCV_TotalMSP_preIndexDate          | 30.43 | 144 | 59.984         | 4.999           |
| Pair 2 Theft_TotalMSP_postIndexDate | 69.74 | 144 | 86.910         | 7.242           |
| DTCV_TotalMSP_postIndexDate         | 41.65 | 144 | 61.449         | 5.121           |
| Pair 3 Theft_TotalMSP_change        | 16.43 | 144 | 60.834         | 5.070           |
| DTCV_TotalMSP_change                | 11.22 | 144 | 62.587         | 5.216           |
| Pair 4 DTCV_TotalMSP_postIndexDate  | 41.65 | 144 | 61.449         | 5.121           |
| DTCV_TotalMSP_preIndexDate          | 30.43 | 144 | 59.984         | 4.999           |
| Pair 5 Theft_TotalMSP_postIndexDate | 69.74 | 144 | 86.910         | 7.242           |
| Theft_TotalMSP_preIndexDate         | 53.31 | 144 | 63.938         | 5.328           |

## F.2 Total Hospitalizations

**Table 26: Paired Sample Statistics for Total Hospitalizations**

|                                      | Mean | N   | Std. Deviation | Std. Error Mean |
|--------------------------------------|------|-----|----------------|-----------------|
| Pair 1 Theft_TotalHosp_preIndexDate  | .53  | 144 | 1.268          | .106            |
| DTCV_TotalHosp_preIndexDate          | .44  | 144 | 1.022          | .085            |
| Pair 2 Theft_TotalHosp_postIndexDate | .74  | 144 | 1.671          | .139            |
| DTCV_TotalHosp_postIndexDate         | .45  | 144 | 1.121          | .093            |
| Pair 3 Theft_TotalHosp_change        | .22  | 144 | 1.731          | .144            |
| DTCV_TotalHosp_change                | .01  | 144 | 1.071          | .089            |
| Pair 4 DTCV_TotalHosp_postIndexDate  | .45  | 144 | 1.121          | .093            |
| DTCV_TotalHosp_preIndexDate          | .44  | 144 | 1.022          | .085            |
| Pair 5 Theft_TotalHosp_postIndexDate | .74  | 144 | 1.671          | .139            |
| Theft_TotalHosp_preIndexDate         | .53  | 144 | 1.268          | .106            |

## F.3 MSP Claims-Methadone

**Table 27: Paired Sample Statistics for MSP Methadone Claims**

|                                    | Mean   | N   | Std. Deviation | Std. Error Mean |
|------------------------------------|--------|-----|----------------|-----------------|
| Pair 1 Theft_MSPMeth_preIndexDate  | 31.22  | 144 | 55.782         | 4.649           |
| DTCV_MSPMeth_preIndexDate          | 20.18  | 144 | 50.610         | 4.218           |
| Pair 2 Theft_MSPMeth_postIndexDate | 45.76  | 144 | 74.765         | 6.230           |
| DTCV_MSPMeth_postIndexDate         | 29.30  | 144 | 55.073         | 4.589           |
| Pair 3 Theft_MSPMeth_change        | 14.53  | 144 | 51.349         | 4.279           |
| DTCV_MSPMeth_change                | 9.1181 | 144 | 56.25224       | 4.68769         |
| Pair 4 DTCV_MSPMeth_postIndexDate  | 29.30  | 144 | 55.073         | 4.589           |
| DTCV_MSPMeth_preIndexDate          | 20.18  | 144 | 50.610         | 4.218           |
| Pair 5 Theft_MSPMeth_postIndexDate | 45.76  | 144 | 74.765         | 6.230           |
| Theft_MSPMeth_preIndexDate         | 31.22  | 144 | 55.782         | 4.649           |

#### F.4 MSP Claims-SUD

**Table 28: Paired Sample Statistics for MSP SUD Claims**

|                                   | Mean | N   | Std. Deviation | Std. Error Mean |
|-----------------------------------|------|-----|----------------|-----------------|
| Pair 1 Theft_MSPSUD_preIndexDate  | 2.61 | 144 | 5.302          | .442            |
| DTCV_MSPSUD_preIndexDate          | 1.10 | 144 | 2.128          | .177            |
| Pair 2 Theft_MSPSUD_postIndexDate | 2.27 | 144 | 4.165          | .347            |
| DTCV_MSPSUD_postIndexDate         | 1.97 | 144 | 3.189          | .266            |
| Pair 3 Theft_MSPSUD_change        | -.34 | 144 | 6.102          | .508            |
| DTCV_MSPSUD_change                | .87  | 144 | 3.406          | .284            |
| Pair 4 DTCV_MSPSUD_postIndexDate  | 1.97 | 144 | 3.189          | .266            |
| DTCV_MSPSUD_preIndexDate          | 1.10 | 144 | 2.128          | .177            |
| Pair 5 Theft_MSPSUD_postIndexDate | 2.27 | 144 | 4.165          | .347            |
| Theft_MSPSUD_preIndexDate         | 2.61 | 144 | 5.302          | .442            |

#### F.5 MSP Claims-MD

**Table 29: Paired Sample Statistics for MSP MD Claims**

|                                  | Mean | N   | Std. Deviation | Std. Error Mean |
|----------------------------------|------|-----|----------------|-----------------|
| Pair 1 Theft_MSPMD_preIndexDate  | 3.85 | 144 | 7.609          | .634            |
| DTCV_MSPMD_preIndexDate          | .90  | 144 | 2.929          | .244            |
| Pair 2 Theft_MSPMD_postIndexDate | 4.47 | 144 | 8.631          | .719            |
| DTCV_MSPMD_postIndexDate         | 1.17 | 144 | 2.596          | .216            |
| Pair 3 Theft_MSPMD_change        | .61  | 144 | 6.310          | .526            |
| DTCV_MSPMD_change                | .26  | 144 | 3.476          | .290            |
| Pair 4 DTCV_MSPMD_postIndexDate  | 1.17 | 144 | 2.596          | .216            |
| DTCV_MSPMD_preIndexDate          | .90  | 144 | 2.929          | .244            |
| Pair 5 Theft_MSPMD_postIndexDate | 4.47 | 144 | 8.631          | .719            |
| Theft_MSPMD_preIndexDate         | 3.85 | 144 | 7.609          | .634            |

## F.6 MSP Claims-Non-Psych

**Table 30: Paired Sample Statistics for MSP Non-Psych Claims**

|  | Mean  | N   | Std. Deviation | Std. Error Mean |
|--|-------|-----|----------------|-----------------|
| Pair 1 Theft_MSPNonPsych_preIndexDate  | 15.62 | 144 | 21.501         | 1.792           |
| DTCV_MSPNonPsych_preIndexDate          | 8.24  | 144 | 18.960         | 1.580           |
| Pair 2 Theft_MSPNonPsych_postIndexDate | 17.24 | 144 | 23.670         | 1.972           |
| DTCV_MSPNonPsych_postIndexDate         | 9.22  | 144 | 14.097         | 1.175           |
| Pair 3 Theft_MSPNonPsych_change        | 1.63  | 144 | 19.159         | 1.597           |
| DTCV_MSPNonPsych_change                | .97   | 144 | 16.632         | 1.386           |
| Pair 4 DTCV_MSPNonPsych_postIndexDate  | 9.22  | 144 | 14.097         | 1.175           |
| DTCV_MSPNonPsych_preIndexDate          | 8.24  | 144 | 18.960         | 1.580           |
| Pair 5 Theft_MSPNonPsych_postIndexDate | 17.24 | 144 | 23.670         | 1.972           |
| Theft_MSPNonPsych_preIndexDate         | 15.62 | 144 | 21.501         | 1.792           |

## F.7 MSP Claims-Total SUD Claims

**Table 31: Paired Sample Statistics for MSP Total SUD Claims**

|  | Mean    | N   | Std. Deviation | Std. Error Mean |
|--|---------|-----|----------------|-----------------|
| Pair 1 Theft_MSPTotalSUD_preIndexDate  | 33.8333 | 144 | 56.73284       | 4.72774         |
| DTCV_MSPTotalSUD_preIndexDate          | 21.2847 | 144 | 51.39857       | 4.28321         |
| Pair 2 Theft_MSPTotalSUD_postIndexDate | 48.0278 | 144 | 75.57999       | 6.29833         |
| DTCV_MSPTotalSUD_postIndexDate         | 31.2708 | 144 | 56.06193       | 4.67183         |
| Pair 3 Theft_MSPTotalSUD_change        | 14.1944 | 144 | 52.21208       | 4.35101         |
| DTCV_MSPTotalSUD_change                | 9.9861  | 144 | 56.88450       | 4.74037         |
| Pair 4 DTCV_MSPTotalSUD_postIndexDate  | 31.2708 | 144 | 56.06193       | 4.67183         |
| DTCV_MSPTotalSUD_preIndexDate          | 21.2847 | 144 | 51.39857       | 4.28321         |
| Pair 5 Theft_MSPTotalSUD_postIndexDate | 48.0278 | 144 | 75.57999       | 6.29833         |
| Theft_MSPTotalSUD_preIndexDate         | 33.8333 | 144 | 56.73284       | 4.72774         |



## F.8 Hospitalizations-SUD Claims

**Table 32: Paired Sample Statistics for Hospital SUD Claims**

|                                    | Mean | N   | Std. Deviation | Std. Error Mean |
|------------------------------------|------|-----|----------------|-----------------|
| Pair 1 Theft_HospSUD_preIndexDate  | .02  | 144 | .143           | .012            |
| DTCV_HospSUD_preIndexDate          | .05  | 144 | .361           | .030            |
| Pair 2 Theft_HospSUD_postIndexDate | .08  | 144 | .411           | .034            |
| DTCV_HospSUD_postIndexDate         | .03  | 144 | .203           | .017            |
| Pair 3 Theft_HospSUD_change        | .06  | 144 | .439           | .037            |
| DTCV_HospSUD_change                | -.02 | 144 | .344           | .029            |
| Pair 4 DTCV_HospSUD_postIndexDate  | .03  | 144 | .203           | .017            |
| DTCV_HospSUD_preIndexDate          | .05  | 144 | .361           | .030            |
| Pair 5 Theft_HospSUD_postIndexDate | .08  | 144 | .411           | .034            |
| Theft_HospSUD_preIndexDate         | .02  | 144 | .143           | .012            |

## F.9 Hospitalizations-Non-Psych Claims

**Table 33: Paired Sample Statistics for Hospital Non-Psych Claims**

|   | Mean | N   | Std. Deviation | Std. Error Mean |
|---|------|-----|----------------|-----------------|
| Pair 1 Theft_HospNonPsych_preIndexDate  | .51  | 144 | 1.263          | .105            |
| DTCV_HospNonPsych_preIndexDate          | .39  | 144 | .917           | .076            |
| Pair 2 Theft_HospNonPsych_postIndexDate | .65  | 144 | 1.615          | .135            |
| DTCV_HospNonPsych_postIndexDate         | .42  | 144 | 1.088          | .091            |
| Pair 3 Theft_HospNonPsych_change        | .14  | 144 | 1.696          | .141            |
| DTCV_HospNonPsych_change                | .03  | 144 | 1.060          | .088            |
| Pair 4 DTCV_HospNonPsych_postIndexDate  | .42  | 144 | 1.088          | .091            |
| DTCV_HospNonPsych_preIndexDate          | .39  | 144 | .917           | .076            |
| Pair 5 Theft_HospNonPsych_postIndexDate | .65  | 144 | 1.615          | .135            |
| Theft_HospNonPsych_preIndexDate         | .51  | 144 | 1.263          | .105            |

## F.10 Injury and Poisoning

**Table 34: Paired Sample Statistics for MSP Injury and Poisoning Claims**

|                                      | Mean | N   | Std. Deviation | Std. Error Mean |
|--------------------------------------|------|-----|----------------|-----------------|
| Pair 1 Theft_MSPInjury_preIndexDate  | 1.61 | 144 | 3.297          | .275            |
| DTCV_MSPInjury_preIndexDate          | 1.18 | 144 | 3.833          | .319            |
| Pair 2 Theft_MSPInjury_postIndexDate | 2.06 | 144 | 4.583          | .382            |
| DTCV_MSPInjury_postIndexDate         | .93  | 144 | 2.527          | .211            |
| Pair 3 Theft_MSPInjury_change        | .44  | 144 | 4.568          | .381            |
| DTCV_MSPInjury_change                | -.25 | 144 | 3.501          | .292            |
| Pair 4 DTCV_MSPInjury_postIndexDate  | .93  | 144 | 2.527          | .211            |
| DTCV_MSPInjury_preIndexDate          | 1.18 | 144 | 3.833          | .319            |
| Pair 5 Theft_MSPInjury_postIndexDate | 2.06 | 144 | 4.583          | .382            |
| Theft_MSPInjury_preIndexDate         | 1.61 | 144 | 3.297          | .275            |

## F.11 HIV

**Table 35: Paired Sample Statistics for MSP HIV Claims**

|                                   | Mean | N   | Std. Deviation | Std. Error Mean |
|-----------------------------------|------|-----|----------------|-----------------|
| Pair 1 Theft_MSPHIV_preIndexDate  | .40  | 144 | 1.678          | .140            |
| DTCV_MSPHIV_preIndexDate          | .31  | 144 | 2.029          | .169            |
| Pair 2 Theft_MSPHIV_postIndexDate | .63  | 144 | 2.631          | .219            |
| DTCV_MSPHIV_postIndexDate         | .93  | 144 | 6.275          | .523            |
| Pair 3 Theft_MSPHIV_change        | .24  | 144 | 1.706          | .142            |
| DTCV_MSPHIV_change                | .63  | 144 | 4.702          | .392            |
| Pair 4 DTCV_MSPHIV_postIndexDate  | .93  | 144 | 6.275          | .523            |
| DTCV_MSPHIV_preIndexDate          | .31  | 144 | 2.029          | .169            |
| Pair 5 Theft_MSPHIV_postIndexDate | .63  | 144 | 2.631          | .219            |
| Theft_MSPHIV_preIndexDate         | .40  | 144 | 1.678          | .140            |

## F.12 Pneumonia and Influenza

**Table 36: Paired Sample Statistics for MSP Pneumonia and Influenza Claims**

|                                    | Mean | N   | Std. Deviation | Std. Error Mean |
|------------------------------------|------|-----|----------------|-----------------|
| Pair 1 Theft_MSPpneu_preIndexDate  | .35  | 144 | 2.546          | .212            |
| DTCV_MSPpneu_preIndexDate          | .18  | 144 | .921           | .077            |
| Pair 2 Theft_MSPpneu_postIndexDate | .38  | 144 | 1.487          | .124            |
| DTCV_MSPpneu_postIndexDate         | .41  | 144 | 1.657          | .138            |
| Pair 3 Theft_MSPpneu_change        | .03  | 144 | 2.911          | .243            |
| DTCV_MSPpneu_change                | .23  | 144 | 1.175          | .098            |
| Pair 4 DTCV_MSPpneu_postIndexDate  | .41  | 144 | 1.657          | .138            |
| DTCV_MSPpneu_preIndexDate          | .18  | 144 | .921           | .077            |
| Pair 5 Theft_MSPpneu_postIndexDate | .38  | 144 | 1.487          | .124            |
| Theft_MSPpneu_preIndexDate         | .35  | 144 | 2.546          | .212            |

## F.13 Neoplasms

**Table 37: Paired Sample Statistics for MSP Neoplasm Claims**

|                                    | Mean | N   | Std. Deviation | Std. Error Mean |
|------------------------------------|------|-----|----------------|-----------------|
| Pair 1 Theft_MSPNeop_preIndexDate  | .03  | 144 | .203           | .017            |
| DTCV_MSPNeop_preIndexDate          | .03  | 144 | .203           | .017            |
| Pair 2 Theft_MSPNeop_postIndexDate | .04  | 144 | .287           | .024            |
| DTCV_MSPNeop_postIndexDate         | .10  | 144 | .463           | .039            |
| Pair 3 Theft_MSPNeop_change        | .01  | 144 | .313           | .026            |
| DTCV_MSPNeop_change                | .07  | 144 | .483           | .040            |
| Pair 4 DTCV_MSPNeop_postIndexDate  | .10  | 144 | .463           | .039            |
| DTCV_MSPNeop_preIndexDate          | .03  | 144 | .203           | .017            |
| Pair 5 Theft_MSPNeop_postIndexDate | .04  | 144 | .287           | .024            |
| Theft_MSPNeop_preIndexDate         | .03  | 144 | .203           | .017            |

## F.14 Endocrine, Nutritional and Metabolic Disease and Immunity Disorders

**Table 38: Paired Sample Statistics for MSP Endocrine, Nutritional and Metabolic Disease and Immunity Disorder Claims**

|                                    | Mean | N   | Std. Deviation | Std. Error Mean |
|------------------------------------|------|-----|----------------|-----------------|
| Pair 1 Theft_MSPEndo_preIndexDate  | .17  | 144 | 1.450          | .121            |
| DTCV_MSPEndo_preIndexDate          | .10  | 144 | .629           | .052            |
| Pair 2 Theft_MSPEndo_postIndexDate | .12  | 144 | .609           | .051            |
| DTCV_MSPEndo_postIndexDate         | .03  | 144 | .165           | .014            |
| Pair 3 Theft_MSPEndo_change        | -.06 | 144 | 1.326          | .111            |
| DTCV_MSPEndo_change                | -.07 | 144 | .587           | .049            |
| Pair 4 DTCV_MSPEndo_postIndexDate  | .03  | 144 | .165           | .014            |
| DTCV_MSPEndo_preIndexDate          | .10  | 144 | .629           | .052            |
| Pair 5 Theft_MSPEndo_postIndexDate | .12  | 144 | .609           | .051            |
| Theft_MSPEndo_preIndexDate         | .17  | 144 | 1.450          | .121            |

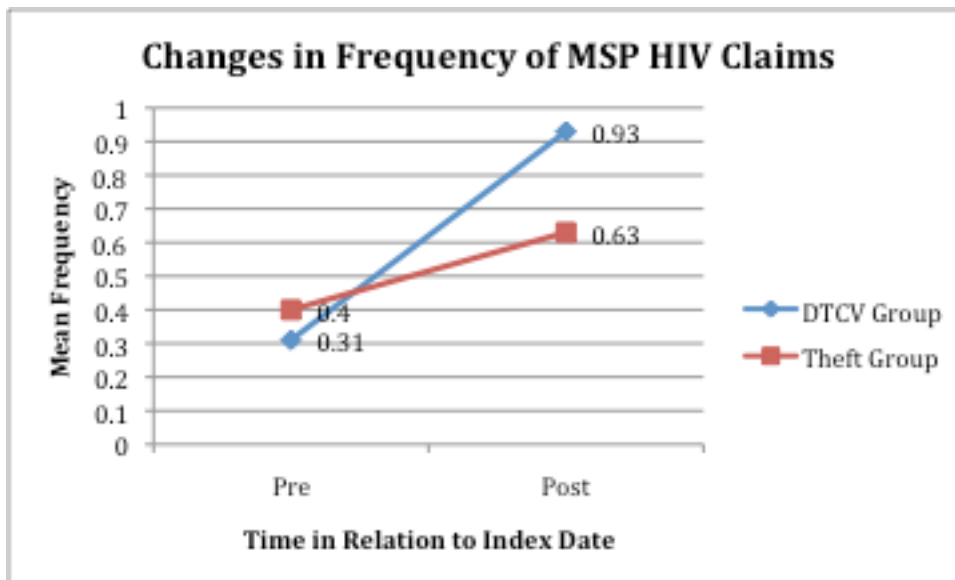
## Appendix G: MSP Claims for Specific Diagnoses

### G.1 HIV

Table 39: Paired T-Tests for MSP HIV Claims

|        | Paired Differences |                |                 |   |       | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |       |     |                 |
| Pair 1 | .090               | 2.678          | .223            | -.351                                     | .531  | .404  | 143 | .686            |
| Pair 2 | -.299              | 6.891          | .574            | -1.434                                    | .836  | -.520 | 143 | .604            |
| Pair 3 | -.389              | 5.032          | .419            | -1.218                                    | .440  | -.927 | 143 | .355            |
| Pair 4 | .625               | 4.702          | .392            | -.150                                     | 1.400 | 1.595 | 143 | .113            |
| Pair 5 | .236               | 1.706          | .142            | -.045                                     | .517  | 1.661 | 143 | .099            |

Figure 23: Changes in Frequency of MSP HIV Claims

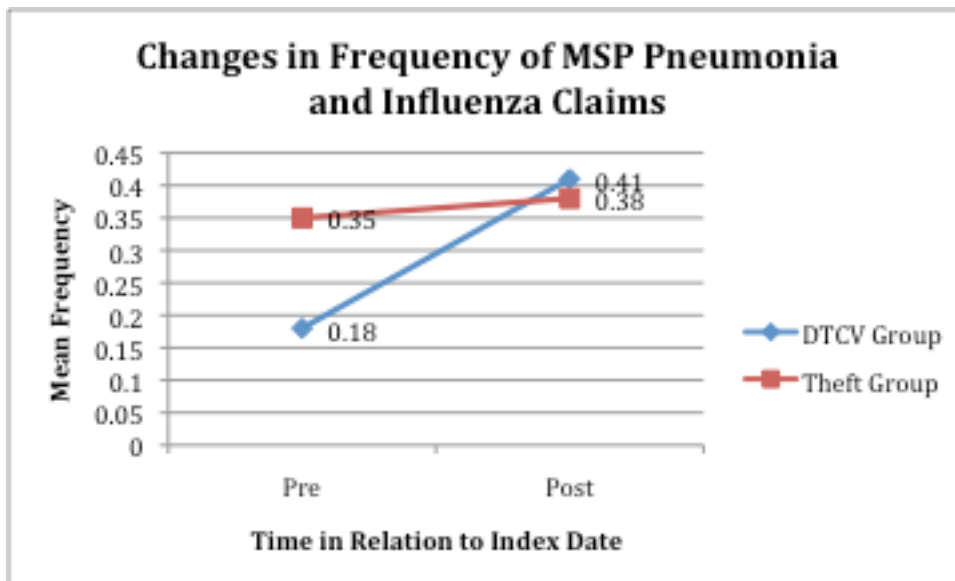


## G.2 Pneumonia and Influenza

**Table 40: Paired T-Tests for MSP Pneumonia and Influenza Claims**

|        | Paired Differences |                |                 |   |       | t     | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|-------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |       |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |       |     |                 |
| Pair 1 | .174               | 2.705          | .225            | -.272                                     | .619  | .770  | 143 | .443            |
| Pair 2 | -.028              | 2.244          | .187            | -.397                                     | .342  | -.149 | 143 | .882            |
| Pair 3 | -.201              | 3.099          | .258            | -.712                                     | .309  | -.780 | 143 | .437            |
| Pair 4 | .229               | 1.175          | .098            | .036                                      | .423  | 2.340 | 143 | .021            |
| Pair 5 | .028               | 2.911          | .243            | -.452                                     | .507  | .115  | 143 | .909            |

**Figure 24: Changes in Frequency of MSP Pneumonia and Influenza Claims**

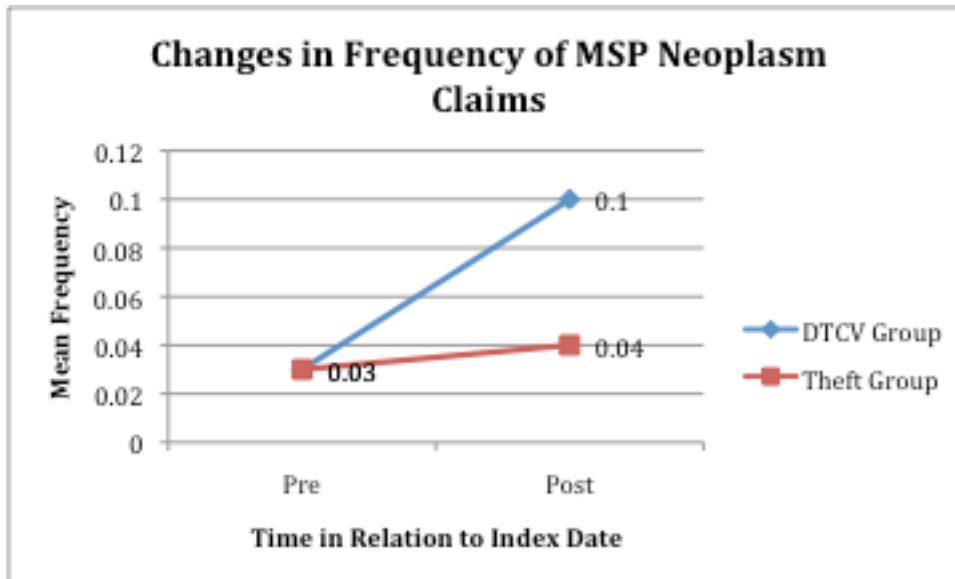


### G.3 Neoplasms

**Table 41: Paired T-Tests for MSP Neoplasm Claims**

|        | Paired Differences |                |                 |   |       | t      | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|--------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |        |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |        |     |                 |
| Pair 1 | .000               | .264           | .022            | -.044                                     | .044  | .000   | 143 | 1.000           |
| Pair 2 | -.056              | .552           | .046            | -.146                                     | .035  | -1.208 | 143 | .229            |
| Pair 3 | -.056              | .589           | .049            | -.153                                     | .041  | -1.132 | 143 | .259            |
| Pair 4 | .069               | .483           | .040            | -.010                                     | .149  | 1.727  | 143 | .086            |
| Pair 5 | .014               | .313           | .026            | -.038                                     | .065  | .533   | 143 | .595            |

**Figure 25: Changes in Frequency of MSP Neoplasm Claims**

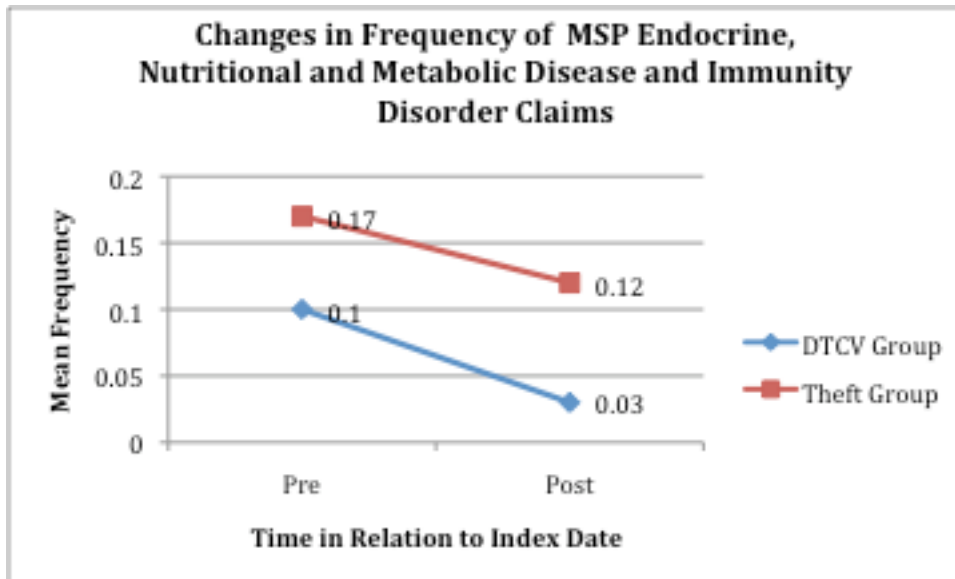


## G.4 Endocrine, Nutritional and Metabolic Disease and Immunity Disorders

**Table 42: Paired T-Tests for MSP Endocrine, Nutritional and Metabolic Disease and Immunity Disorder Claims**

|        | Paired Differences |                |                 |   |       | t      | df  | Sig. (2-tailed) |
|--------|--------------------|----------------|-----------------|---|-------|--------|-----|-----------------|
|        |                    |                |                 | 95% Confidence Interval of the Difference |       |        |     |                 |
|        | Mean               | Std. Deviation | Std. Error Mean | Lower                                     | Upper |        |     |                 |
| Pair 1 | .076               | 1.591          | .133            | -.186                                     | .339  | .576   | 143 | .566            |
| Pair 2 | .090               | .636           | .053            | -.014                                     | .195  | 1.704  | 143 | .091            |
| Pair 3 | .014               | 1.453          | .121            | -.225                                     | .253  | .115   | 143 | .909            |
| Pair 4 | -.069              | .587           | .049            | -.166                                     | .027  | -1.419 | 143 | .158            |
| Pair 5 | -.056              | 1.326          | .111            | -.274                                     | .163  | -5.03  | 143 | .616            |

**Figure 26: Changes in Frequency of MSP Endocrine, Nutritional and Metabolic Disease and Immunity Disorder Claims**





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