Can participation in Drug Treatment Courts reduce emergency department use? An evaluation.

By

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A Thesis Submitted in Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

In

The Faculty of Social Science and Humanities

Criminology Program

University of Ontario Institute of Technology

August 2015

Abstract

Drug treatment court evaluations often measure criminal recidivism. Further research is required to reflect any additional social benefits that may transpire from participation in this diversion program. To expand drug treatment court evaluations, the relationship between drug abuse and the use of emergency department services is considered. This study tests which participants' characteristics predict successful completion of Durham's Drug Treatment and Mental Health Court and if participation can reduce emergency department use. Results from Hypothesis One suggest that education, marital status and number of days in the program are significant predictors of program completion. Results from the second hypothesis confirm that number of emergency department visits while enrolled in drug treatment court has a significant positive relationship with emergency department use one year following programming. Recommendations to address drug treatment court participants' ongoing use of emergency department services and areas for future research are discussed.

Key words: Drug treatment court, outcomes, program completion, emergency department

Acknowledgments

I would like to thank my thesis supervisor, Dr. Hannah Scott, for her assistance and dedication over the last two years. Dr. Scott shared an abundance of knowledge with me regarding community research. Without her ongoing support, I would have not been able to complete my thesis. I thank her for providing me with reassurance throughout this entire process and for believing in my abilities.

To my committee members, Dr. Liqun Cao and Dr. Toba Bryant, I would like to thank them for dedicating their time and effort to this thesis. Dr. Cao's expertise of quantitative analysis does not go unnoticed and I continue to benefit from his shared skills. I recognize his astonishing ability to keep me focused on the project at hand and redirection when I would attempt to create additional projects.

I would like to thank Allison Perrie-Radoslovich and Jen Lysay from Pinewood Centre of Lakeridge Health for their efforts throughout this process. Additionally, the staff at Pinewood Centre, Centre Street location, provided me with office space to collect data. Justice Esther Rosenberg and Crown Attorney Jocelyne Boissonneault understood the importance of having Durham's Drug Treatment and Mental Health Court evaluated and made sure the research process continued despite any road blocks. To all members of Durham's Drug Treatment and Mental Health Court thank you for welcoming my presence as a researcher.

To my loving partner, son, parents, siblings and closest friends, I would have never survived this journey without their ongoing support and motivation. I sincerely apologize for bringing them on this roller coaster ride, but I assure them that it was worth the sweat and tears.

Dedication

       I dedicate this thesis to my Nana, Jean Middleton, whom I lost while on this journey. All of this hard work was completed for her as I promised to never give up on graduate school despite tempting employment opportunities that surfaced. I hope you're dancing in the sky my beautiful angel.

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Chapter 1: Introduction

Diversion programs in the criminal justice system (CJS) can often be more effective than exposure to the traditional and harsher elements of incarceration. Drug treatment courts (DTC) are mandated as a CJS diversion program which uses therapeutic jurisprudence (TJ) to address underlying health concerns that may motivate criminal behaviour. Health practitioners, court officials and government bodies understand the CJS and Health Care System (HCS) operate at significant financial costs. Drug abusers are disproportionately housed in prisons and this population is also frequent users of emergency department (ED) services for a number of reasons. Use of ED services by drug abusers is related to a number of co-occurring disorders (Schildhaus, Stocks, Santora & Smith, 2013). Therefore, diversion programs that want to ensure the CJS and HCS are being used appropriately and efficiently should continue to be implemented. The present thesis seeks to study which participants' characteristics predict completion of Durham's Drug Treatment and Mental Health Court (DDT&MHC) and whether participation reduces the use of ED services.

The relationship between drug abuse and criminal activity is well documented, suggesting that drug abuse can be a motivator for crime (Goldstein, 1985). As a response to the overwhelming number of drug offenders who enter the CJS, combined with the associated financial costs, the first specialized DTC was introduced in Miami, Florida, in 1989 (Stinchcomb, 2010). Over the past twenty years, DTC programs have become a popular alternative to incarceration. The conceptual foundation of the DTC approach is therapeutic jurisprudence (TJ). Therapeutic jurisprudence is understood as the equilibrium between treatment and punishment as a means to address the psychological needs of drug dependent offenders (Lessenger & Roperd, 2007). Drug treatment courts can reduce drug abuse and criminal behaviours which may result in a reduction in financial costs. To end the cycle of drug

abuse and criminal behaviours, DTC programs divert drug offenders out of the traditional court system and into a treatment based program.

There are numerous studies that quantify DTC participants' criminal recidivism (Gallagher, 2014; Heck, Roussell & Culhane, 2008; Krebs, Lindquist, Koetse & Lattimore, 2007; Latimer, Morton-Bourgon & Chretien, 2006; Spohn, Piper, Martin & Frenzel, 2001). These evaluations have documented mixed results. However, by using meta-analytic methods, Wilson, Mitchell and Mackenzie (2006) state that typically drug offenders who participate in DTC are less likely to reoffend than similar offenders sentenced in the traditional court system. Previous DTC evaluations often support the programs ability to prevent and/or reduce future involvement in the CJS.

If DTC is successful, there should be a reduction in criminal recidivism. A reduction in criminal activities can minimize financial costs related to future law enforcement services. The annual Canadian financial costs associated with alcohol and illicit drug abuse are estimated at a massive $23 billion and just under half of these costs, $9.8 billion, include law enforcement and health care services (Brubacher et al., 2008). Drug offenders are increasingly and disproportionately represented in the CJS. The literature claims that DTC can reduce reoffending and can be a cost effective alternative.

In addition to the relationship between drug abuse and crime, research indicates that the total number of substance abusers using ED services are growing at a steady rate (Slade, Dixon & Semmel, 2010; Wu et al., 2012). Substance abusers whose choice of drug is cocaine (Cunningham et al., 2009; Fortney, Tripathi, Walton, Cunningham & Booth, 2011; Lee, Vivier & Diercks, 2009; Thapa et al., 2008), methamphetamine (Lee et al., 2009) ecstasy (Halpern etl al., 2010) or opioids (Davis, Severtson, Bucher-Bartelson & Dart, 2014; Unick, Rosenblum, Mars & Ciccarone, 2013) frequently use ED services as their first means for health care rather

than seeking treatment from a family physician. The increase in substance abusers who visit the

ED also results in higher average health care costs because of patients who require acute

stabilization (Slade et al., 2010). The ongoing use of ED services by substance abusers can be a

result of patient related factors, chronic disease related factors and/or system related factors

(Cederbaum, Guerrero, Mitchell & Kim, 2014). The same authors argue that understanding the

ways that community based substance abuse treatment facilities may reduce financial costs is

imperative.

Drug treatment courts could potentially be a program which reduces substance abusers'

use of ED services. However, research has yet to determine the relationship between DTC

participants and their use of ED services. Going forward, DTC evaluations would benefit from

measuring the program's potential ability to reduce both criminal justice and health care costs.

This study seems to be the first attempt to link DTC participation to changes in the use of ED

services. Connecting these two concepts appears to be a unique contribution to the literature as it

represents an expansion to typical impact evaluations that measure criminal recidivism. This

impact evaluation explores additional social impacts which DTC programs can contribute.

Interlinking completion of DTC to participants' ED use may highlight ways that DTC programs

can address this relationship and potentially save additional government funding in the near

future. The current study proposes the following two research questions: (1) "What participants'

characteristics predict successful completion of Durham's Drug Treatment and Mental Health

Court (DDT&MHC)" and (2) "Does participation in DDT&MHC reduce participants' use of ED

services?" This study will specifically assess DDT&MHC participants' program completion

and involvement with Lakeridge Health's ED during and post engagement in DTC with the

hope of reporting a reduction in the use of services. These findings will advance DTC literature

because prior studies have not evaluated the potential changes in participants' use of ED services.

This thesis is divided into six parts. Chapter one outlines the research questions and highlights the current gap in DTC literature and outlines DTC programs. Chapter two reviews the literature on drug abuse and crime, DTC programs and drug abuse and the use of ED services. Chapter three describes the research design, sources, sampling, variables, missing data and the statistical model used in the analyses. Chapter four reports the results. Chapter five discusses the current findings in relation to the previous literature that is reviewed and suggests DTC and policy implications. Chapter six concludes the thesis while directing future research on DTC impact evaluations. Prior to discussing the relationship between drug abuse and crime, as well as, previous research of the effects of DTC programs, this diversion program is outlined in detail.

A New Drug Control Strategy: Drug Treatment Courts

By the late 1980s, drug-addicted offenders were clogging the CJS, from being arrested to incarcerated (Lurigio, 2008). As a result of frustration with drug crimes and the failure of punitive drug legislation, a diversionary treatment court was designed and implemented in 1989 in Miami, Florida (Jensen, Parsons & Mosher, 2007). This program is referred to as drug treatment court. Lurigio (2008) argues that DTC is the most popular and widely adopted specialized drug court in the United States. Jenson at al. (2007) believe that DTC has earned national support. In 1998, Canada implemented their first DTC in Toronto and there are currently an additional five federally funded DTC programs operating in Vancouver, Edmonton, Winnipeg, Ottawa and Regina. Nolan (2001) claims the rapid expansion of DTC programs across the world has led to the phenomenon being labelled as a movement and a revolution in

the CJS. A movement is defined as collective social behaviours seeking to effect change from outside the political process (Nolan, 2001). The same authors assert that the social movement of DTC is different than traditional movements because the major agents of change are the political actors themselves. Thus, the revelation of DTC programs is not occurring outside of the political process. Political actors have begun to act and move towards treatment based mechanisms to address the relationship between drug abuse and crime.

Drug Treatment Court Goals and Principles

The goal of DTC in the United States and Canada is to break the cycle of drug abuse and criminal recidivism, with the desire to reduce the overreliance on the costly prison system (Lessenger & Roperd, 2007). To reduce drug crimes, participants of DTC are expected to become and remain clean from their problematic substance(s) and develop or re-establish themselves as productive members of society who obey the law (Lessenger & Roperd, 2007). Advancing into productive members of society is difficult to conceptualize because productivity varies among participants. However, productivity is evaluated through participants' stability, which Latimer et al. (2006) define as demonstrating control over their drug abuse and obtaining safe housing, employment, volunteer work and/or vocational skills training.

In 1997, an American non-profit organization, National Association of Drug Court Professionals (NADCP) identified how DTC programs should operate to be successful. The association had a vision to implement DTC programs into all major legal systems across the world. The NADCP (n.d.) defined 13 key principles, now internationally recognized, for court-directed treatment and rehabilitation programs. As noted on the NADCP (n.d., para. 5-13) website located under the heading 13 Key Principles for Court-directed Treatment and Rehabilitation Programmes, the principles are listed below:

1. The programs integrate substance dependency treatment services with justice system case processing.

2. Using a non-adversarial approach, prosecution and defense lawyers promote public safety while protecting offenders' due process rights.

3. Eligible offenders are identified early and promptly integrate into the program.

4. The programs ensure access to a continuum of substance dependency treatment and other rehabilitation services.

5. Compliance is objectively monitored by frequent substance testing.

6. A coordinated strategy governs responses of the court to program non-compliance (and compliance) by offenders.

7. Ongoing judicial interaction with each offender in a program is essential.

8. Monitoring and evaluation measure the achievement of program goals and gauge effectiveness.

9. Continuing interdisciplinary education promotes effective planning, implementation, and operations of these court-directed programs.

10. Forging partnerships among courts directing treatment programs, public agencies, and community-based organizations generates local support and enhances program effectiveness.

11. Ongoing case management includes the social support necessary to achieve social reintegration.

12. There is appropriate flexibility in adjusting program content, including incentives and sanctions to better achieve program results with particular groups, such as women, indigenous people and minority ethnic groups.

13. Post treatment and after-care services should be established in order to enhance long term

program effects.

Professional Members of Drug Treatment Court

Drug treatment court programs require a diverse and collaborative team of professionals

to successfully decrease and over time eliminate participants' drug abuse, reduce criminal

recidivism and establish productive members of society. The steering committee includes

community partners and stakeholders within a particular jurisdiction who participate in the

formative negotiations for DTC (Hardin & Fox, 2011). The same authors (2011) argue that DTC

programs require the explicit buy-in and support of political and community leaders. The

authors also recommend the steering committee meet on a quarterly basis to evaluate the

program's effectiveness and develop or refurbish policies and procedures.

In contrast to the steering committee, the DTC team is defined as a group of

professionals responsible for delegating the operations of treatment, court proceedings and

supervisory interventions (Hardin & Fox, 2011). Drug treatment court teams include judges,

crown attorneys, program coordinators, defense lawyers (Mackinem & Higgins, 2008), mental

health and substance abuse treatment providers, social service providers (Broadus, 2009), law

enforcement officials (Carey, Pukstas, Waller & Finigan, 2008), probation services and program

directors (Hardin & Fox, 2011). Carey and colleagues (2008) advise that if any professionals are

regularly absent the effectiveness of DTC could decrease.

Key Characteristics and Processes of Drug Treatment Court

Although DTC programs may vary, across Canada the courts typically share several key

characteristics (Krebs et al. 2007). To be considered for DTC, participants have to complete an

application that is screened by crown attorneys. In some cases, defense counsels may refer

clients to the program. A referral for DTC includes determining eligible offences and who will

be considered appropriate candidates (Brown & Gassman, 2013). To be eligible, participants cannot have committed any previous violent offences and must demonstrate that he/she has an addiction issue that is directly or indirectly related to their criminal activity. Roper and Lessenger (2007) include a list of additional criteria that may exclude an offender, having a history of sex offences, violent offences and possession of dangerous weapons. Based on applicants' criminal record, crown attorneys decide if clients will be considered further.

If applicants are considered suitable, prior to entry into the program there are mandatory requirements that need to be met depending on the type of DTC model. Harding and Fox (2009) suggest that DTC programs are structured based on one of the following models: pre-plea, post-plea, diversion with stipulated facts, post-adjudication probation and mixed models. The two most common DTC models are post-plea and pre-plea/deferred prosecution (Franco, 2010) which determine the overall amount of leverage the court will possess (Longshore, Turner, Wenzel, Morral, Harrell, McBride & Iguchi., 2001). Longshore et al. (2001) define leverage as the nature of consequences faced by participants who are entering DTC.

The *post-plea model* requires participants to enter a guilty plea prior to being introduced into the program. When a guilty plea is entered prior to commencing programming it is then held in abeyance (Hardin & Fox, 2009). Entering a guilty plea results in a mandatory sentence hearing. However, with successful completion of the program, participants can face lighter sentences such as probation compared to incarceration. Alternatively, participants may have the opportunity to withdraw their guilty plea and have the charges withdrawn (Harding & Fox, 2009). This model provides the CJS with enough leverage to encourage program completion. In contrast, the *pre-plea model* does not require a guilty plea be entered prior to admission into DTC. Without a guilty plea, the court does not possess any leverage to encourage completion because the absence of an outstanding sentence (Longshore et al., 2001). Likewise, participants

are not presented with the incentive to be successful in order to avoid incarceration or a reduced sentence. Hardin and Fox (2009) state that there is no evidence to support the superiority of one model over another, however, Longshore and colleagues (2001) highly support the post-plea model indicating the ability to be most effective.

Entry into DTC signifies the beginning stage where participants receive a combination of services to reach the goal of reduced recidivism and drug dependency. These services include regular drug testing, placement in substance abuse treatment and status hearings (Listwan, Sundt, Holsinger & Latessa, 2003; Spohn et al., 2001; Wilson et al., 2006). To monitor the services participants are enrolled in, a pre-court meeting is held immediately before court sessions (Mackinem & Higgins, 2008). The professional members who attend are the judge, lawyers and substance abuse counsellors. These members discuss and make non-binding decisions on each individual case (Moore, 2009). In addition, the professionals meet to consider the ongoing monitoring of participants, evaluate their progress and decide on rewards and sanctions (Mackinem & Higgins, 2008) based on random urine screens and individual progress (Wilson et al., 2006).

Following the DTC team's decision regarding participants' progress, judges provide incentives for success and sanctions for failures (Wilson et al., 2006). In addition to incentives such as later curfew, gift card, or less court hearings, the judge also reinforces successes through praise and encouragement (Wilson et al., 2006). Comparatively, sanctions operate on the basis of deterrence theory, subjecting participants to penalties for not following program rules (Fulkerson, Keena & O'Brien, 2013). These sanctions can include public services, short jail sentences, additional treatment requirements, house arrest and restrictions on daily activities (Fulkerson et al., 2013). Incentives and sanctions are administered during court hearings which take place in traditional court rooms. During the court hearing, participants stand before a judge

for several minutes discussing their weekly progress. After a brief interaction, the judge

provides praise, an incentive and/or a sanction.

Theoretical Framework

War on drugs policy were implemented to address the relationship between drug abuse

and crime, however, little success is reported. The lack of success is the underlying motivator

for developing DTC programs. Hora (2002) argues that there was no theoretical basis for how

DTC programs would be implemented and structured. However, over the last two decades,

researchers highlight therapeutic jurisprudence (JT) as the theoretical framework that would best

enhance DTC functioning (Hora, Schma & Rosenthal, 1999; Winick & Wexler, 2002).

Therapeutic jurisprudence is a combination of deterrence theory and harm reduction approaches.

Deterrence theory has been adopted as the essential framework for thinking about the

CJS. The main theoretical perspective used by the CJS to reduce future criminal behaviour is

deterrence theory. Beccaria (1767) and Bentham (1789) are scholars who are associated with the

development of deterrence theory. Beccaria (1767) held the belief that punishment should only

serve to deter, meanwhile, Bentham (1789) claimed that punishment in itself was evil and

should only be used to prevent greater evil. Deterrence theory believes to prevent criminal

offending, the behaviour must be identified, discovered and properly penalized (Higgins, Wilson

& Fell, 2005). As an element of classical criminology, deterrence theory insinuates that

individuals are rational beings and will act on behaviours that they perceive to be pleasurable

and avoid behaviours that are painful (Higgins et al., 2005).

Deterrence theory is comprised of three components: certainty, severity, and celerity. For

a punishment to effectively deter future criminal behaviour, the punishment must entail these

three components. *Certainty* highlights that an offence must occur, but more importantly, that an

individual must believe that the criminal behaviour will be detected (Higgins et al., 2005). That is, an offender must expect a consequence from their behaviour. If an individual commits an offence but does not think about the possible consequences, a punishment as a deterrent will be ineffective. *Severity* implies that criminal behaviour will be punished harshly (Higgins et al., 2005). Moreover, severity suggests that the punishment should be proportionate to the offence to act as a deterrent. *Celerity* proposes that discover and detection of criminal behaviour will occur quickly (Higgins et al., 2005). Thus, punishments need to be implemented swiftly after the criminal behaviour is detected to act as a deterrent.

In conjunction with deterrence theory, harm reduction approaches are also essential to understanding the foundation of DTC. The main philosophy behind harm reduction refers to policies and programs which aim at minimizing the negative social, economic and health related consequences of drug abuse (Jarvinen, 2008). Traditional treatment programs have established the goal of abstinence for all drug abusers. In contrast to the traditional approach, harm reduction seeks to have community workers attend to individual needs and develop personalized goals. Through this approach, treatment goals and measures can be adapted with realistic expectations.

Pauly (2008) places emphasis on four harm reduction principles: pragmatism, humanistic, balancing costs and benefits and immediate goals. *Pragmatism* implies that many activities in life are risky and harm reduction demonstrates that elimination of drug use may not be easily attainable nor desirable to some individuals as a result of associated risks. *Humanistic* as a principle validates that respect, worthiness and dignity must be shown towards all individuals, including those who abuse drugs. *Balancing the costs and benefits* for individuals and society as a whole is another harm reduction principle. Being able to benefit the common good of individuals and communities can limit the manifestation of tension between the two

populations. The fourth principle speaks to the importance of addressing the *immediate goals* that are identified by the user.

According to Senjo and Leip (2001), TJ is a combination of both deterrence theory and harm reduction approaches. Took and Wexler (2009) reveal that TJ at its most basic, is a therapeutic perspective of the legal system. The same authors argue TJ has become a highly influential framework for understanding law and the way legal officials interact with offenders. The main argument behind TJ is that law and the way legal personals interact with people have therapeutic consequences (Took & Wexler, 2009). Ideally, TJ has the potential of enhancing criminal justice performance through the unity of offenders' right and care perspectives (Casey & Rottman, 2000). The same authors (2000) clearly indicate that DTC programs handle complex cases of individuals who present with various psychological and sociological problems which may affect the traditional court process and available responses. TJ can guide the principles and structure of DTC programs (Hora, 2002). Took and Wexler (2009) specify that TJ is not superior to other considerations of justice values, but that TJ can achieve truly effective and humane law reform. Therefore, TJ does not dismiss the traditional values of the CJS, but has added to the way scholars think about law. The comprehensive theoretical framework that combines the criminal justice and mental health systems provides a model for understanding the complex needs of drug abusers and is adopted in DTC programs.

Research Methods for Drug Treatment Court Evaluations

Researchers have used a variety of methodological strategies including different study designs, sample sizes and follow-up periods to evaluate DTC programs. Reviewing Wilson's et al. (2006) meta-analyses regarding DTC evaluations reveals that some studies use experimental and quasi-experimental designs, while other studies do not include control groups. The same authors note that in their meta-analysis only five of the studies used random assignment.

Conversely, about half of the studies used weak quasi-experimental designs, suggesting not many DTC evaluations use random assignment, statistical control, or subject level matching.

The existing literature implies that there is a lack of understanding of the long term effects of DTC programs. Some evaluations do not extend outcome measures beyond participation engagement. When DTC evaluations examine outcomes post participation, many evaluations are characterized by relatively short follow-up periods. Krebs et al. (2007) advise that it is important to determine the immediate positive effects of DTC. However, the same authors also argue the significance of examining whether DTC programs provide benefits to participants and larger communities over extended periods of time. Furthermore, in the same report there are minimal studies which follow participants for more than two years. Krebs et al. (2007) imply that their study is the second DTC evaluation which had findings that the effects of DTC on recidivism are delayed. Future DTC evaluations would benefit from having longer follow-up periods in order to accurately document the long term effects of DTC. Despite the mentioned methodological shortcomings with DTC evaluations, Krebs et al. (2007) argue that similar results from studies with substantial variations in terms of evaluation methodology, outcomes examined and the measured magnitude of their impacts, indicates a significant degree of consistency.

With the rapid expansion of DTC, researchers have developed an interest in evaluating the programs performance. Belenko (1998) argues that there are three types of evaluations: process or operations evaluation, cost saving analysis and impact evaluations. *Process or operations evaluations* present basic descriptive information on participants and program structure. *Cost savings evaluations* attempt to prove the major assumption about drug courts, that they are less costly than traditional criminal justice procedures. The goal with cost savings evaluations are to justify continued funding levels or to increase funding levels for DTC

programs. *Impact evaluations* focus on how DTC has affected participants, usually by

measuring outcomes such as criminal recidivism. The current study is an impact evaluation of

Durham's Drug Treatment and Mental Health Court (DDT&MHC). The study examines which

participants' characteristics predict successful completion and how DDT&MHC affects

participants by measuring the use of emergency department services post programming.

Chapter 2: Literature Review

While the introductory chapter outlined the current study's research questions and DTC programs, this chapter reviews previous studies that address the relationship between drug abuse and crime, present findings of DTC evaluations and argue that there is a connection amongst drug abuse and the use of ED services. This review discusses previous literature that implements these two relationships and examines DTC evaluations as part of the contemporary drug control strategy.

The Drugs and Crime Nexus: A Historical Review

During the late 1980s, Goldstein (1985) developed a framework to better understand the relationship between drug abuse and crime. This framework identifies three possible explanations for drug crimes: pharmacological violence, economic-compulsive and systemic violence. First, p*harmacological violence* is based on the belief that ongoing ingestion of substances can result in individuals becoming excitable, irrational and exhibiting violent behaviours. This model suggests that the effects of intoxication such as disinhibition, poor judgment and its byproducts, withdrawal and sleep deprivation contribute to criminal behaviours. Researchers should be wary of different substances and their distinctive effects. The effects of all substances cannot only be explained by the pharmacological violence model in Goldstein's (1985) framework.

The second model, *economic compulsive* proposes that drug abusers may engage in criminal activity to financially support their addiction (Goldstein, 1985). In this model, substance abusers may commit income generating crimes such as robbery, burglary and drug sales to support their own drug habit. Gizzi and Gerkin (2009) believe that this model better explains why individuals do not commit crime prior to abusing substances. Thus, the assumption is that without abusing drugs individuals would not have to commit economic

compulsive crimes because it is not necessary for them to obtain money to purchase illicit substances for their own use.

Goldstein (1985) developed a third model, *systemic violence* as recognition for the culture associated with the illegal drug market. This model accounts for disputes between drug dealers and drug abusers, assaults and homicides committed within criminal hierarchies. Committing violent crimes is a mechanisms for maintaining normative codes within the culture of selling drugs. Goldstein's (1985) framework for understanding the drugs and crime nexus is largely supported. However, Bennett and Holloway (2009) propose that additional models should be introduced to account for external factors which are known to influence the relationship between drug abuse and crime.

Gizzi and Gerkin (2010) report that the relationship between drug abuse and crime has long been presumed, but understanding the full context of this association is complex as a results of external factors. For example, Gizzi and Gerkin (2010) suggest that researchers who test the association between drug abuse and crime should consider the potency of drugs used, the dose, the users' body composition, personal drug tolerance and the social context in which the drug is consumed. These external factors insinuate that drug crimes are not simplistic and cannot be understood solely by the two concepts: drug abuse and crime. Some researchers maintain that there is no direct link between these two concepts, but argue that they are related by a number of common causes (Gottfredson, Kearley & Bushway, 2008). For example, genetic or temperamental traits, antisocial personality disorder, parental alcoholism, poor relations with parents, subculture norms and environmental factors are all described as common causes for both drug abuse and criminal activities (Gottfreson et al., 2008). For many of the same genetic and sociological reasons individuals may resort to drug abuse and/or criminal behaviours.

Despite the ongoing debate regarding the relationship between drug abuse and crime, the association has been well established by criminological researchers in Canada (Dauvergne, 2009). Based on police reported drug offences in Canada, Dauvergne (2009) explores the long term trends in possession, trafficking, production, importing and exporting of drugs based on the Uniform Crime Reporting Survey. The results of the analysis do not reflect the full extent of drug crimes in Canada because not all crimes are reported to police. Even with drug crimes being underreported to police, the same study reports that drug offences in Canada have been increasing since 1993. In 2007, drug offences reached 305 incidents per 100,000 population, the highest point in 30 years.

Dauvergne (2009) states that, in Canada, the production of cannabis accounts for the largest category of drug crimes and has significantly increased. In 2007, the rate of cannabis production was eight times higher than 30 years ago as a result of indoor and outdoor marijuana grow-ops. The same author argues that the second largest category of drug crimes involves cocaine offences. In 2007, cocaine accounted for one quarter of all drug offences; half for possession and half for trafficking. The results for heroin related crimes remain relatively low and similar over the past 30 years. In Dauvergne's (2009) report, all other drugs include methamphetamine, ecstasy, date rape, LSD, and barbiturates. It is this category of drug offences that has increased the most in the past 10 years, by 168 percent. An increase in drug related offences which include all other drugs is reported across all provinces and all offence types. Based on these findings, the relationship between drug abuse and crime cannot be ignored. These trends urged the government's intervention through the implementation of many war on drugs policies.

As a result of the war on drugs policy there was a substantial increase in the prison population. Responding to the overrepresentation of drug offenders in the CJS, some policy

makers began to respond to the public demand that drug addiction to be addressed as a health

concern rather than a criminal matter (Allard, 2009). On October 4, 2007 Canada launched the

National Anti-Drug Strategy which involves three action plans: prevention, treatment and

enforcement (Dauvergne, 2009). Under the enforcement action plan, Members of Canada's

Parliament implemented Bill C-15 which imposes mandatory minimum prison sentences for

drug offences. However, Bill C-15 also supports the use of DTC programs as a way to avoid

incarcerating offenders who desperately need help with their addiction (Allard, 2009). Spohn

and Belenko (2013) note that recent changes in sentencing laws coupled with the

implementation of DTC programs are receiving increased support.

Drug Treatment Court Meta Analyses Measuring Recidivism

Criminal recidivism is the most common outcome measured in DTC evaluations.

Measuring criminal recidivism allows researchers to conclude whether DTC programs are

effective in achieving the goal of breaking the cycle of drug abuse and crime. Several DTC

meta-analyses confirm the program's effectiveness in reducing criminal recidivism (Holloway,

Bennett & Farrington, 2006; Latimer et al., 2006; Mitchell, Wilson, Eggers & MacKenzie,

2012; Shaffer, 2011; Wilson, et al., 2006). A meta-analysis is defined as a statistical analysis of

a collection of studies that aggregates the magnitude of a relationship between multiple

variables (Glass, McGaw & Smith, 1984). Meta-analyses on DTC evaluations are reviewed

below.

In 2006, Wilson and colleagues review 55 DTC evaluations that report on the programs'

effectiveness in reducing criminal offending. Included in the meta-analysis are studies that use

comparison group designs and measure some form of criminal activity related to recidivism.

The results tentatively suggest that drug abusers who participate in DTC are less likely to

reoffend than similar offenders who are sentenced in the traditional CJS. Although these

findings support DTC programs, the argument is weakened by methodological issues because these quasi-experimental designs made no attempt to control for differences between participants and the control group.

A similar systematic review conducted by Latimer et al. (2006) synthesize the findings of 66 DTC evaluations. A majority of the studies are from the United States. However, the authors did include two studies from Canada and two from Australia. In the same report, only 10 studies indicate a negative impact while 56 studies confirm a positive impact on reducing criminal recidivism. The findings show that DTC programs reduced recidivism by 14 percent compared to traditional criminal justice responses. More specifically, the results specify that 57 percent of participants are not charged with a new criminal offence compared to 43 percent of offenders in comparison groups. In the same study, as follow-up periods increased, respondents in the comparison group are more likely to re-offend compared to DTC participants. This is evidence that DTC research should include longer follow-up periods to fully understand the impact that DTC has on reducing criminal recidivism.

Most recently, a study conducted by Mitchell et al. (2012) synthesize the findings of 154 independent DTC evaluations. The evaluations included in this meta-analysis are both experimental and quasi-experimental which contained control groups, as well as, a measure of recidivism. The results indicate that the effect of participation is equivalent to a reduction in general recidivism from 50 percent to 37 percent. Additionally, the results demonstrate that the reductions in criminal behaviours persist for at least three-years after program entry. Overall, this meta-analysis strongly supports the hypothesis that DTC is effective in reducing criminal recidivism.

In contrast to the previous meta-analysis, Shaffer (2011) attempts to overcome the standard of only measuring moderating factors by merging survey data with existing primary

study data. The same author reviews 115 DTC evaluations. Consistent with the previous meta-analyses explored here, the study provides evidence that supports DTC programs' ability to reduce recidivism. Shaffer (2011) highlights that the success of DTC programs depend on the type of offender, the leverage the court holds over participants, the expectations placed upon them and the quality of the staff. This study demonstrates the importance of examining the variability of drug court effectiveness.

Existing reviews of DTC programs' ability to reduce criminal recidivism is strongly supported. The review of the DTC meta-analyses determines that there are various ways to conduct DTC evaluation research, but the overall hypothesis that these programs can have a positive effect on recidivism has been proven. As Shaffer (2011) states, the success of DTC programs depend on various program and participants' characteristics. The literature below highlights some of the more specific and key arguments located in DTC evaluations.

Independent Drug Treatment Court Evaluations Measuring Recidivism

There are also several independent evaluations that support the main argument that DTC is effective in reducing criminal recidivism (Gallagher, 2014; Gifford, Eldred, McCutchan & Sloan, 2014; Heck et al., 2008; Krebs et al., 2007; Shaffer, Hartman & Listwan, 2009; Somers, Currie, Moniruzzaman, Eiboff & Patterson, 2012). Although support for DTC programs is documented, these independent studies highlight which variables are best predictors of a reduction in criminal recidivism. Previous research indicates that participants are more likely to have positive outcomes related to recidivism if they are: older (Krebs et al., 2007), are employed or a student (Dannerbeck, Harris, Sundet & Lloyd, 2006), are high school graduates, are married (Shaffer et al., 2009), are Caucasian participants (Dannerbeck et al., 2006; Krebs et al., 2007), and are successful graduates of DTC (Gifford et al., 2014).

As previously stated, DTC impact evaluations often focus on measuring criminal recidivism. The outcome measure, criminal recidivism, is continuously measured by researchers because the overall goal of DTC program is to reduce drug crimes. Therefore, it is important for researchers to evaluate this programs' performance. The literature presents findings which significantly support the ongoing implementation and use of DTC because of the models ability to reduce criminal recidivism. At this point, DTC research would benefit from extending the typical impact evaluations to include measures for additional social benefits, which is the purpose of the current study. Prior to introducing emergency department use as a new outcome measure, the literature below reviews which participants' characteristics are significant predictors of program completion. The purpose for reviewing predictors of program completion is because the first model in the current study seeks to measure this relationship, which than becomes a predictor of emergency department use in the second model.

Participants' Demographics as Predictors of Program Completion

Previous DTC evaluations present mixed results regarding gender as a predictor of program completion. For example, Dannerbeck et al. (2002) argue that a higher percentage of women, in comparison to men, graduate from DTC programs. Shannon, Jackson, Perkins and Neal (2014) examine gender differences and participant characteristics among individuals in drug court. The authors find that gender may not be a critical factor of program completion. There is no clear indication that gender can predict DTC completion.

Schiff and Terry (1997) argue that education is a significant predictor of program completion. The authors report that participants with more education are more likely to successfully graduate from DTC. In addition, a one-unit increase in education would increase the probability of graduating. Taking into consideration their measure for education, graduating

from high school rather than having some high school increases the probability of graduating from DTC.

There are contradictions in regards to marital status being a significant predictor of program completion. Shannon et al. (2014) report that marital status is not a significant predictor of program completion. However, Newton-Taylor, Patrat and Gliksman (2009) suggest that graduates within their study are more likely to be divorced or separated from their partner. Thus, when marital status is a significant predictor of program completion, having a partner negatively affects participants' ability to complete DTC programming.

Drug of Choice as a Predictor of Program Completion

Mechanisms for coding variables can vary by study, as portrayed in the reviewed DTC impact evaluations. Respondents' primary drug of choice is measured through multiple avenues. Although previous researchers code drug of choice differently, Peters, Haas and Murrin (1999), Schiff and Terry (1997) and Shaffer, Hartman, Listwan, Howell and Latess (2011) show some similarities. For example, the authors code primary drug of choice into the following categories: (1) alcohol, marijuana, cocaine and other (Peters et al., 1999), (2) alcohol, marijuana, cocaine and crack/cocaine (Schiff & Terry, 1997) and (3) alcohol, marijuana and crack/cocaine (Shaffer et al., 2011). In contrast, other studies measure primary drug of choice as: (1) stimulants and nonstimulants (Gallagher, 2014) and (2) yes or no to crack/cocaine (Miller & Shutt, 2001). When considering the different means to measure respondents' primary drug of choice, inconsistencies are present. Research continues to portray important results within DTC evaluations relating to primary drug of choice and program completion.

Within some DTC impact evaluations, researchers test if primary drug of choice is a potential predictor of program completion (Dannerbeck et al., 2006; Gallagher, 2014; Miller & Shutt, 2001; Peters et al., 1999; Schiff & Terry, 1997; Shaffer et al., 2011). The results

suggesting that primary drug of choice is a predictor of DTC completion imply mixed findings.

First, two DTC evaluations demonstrate that primary drug of choice is not a significant predictor

of program completion (Gallagher, 2014; Shaffer et al., 2011). In contrast, the results of other

DTC evaluations identify that respondents' primary drug of choice is significant to successful

completion of DTC (Dannerbeck, 2006; Miller & Shutt, 2001; Peters et al., 1999; Schiff &

Terry, 1997). Overall, previous research is unclear whether primary drug of choice can predict

DTC completion. Consideration should be given to the results which imply that primary drug of

choice is a significant predictor.

        Despite the inconsistencies displayed in previous DTC evaluations relating to the

significance of primary drug of choice, there remains positive evidence that requires careful

consideration. Impact evaluations which indicate that primary drug of choice is a significant

predictor of DTC completion, report that cocaine and crack/cocaine use are the type of

substances that have relationships with program completion. For example, Dannerbeck et al.

(2006) and Peters et al. (1999) present results which support the argument that cocaine as

respondents' primary drug of choice is significantly related to not successfully completing DTC.

Likewise, Miller and Shutt's (2001) and Schiff and Terry's (1997) results indicate that

crack/cocaine as respondent's primary drug of choice is also significantly related to not

successfully completing DTC. These results support the argument that researchers need to

consider both cocaine and crack/cocaine use as potential predictors of DTC completion.

        According to the United States General Accountability Office (2005), cocaine and

crack/cocaine are the most common drugs reported by drug court participants. Taking this

statement into consideration, combined with previous evidence that there is an association

between crack/cocaine and DTC completion, is evidence that primary drug of choice could be

coded as: (1) cocaine and crack/cocaine and (2) other. The current study uses this technique to

code primary drug of choice to report if cocaine and crack/cocaine predict completion and to determine if this drug has similar effects on participants' use of ED services, as it does with program completion.

Program Exposure as a Predictor of Completion

It seems that previous DTC evaluations have not measured the relationship between length of time in the program and completion. However, research demonstrates that exposure to DTC without successfully completing the program has significant effects on reduced recidivism. For example, Somers et al. (2012) report that the longer a participant stayed in DTC, regardless of their negative status as a graduate, significantly predicted reduced recidivism. Gallagher (2014) also claims that if participants violate within the first 30 days of DTC, which is the probation period, they are more likely to recidivate. This suggests that if participants successfully passed their probation period they are more likely to have a reduction in recidivism. Supporting this claim, Gifford and colleagues (2014) indicate that participants who do not successfully graduate from the program still recidivate less than the compared controlled group who went through the traditional criminal justice system.

Francis and Abel (2014) conducted a study which reports substantial benefits for non-successful DTC participants. In this study, participants who did not graduate from DTC reported having increased motivation and self-efficacy, relationships with family and peers are enhanced and reported abstinence or decreased substance use. However, it should be highlighted that those who are terminated from DTC recidivate at a higher rate than those who graduate (Gallagher, 2014). Although exposure to DTC can reduce future criminal activity, the ultimate goal should be to have participants graduate. Although no studies measure the length in DTC as a predictor of completion, there is evidence which suggests that the longer one participates in DTC, the more likely positive benefits will transpire.

The Relationship between Drug Abuse and Health Care

The review of DTC evaluations demonstrates that this program can be successful in addressing drug abuse to reduce criminal recidivism. Now that research has confirmed DTC programs' ability to reduce recidivism, further impact evaluations should begin to consider additional benefits. Murphy (2011) argues that DTC programs are concerned with both participants' punishment and treatment. This validates that DTC not only holds offenders accountable, but also presents a heightened concern for their health. Drug treatment court evaluations should assess and reflect both CJS and HCS components.

The literature establishes that there is a well-documented association between patients with substance abuse problems and use of health care systems (Brubacher et al., 2008; Cederbaum, et al., 2014; Fairbairn et al., 2012; Jouanjus, Pourcel, Saivin, Molinier & Lapeyre-Mestre, 2012; Laine, Hauck, Gourevitch, Rothman & Turner, 2001; Raven et al., 2010; Parker, Libart, Fanning, Higgs & Dirickson, 2012; Schildhaus et al., 2013; Wu et al., 2012). Substance abuse problems can result in direct health issues and/or a number of co-occurring disorders. For example, Bennett and Holloway (2009) argue that drug abusers experience a variety of health problems including, but not limited to, dependency, infectious diseases, harmful physiological effects, risk of overdose and death. With a wide variety of health concerns drug abusers may develop, this increases the burden placed on health care services.

The Prevalence of Drug Abusers Using Emergency Department Services

The relationship between substance abusers and their use of health care systems tend to focus on understanding patients' use of emergency departments. Emergency physicians and nurses recognize that a considerable number of ED patients have issues related to substance abuse (Brubacher et al., 2008). Schildhaus and colleagues (2013) find through the use of a

Nation Wide ED Sample, that 4.3 million ED visits (4.6 percent of all ED visits) carried a

substance abuse disorder diagnosis. Likewise, Laine et al., (2001) report that even in Canada,

where citizens have access to universal health insurance, substance abuse accounts for

approximately eight percent of hospitalizations. Drug abusers may access ED as their main point

of health care contact (Parker et al., 2012). Many times, ED services are used by drug abusers as

their sole provider for medical care (Brubacher et al., 2008), and Schildhaus et al. (2013) advise

that this increases the likelihood of drug abusers using ED services.

Brubacher et al., (2008) conduct a Canadian based study to determine the prevalence of

substance-related medical problems in Vancouver's ED. During the six-week study period 5188

patient files are reviewed and 600 patients had at least one visit with a documented substance

abuse issue. In the same study, visits which had a documented substance abuse problem resulted

in patients being admitted into the hospital more often than visits without a substance abuse

diagnosis. Overall, patients with substance abuse problems have more readmissions into the

hospital during the one year follow-up period than those without substance abuse conditions.

These findings suggest that a significant portion of ED patients are accessing services as a result

of substance abuse issues and on a regular basis. Emergency department admissions and

readmissions of individuals with substance abuse conditions are prevalent and occur at high

financial costs (Brubacher et al., 2008).

Repeated Emergency Department Use by Substance Abusers

As previously stated, substance abusers are admitted and readmitted to the ED on a

regular basis. In one study, Smith, Stocks and Santora (2015) find that ED visits within 30 days

of discharge are common among adults who report substance abuse conditions. In this study, 12

months after discharge, 16.4 percent of patients had another ED visit. Having a substance abuse

issue increases the likelihood of patients being readmitted to the ED during a 12 month follow-up period.

Repeated hospital admissions are an issue of concern for the health care sector (Wong, Chan, Chow, Chang, Chung, Lee & Lee, 2010). In this report, the authors highlight three groups of factors that contribute to readmissions: patient related factors, disease related factors and system related factors. *Patient related factors* associated with readmissions include age, gender (males) and those who depend on financial assistance. Second, *disease related factors* suggest that patients who have a chronic illness increases the likelihood of being readmitted. Third, *system related factors* refer to hospital practices, discharge destination and post discharge support provided to patients.

Raven et al. (2010) present some concrete examples of Wong's et al. (2010) factors related to hospital readmissions. In Raven's et al. (2010) qualitative study, themes related to substance abuse and hospitalization emerge: (1) barriers to planning long-term treatment and follow up, (2) use of hospital as a temporary housing solution and (3) unsuccessful substance use after care following discharge. This illustrates hospitals' inability to provide adequate services to drug abusers who use ED services.

Patients included in Raven's et al (2010) study describe that a barrier to planning long-term treatment as being offered services that they think are inadequate. For example, patients indicate that because they spend such a short period of time in the hospital, they have no time to think about their options and are forced into acting on what service providers suggest. Service providers also acknowledge that programs offered to patients are inadequate as a result of the insufficient amount of time and a lack of resources. The second theme, use of hospitals as a temporary housing solution is a reason for ongoing readmissions of drug abusers. For example, patients indicate that admission into the hospital is a way for them to be provided with housing

options. Additionally, sometimes hospital stays are a means to take a break from the street life, including sleeping arrangements. Once a discharge plan is completed, being successful in after care becomes a challenge. For example, many patients do not have the financial means to transport themselves to the next service provider. Additional barriers to successful after care are in relation to patients' past experiences with both the HCS and after care programs where they have not been able to build adequate trusting relations.

Smith et al. (2015) strongly speculate that identifying the knowledge gaps of what determines repeated hospitalization for patients with substance abuse conditions is essential to preventing readmissions and reducing costs. In the same document, the authors indicate that high readmission rates and ED visits after discharge may reflect short comings in outpatient care. In the same study, the authors recommend that future interventions include supportive housing, detox-to-rehab transportation and post discharge patient support.

Demographic Factors as a Predictor of Emergency Department Use

Previous literature that focuses on the relationship between substance abusers and ED use highlights some important demographics which predict ED use. When accounting for ED patients who have a substance abuse issue, females accounted for a larger portion of the population than males (Cedearbaum et al., 2014). However, Brubacher et al. (2008) and Schildhaus et al. (2013) find conflicting results suggesting that ED patients who report having a substance abuse issue are more likely to be males compared to females. Therefore, measuring gender as a significant predictor of ED use, marks mixed results. Cedearbaum et al. (2014) also report that patients' education level is a significant predictor of ED use related to substance abusers. More precisely, the authors convey that patients who abuse drugs and report having lower education are more likely to use ED services. There is no indication in previous studies whether marital status in combination with substance abuse predicts the use of ED services.

Drug of Choice as a Predictor of Emergency Department Use

Researchers consider the association between the use of illicit drugs and the use of ED services. In 2008, Thapa et al., argue that cocaine continues to be the most common illicit drug associated with ED visits in the United States. Supporting this claim, Vitale and Mheen (2006) state that while both cannabis and cocaine appear most often in studies related to the use of ED services, cocaine remains the most prevailing illicit drug associated with ED use. The authors note that in their meta-analyses on ED studies the use of cocaine ranged from 2.7 percent to 18.7 percent. Likewise, Buchfuhrer and Radecki (1996) conduct a study which measures the presence of illicit drug use in the ED. The results find that cocaine (16.4 percent) is positively measured through toxicology test. These findings support the argument that cocaine use is associated with patients' use of ED services.

In addition to toxicology tests, researchers must also rely on self-reporting. Lee and colleagues (2009) examine if patients self-reported cocaine use when attending the ED. The results indicate that half of the patients would self-report cocaine use when presenting at the ED with chest pains. In contrast, Vitale and Mheen (2006) conclude that only one percent to five percent of cocaine users self-report their use when using ED services. Despite some research suggesting that there is a low self-reporting of cocaine use when using ED services, there remains enough evidence to propose that cocaine use is the most prevalent illicit drug associated with the use of ED services.

Cocaine abuse accounts for approximately half of all ED visits that are substance related (Cunningham et al., 2009; Thapa et al., 2008). The common complaints among cocaine users in ED is chest pain (Lee et al., 2009). Cocaine use is also associated with seizures, strokes and neurologic disorders which can result in the use of ED services (McGeary & French, 2000). The

same authors imply that crack/cocaine use intensifies health-related disorders associated with damage to the central nervous, circulatory and respiratory systems.

Also studying cocaine users, Cunningham et al. (2009) report that 65 percent of cocaine users/patients return to the ED post-index visit and 23 percent returned for chest pain. These results suggest that patients who continue to use cocaine following an ED visit are more likely to have recurrent ED visits, most often related to pain and injury. Thapa et al. (2008) indicate that cocaine use decreases following an ED visit for cocaine related chest pain. However, half of the subjects continue to use cocaine. This data suggests that ED services are an ineffective resource to overturn addictions to illicit substances.

Moving Forward to Address Substance-related Emergency Department Use

Research demonstrates that substance abusers use ED services at elevated rates which increases financial cost. Drug-related ED visits are significant predictors of health care costs worldwide (Wilbur, Hazi & El-Bedawi, 2013). Given the number of ED visits attributed to substance abuse, understanding ways in which community-based treatment facilities may reduce financial costs are imperative (Cederbaum et al., 2014). Based on this indication, Brubacher (2008) argues that substance issues contribute significantly to ED visits and this supports the need for an interdisciplinary identification and intervention program. Laine et al. (2001) also hypothesizes that a combination of regular medical care and regular drug abuse treatment would show a protective association with hospital care. The authors imply that engaging substance abusers in treatment for six months is associated with significant improvements on individual health and social factors. Outpatient treatment for substance abuse disorders can efficiently decrease hospitalization rates and costs (Cederbaum et al., 2014). This may be accomplished through the systematic delivery of contingency management treatment in community based settings.

Drug treatment court programs could deliver management treatment in community based settings that is needed to adhere to the unique needs of substance abusers who access ED services. Drug treatment court programs have the resources and abilities to establish both regular medical care and regular substance treatment for participants. The literature proposes that if medical care and treatment are integrated for drug abusers this is associated with less subsequent hospitalization (Laine et al., 2001). Thus, DTC could have a positive effect as a community based program that may reduce hospital costs. For example, Freeman (2002) reports that individuals improve their health and wellbeing following engagement in DTC. However, DTC programs' ability to reduce participants' use of ED services has yet to be studied. In fact, Freeman (2002) states that it is surprising that such little attention has been given to assessing DTC therapeutic effects.

To date, only one Canadian study conducted by Somers et al. (2012) considers participants hospitalization regarding DTC. Number of days spent in the hospital prior to entering Vancouver's DTC is used as a matching variable. This study measures reduced criminal recidivism and did not give consideration to changes in participants' use of ED services. However, this study reports that DTC participants had greater number of hospitalizations compared to the control group. It is important to consider whether DTC programs have similar effects on reduced ED use as it does with criminal recidivism. If DTC programs are proven to be a significant predictor of reduced levels of emergency department visits, this will add rich data to the existing impact evaluations, as well as, cost effective analyses.

Current Research Questions and Statement of Hypotheses

There is an evident relationship between drug abuse and criminal behaviours. Government officials have implemented tough on crime mechanisms to address this

relationship. However more recently DTC programs, which use a TJ framework, were introduced to address the drug abuse and crime nexus. The overall goal of this diversion program is to address drug abuse as a root cause and/or motivation of criminal activities. Previous DTC evaluations determine that these programs can be successful at achieving reduced recidivism. Thus, while much is known about DTC programs' ability to reduce recidivism, the capability to reduce participants' use of ED services remains unstudied. This research is relevant because literature also supports a strong relationship between drug abuse and elevated use of ED services. Thus, DTC impact evaluations should seek to measure ED use as an outcome variable, with hopes of reporting an overall reduction post programming.

To investigate the assumption that particular individuals who participate in DTC will complete the program successfully, and further, reduce their use of ED services post programming, secondary data is accessed for 70 participants of DDT&MHC. Using a deductive analytic framework, this research is guided by the following research questions: (1) Can successful completion of DTC be correctly predicted from knowledge of gender, education, marital status, drug of choice and number of days in the program?, and (2) Can ED use post DTC enrolment be correctly predicted from knowledge of gender, education, marital status, drug of choice, number of days in the program, final disposition and ED use during DTC? Hypothesis One is: the predictor variables gender, education, marital status, children, drug of choice and number of days in the program are related to the probability of successfully completing the DTC program (see figure 1). Next, Hypothesis Two is: the predictor variables gender, education, marital status, drug of choice, number of days in the program, final disposition and ED visits during DTC are related to the probability of ED use post DTC programming (see figure 2).

As noted in the theoretical framework section, therapeutic jurisprudence is the model that has been previously tested and proven to be associated with the functioning and impacts of DTC programs. Therapeutic jurisprudence will be the framework implemented to confirm the two hypothesis outlined for the current study. These hypotheses have been constructed on the basis that DTC programs function through deterrence theory and harm reduction approaches. That is, (1) through the court proceedings punishments entail certainty, severity and celerity and (2) addiction counsellors aim to minimize the negative social, economic and health consequences related to their drug use. Based on the marriage of these two approaches DTC programs have the resources to ensure participants successfully complete the program and ability to have positive effects on their health issues.

Figure 1: Model 1 Drug Treatment Court Participants' Characteristics Predicting Program
            Success
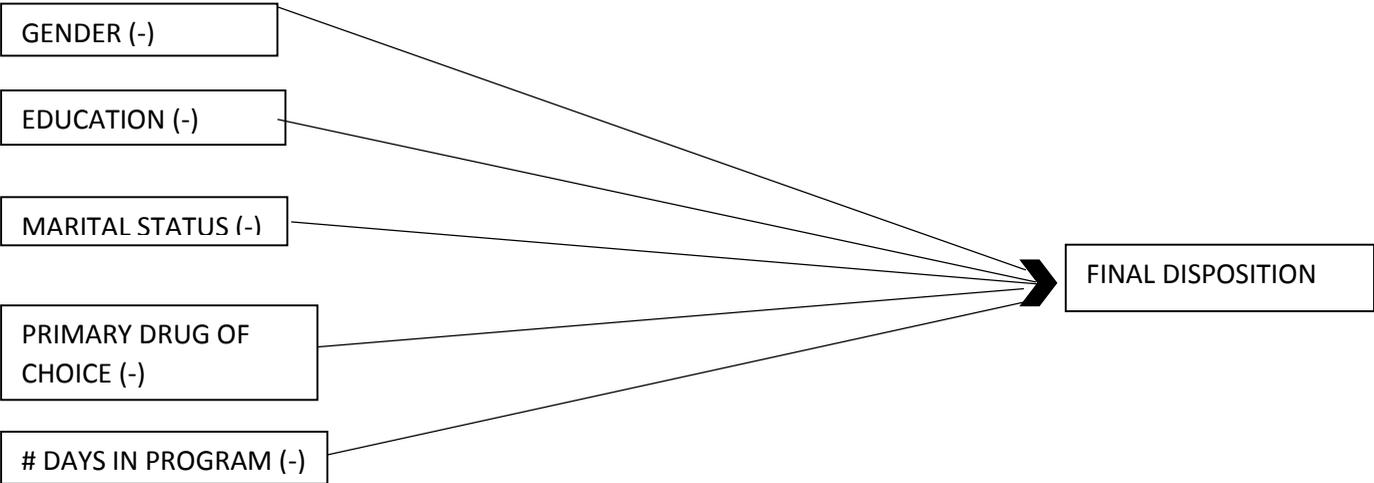
Figure 2: Model 2 Drug Treatment Court Participants' Characteristics Predicting Emergency
            Department Use Post Program

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│ GENDER (-)          │──────────────────────────────────┐
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┌─────────────────────┐                                   ├────▶│ ED VISITS POST DTC   │
│ PRIMARY DRUG OF     │───────────────────────────────────┤     └──────────────────────┘
│ CHOICE (-)          │                                   │
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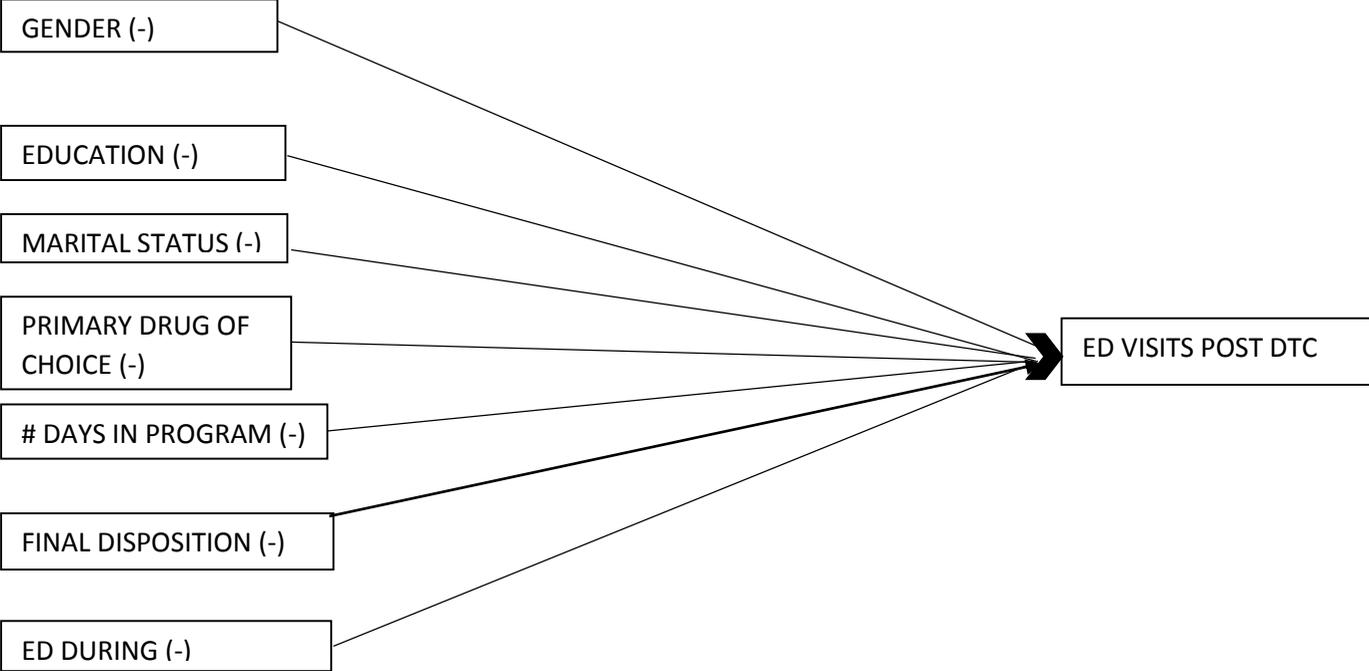
The current study explores a new DTC outcome, ED use, which will add rich data to the existing literature. In addition, the current study presents an opportunity to direct a new direction for impact evaluations. In the following chapter, the methods used to obtain and evaluate data will be presented.

Chapter 3: Methodology

This chapter describes the data and variables used in the analyses. In order to evaluate successful completion of DDT&MHC and introduce a new outcome variable, ED use, it was decided that the current study would use secondary data that has been collected by various branches of Lakeridge Health. The first section details the research design including the study setting and sources. Next, the methodology for collecting variables will be presented. Last, an outline of all variables one by one in detail and a description of the statistical model used in the analyses will be displayed.

Research Design

The previous chapter clearly outlined that there is a relationship between drug abuse and crime. Drug treatment court programs have been implemented as a reactive alternative to address this relationship. In the case of DTC evaluations, research strongly supports the programs' ability to reduce criminal recidivism. Reduction in criminal activity is discussed as being a cost effective criminal justice approach. This effect is quite evident, yet no research considers a reduction in DTC participants' use of ED services as a way to examine how this diversion program can save additional government funding.

The literature demonstrates that drug abusers may use ED services as their main source of health care which substantially increases the financial costs of hospitals. Drug treatment court studies should begin to measure whether the program can also be successful in reducing health care costs. This study uses a quasi-experimental design of 70 DTC participants, which is sufficient to allow analysis of various characteristics that may predict successful completion of the program and reduced ED visits.

Research on drug treatment court programs typically employs quasi-experimental research designs because participants are randomly assigned to control groups. A quasi-experimental study is a type of evaluation which seeks to measure whether treatment impacted the sample participants (Salkind, 2010). In contrast to a true experiment which contains a pre-post test design, control group and random assignment, quasi-experimental design lacks one or more of these elements (Salkind, 2010). The current study did not implement a pre-post test design, a control group nor random assignment and therefore, is considered a quasi-experimental research design.

Sources and Sampling Procedure

This study incorporates data from various organizations within Lakeridge Health. First, majority of the data was collected from Pinewood Centre of Lakeridge Health. Pinewood Centre is one of Ontario's largest treatment programs. This service provider helps people cope with substance use, concurrent disorders and gambling concerns. The staff at Pinewood Centre work with individuals to create treatment plans that reflect their strengths, concerns and preferences. Pinewood Centre is associated with DDT&MHC. Participants of DDT&MHC are connected with a specialized counsellor from Pinewood Centre in order to create and work towards their treatment goals. Pinewood Centre preserves paper files on all participants which contain admission forms and scales used within the addiction counselling field. The admission forms and scales have been accessed for this study. Pinewood Centre, in conjunction with the Provincial Crown Attorney constructed a list of all DDT&MHC participants, their dates of entry into the program and exit out of the program, as well as, the manner in which they exited DTC. This list was provided to the researcher to obtain appropriate data.

The second source that was accessed to collect all ED data was electronic hospital files of Lakeridge Health. Pinewood Centre staff have computer access to ED data which was used as

one of the outcome measures. Having an outcome measure resulted in the preferred population for the study being DTC participants who have exited the program one year prior to this study commencing. For DTC participants to be eligible for this study their participation in the program had to be terminated prior to February 1, 2014, as data collection commenced on February 1, 2015. Based on these dates, there were 76 participants that met this criteria. However, five participants were excluded from the analyses because they were never assessed by Pinewood Centre. In other words, give participants were excluded because they were referred to DTC, but never began receiving treatment. An additional participant was excluded from the analyses because he/she was considered a youth, by age requirements, when enrolled in DTC. The final analyses included 70 participants that met the date and age requirements.

Human Subjects Consideration

This research project contains data regarding vulnerable human participants. As a result of examining sensitive data approval was sought from two research ethics boards (RED). Two research ethics board (REB) applications were completed. First, a proposal for this research to the University of Ontario Institute of Technology (UOIT) was submitted. UOIT accepted the proposal for research and granted permission for the study to commence. Following that, an REB application was submitted to Lakerdige Health REB. This board advised the research supervisor, Hannah Scott, and Masters Student, Meaghan Middleton that some minor revision would have to take place prior to the study commencing. Following all revisions regarding the storage of data via encrypted USB port and the highlighted exceptions for participant consent regarding the Tri-Council Policy Statement: Ethical Conduct Involving Humans (TCPS-2), Lakeridge Health approved this study. The TCPS-2 is an online course which includes eight modules ranging from core principles to REB review when researchers are implementing human participants into their study.

Methodology for Collecting Variables

The determination was made that the best approach was to use existing information from various agencies within Lakeridge Health. The time required to interview DTC participants and collect data first hand with the lack of participant consent was deemed prohibitive. Thus, an instrument was constructed to guide data collection, with variables developed from multiple sources. First, the predictive variables located in previous studies were incorporated. Second, the coder spent a day reviewing an unidentified example file to have an understanding of which variables would be accessible. Third, interviews with addiction counsellors who advised the best practical way to code were included. All items were originally incorporated into the data collection instrument and approaches to their measurement were redefined during the period of data collection. Originally there were 124 variables collected based on Pinewood Centre's admission forms, scales and ED data. Majority of these variables were eliminated from the analyses because they were not necessary to examine the current study's research questions. A total of eight variables were used to test the current hypotheses (see table 1).

Table 1

Variables used in Logistic Regression Analyses

Variable Name	Variable Label	Survey Question	Value Labels	Level of Measurement	Variable Classification
Gender	Respondent's gender	What is your gender?	[0] Male [1] Female	Nominal	Categorical
Education	Respondent's level of education	What level of education does respondent have?	[0] less than high school [1] some high school [2] high school [3] more than high school	Nominal	Categorical

Table 1

Variables used in Logistic Regression Analyses (Continued)

Marital Status	Does respondent have a significant other	Do you have a significant other?	[0] No [1] Yes	Nominal	Categorical
Primary Drug of choice	Respondents drug of choice	What is your first drug of choice?	[0] Other [1] Crack/cocaine	Nominal	Categorical
Disposition	Did respondent graduate from DTC	Did you graduate from DTC?	[0] No [1] Yes	Nominal	Categorical
Days in program	How many days respondent was enrolled in DTC	How many days were you in DTC?	None	Interval	Continuous
ED during	How many times did respondent use ED during DTC enrollment	How many times did you access the Oshawa ED while enrolled in DTC?	None	Interval	Continuous
ED post	How many times did respondent use ED one year post DTC enrollment	How many times did you access the Oshawa ED one year post DTC?	None	Interval	Continuous

An electronic instrument was constructed to collect all demographic variables and used during the entire process of data collection. All data was placed directly into a statistical package for the social science (SPSS) data set by the coder. The coder met with a Pinewood staff who retrieved hospital data electronically. The Pinewood staff verbally provided the coder with the dates (from three-years prior to three years post DTC) and the documented reasons for the ED visits. For adequate analyses to take place, the researcher only used ED data one year prior and one year post DTC to ensure that there were enough participants included in the study. Pinewood staff accessed two different descriptions regarding reasons for ED visits. First, the staff member provided the coder with data from visit history which identified the principle diagnosis for the ED visit. Principle diagnosis is the doctor's perspective for the reason of the ED visit. Next, the coder was provided with information from emergency data which identified the chief complaint. The chief complaint is the patient's reason for visiting the ED. Following the collection of all data, the coder than organized the data into one year prior to DTC enrollment, six months prior DTC enrollment, one month prior DTC enrollment, during DTC enrollment, one month post DTC enrollment, six months post DTC enrollment and one year post DTC enrollment. Whether each ED visit was drug related was also recorded. In order to classify a visit as being drug related there was a direct indication of being substance related in either the principle diagnosis and/or chief complaint. The data was then entered into the same SPSS data set for analysis.

Variables in Analysis

Dependent variables. Previous DTC studies measure program completion by whether participants graduate or do not graduate (Dannerbeck et al., 2002; Shannon et al., 2014) Completion of DTC is the first outcome measure included in the current study which is coded as 1 = *successful graduation* and 0 = *non-successful graduation*. The successful graduation

category includes those participants who have graduated or received a certificate/recognition of completion. Participants successfully graduate from DTC if they meet all program requirements such as abstaining from all substances, not committing further crimes and becoming a student or being employed. In contrast, participants receive a certificate/recognition of completion if they are not successful in achieving all of the goals stated above, however, have made substantial gains. For example, a participant who has stopped using crack/cocaine and has maintained full time employment, but still uses marijuana may receive a certificate/recognition of completion. The second disposition attribute, non-successful graduation includes participants whose disposition indicated that they had reoffended and/or had been incarcerated, had been discharged for noncompliance, had been expelled, identified as being absent without leave (AWOL), recognized as no longer interested in program, were diverted to more appropriate programs and had failed to appear in court.

Previous DTC evaluations have not considered participants use of ED services as a possible outcome measure. In the literature review section, it was highlighted that DTC evaluations would benefit from measuring components that illustrate the health component of the programs. As such, participants' use of the emergency department one year post DTC is the second outcome variable included in the analyses. Participants' use of ED services is coded as 1 = *yes* and 0 = *no*. The yes category includes participants' total number of ED visits ranging from one to highest. For example, participants were included in this category if they reported using the ED on one occasion prior to entering DTC or even if they reported 26 visits to the ED. The no category includes participants who reported having zero ED visits. For example, all participants who did not use ED services one year prior to entering DTC were included in this category.

Independent Variables. There were a number of independent variables, also labelled,

predictor variables included in the analyses. Below is a discussion of demographic variables,

primary drug of choice variable, drug treatment court variables and emergency department

variables.

Demographic variables. There were a number of demographic variables measured in

this study. The gender of DTC participants is a common variable measured. In some cases,

gender is a significant predictor of DTC completion (Dannerbeck et al., 2002). However, other

researchers imply that gender of DTC participants may not be a critical factor in determining

program completion (Shannon et al., 2014). Regarding the second outcome variable, ED use,

measuring patients' gender also shows conflicting results (Cedearbaum et al., 2014; Schildhaus

et al., 2013). Because it is not clear whether gender is a significant predictor of DTC completion

and ED use, the current study measures gender which was defined as 0 = *male* and 1 = *female*.

Participants' education level is another common variable measured in DTC evaluations.

Previous studies note a positive relationship between education and DTC completion (Schiff &

Terry, 1997), suggesting that participants who have a higher education have an increased chance

of completing DTC programming. In contrast, patients who have lower education are more

likely to use ED services (Cedearbaum et al., 2014). These findings suggest that there is a

positive relationship between education and DTC completion, whereas, there is a negative

relationship between education and ED use.

The current study measures education which is coded as 0 = *less than high school*, 1 =

some high school, 2 = *high school*, and 3 = *more than high school*. Again, when it comes to the

documented relationship between marital status and DTC completion, research reports

contradictions. Some researchers suggest that marital status is related to DTC completion

(Newton-Taylor et al., 2009). Other researchers suggest that marital status is not a significant

predictor of program completion (Shannon et al., 2014). Regarding use of ED services, no

studies report a positive or negative relationship with marital status. The current study measures

marital status which is coded as 1 = *yes*, *currently has a partner* and 0 = *no, does not have a*

partner. The yes, has a partner category includes participants who reported being common law

and married/widowed. In this case, the widow is considered married not because of the real

marriage, but rather because of the psychological status of marriage. This method for coding

marital status is also located in Zhao and Cao's (2010) study, where the authors use data from

World Value Surveys to examine social change and anomie. The same authors code marital

status with values of 1 for respondents who are married including living together and widowed,

and 0 for single, separated and divorced. In the current study, the category of no, does not have a

partner category includes participants who reported being single, separated or divorced.

    Primary drug of choice variable. Previous DTC researchers who study program

completion measure primary drug of choice through various attributes (Dannerbeck et al., 2006;

Gallagher, 2014; Miller & Shutt, 2001; Peters, Haas & Murrin, 1999; Schiff & Terry, 1997;

Shaffer, Hartman et al., 2011). The most common categories are alcohol, marijuana, cocaine and

crack/cocaine. However, when considering the results that indicate that primary drug of choice

is significant to DTC completion, cocaine and crack/cocaine are the only two categories that are

significant predictors. In addition, The United States General Accountability Office (2005)

maintain that cocaine and crack/cocaine are the most common drugs reported by DTC

participants. Given this evidence, research on DTC programs would value the identification of

primary drug of choice as cocaine and crack/cocaine as one category and all other substances as

a separate category. In the current study, primary drug of choice is defined as 1 = *cocaine and*

crack/cocaine and 0 = *other*. The category of cocaine and crack/cocaine includes participants

who use crack and cocaine as their primary drug of choice. The category of other includes

participants who reported their primary substance as alcohol, heroin, prescription opioids, hallucinogens, ecstasy, amphetamines, tobacco, benzodiazepines, steroids, cannabis and other drugs not listed.

      Drug treatment court variables. Based on previous literature, there is some indication that exposure to DTC, without graduating, can have positive effects on participants (Francis & Abel, 2014; Fulkerson et al., 2013). This argument suggests that participants do not have to successfully graduate from DTC in order to gain the proposed benefits. For example, Fulkerson et al. (2013) report that graduates and non-graduates express satisfaction with their DTC program. Likewise, Francis and Abel (2014) note that non-completers of DTC benefit from an increase in self-motivation, self-efficacy, family relations improved, decreased substance use and improvements to their employment and/or education status. Taking these findings into consideration, it is important to measure not only successful graduation, but also length of stay in the program as a measure of success. Total number of days in DTC program is coded as an interval ratio variable that measures the actual number of days a participant was enrolled in DTC.

      Emergency department use variables. Smith and colleagues (2015) highlight the probabilities of hospital readmission regarding substance abusers and the importance of measuring the number of prior-year hospital stays. The same authors hypothesize that number of prior hospital stays can significantly predict hospital readmissions. Following this indication, the current study includes multiple measures of ED visits not only to predict future use, but also to measure if there are changes or reductions in number of ED visits following DTC. Emergency department use during DTC measures the total number of ED visits while participants were enrolled in DTC. This is an interval variable. Emergency department use post DTC measures whether or not participants used this service one year post DTC. This variable is coded as 1 =

yes and 0 = no. The yes category includes participants who had one or more ED visits and the no category includes participants who had zero ED visits.

Missing Data

Missing values were addressed prior to running the analyses. When using logistic regression analysis, cases which contain missing values are automatically deleted through listwise deletion. Mertler and Vannatta (2013) argue that the deletion of cases may result in a substantial loss of data. The current study has a small sample size, therefore, the deletion of cases was avoided through the implementation of estimation of missing values. This method involves the calculation of the means for variables with missing data (Mertler & Vannatta, 2013). In other words, given the available data, the average response replaces the missing values. For example, missing values within the education variable were replaced with the response that participants had completed high school because this was the most frequent answer. Likewise, all missing values within the marital status variable were replaced with the response that participants reported being single as this was the most common attribute that was recorded.

Statistical Models

The current analyses have three goals: first, to determine baseline participant demographics; second, to predict successful completion of DTC; and third, to use successful completion of DTC to predict the use of ED one year post programming. To complete these tasks a number of preliminary analyses were conducted to confidently choose the best fitting statistical model. In order to minimize the loss of variance in the analyses attempts were made to complete first, ordinal regression analyses and second, ordinary least regression analyses. Unfortunately, these models did not result in statistically significant models. Thus, the current study uses logistic regression analyses to complete the three goals listed above. The first set of results are descriptive univariate statistics that highlight the demographics of DDT&MHC

participants. Following that, results from a logistic regression analysis determine which

variables predict program completion (coded no/yes). The second logistic regression analysis

examines which variables significantly predict ED use one year post DTC programming.

    According to Sainani (2014) logistic regression analyses are frequently used in medical

literature for evaluating binary outcome data. Determining binary outcome data is the goal of

the current study. The basic purpose of performing a logistic regression analysis is to classify a

sample into certain groups (Mertler & Vannatta, 2013). The dependent variable, also labelled

the outcome variable, is what the analysis attempts to predict. For example, the outcome could

be completion or noncompletion of a program, passing or failing of a course, or even being alive

or deceased. These examples could result in a binary logistic regression analysis because the

outcome variables are dichotomous, having two attributes. Overall, logistic regression specifies

the probabilities of the particular outcome for each participant included in the sample. Unlike

many other statistical analyses, logistic regression is not strained by assumptions that need to be

made by the researcher regarding the distributions of predictor variables (Mertler & Vannatta,

2013). This implies that logistic regression is flexible in that, the predictors of the outcome

variable do not have to be normally distributed, linearly related or have equal variances within

each group (Mertler & Vannatta, 2013).

    Despite logistic regression being fairly flexible regarding statistical assumptions, Mertler

and Vannatta (2013) recommend that researchers acknowledge multicollinearity issues and

outliers in a preliminary regression analysis. First, multicollinearity is a problem that arises

when moderate to high correlations exist between independent, also referred to as predictor

variables. When correlations exist, two variables can contain the same, or some of the same data

which essentially results in the researcher measuring the same content. To evaluate

multicollinearity, researchers compute a collinearity statistic and analyze the tolerance value. If

the tolerance value is less than 0.1 multicollinearity is a presenting issues. If multicollinearity is an issue researchers should consider deleting one or more of the redundant variables from the model in order to eliminate the multicollinear relationship. Second, in the preliminary regression analysis, researchers calculate the mahalanobis distance to identify any multivariate outliers. Mahalanobis distance is a statistical measure which is based on a chi-square distribution, determined by the number of predictors in a specific model. For the purpose of the current study, the first model has five predictor variables, therefore, the critical chi-square value is 20.52. The second model has seven predictor variables with a critical chi-square of 24.32. All cases in which the mahalanobis value exceeds the critical chi-square value are considered multivariate outliers and need to be eliminated prior to running the logistic regression analysis.

To predict a dichotomous outcome, logistic regression is based on probabilities – odds – and the logarithm of the odds (Mertler & Vannatta, 2013). Probability is the value being predicted in a logistic regression analysis, which ranges from 0 to 1. Logistic regression specifies the probability of a particular outcome for each case involved. For example, this analysis could be used to predict the probability of whether an individual will fall into the category of passing or failing a particular outcome measure. Second, odds are defined as the ratio of the probability that a certain outcome will take place divided by the probability that the outcome will not occur. Third, the logarithm of the odds, or logit, is the natural log of the probability of being in one group divided by the probability of being in the other group. Overall, the linear regression equation creates the logit or log of the odds.

Interpretation of logistic regression can be divided into three parts: the statistic for overall model fit, a classification table, and the summary of model variables (Mertler & Vannatta, 2013). First, the statistic for overall model fit includes multiple components to be analyzed. The -2 Log Likelihood provides an index of model fit where a perfect model would be

-2, therefore, the lower this value appears the better the model. The -2 Log Likelihood

represents the sum of the probabilities associated with the predicted and actual outcomes. The

next statistics within the overall model of fit are Cox & Snell's R Square or Nagelkerke R

Square. These statistics are also referred to as pseudo R square statistics which disclose the

amount of variance in the outcome variable that is explained by the model. Pseudo R square

statistics can range from 0 to 1, with higher values indicating better model fit. The first pseudo

R square measure used in SPSS is Cox and Snell's. This statistical measure is based on

calculating the proportion of unexplained variance that is reduced by adding variables to the

model. The Cox and Snell's statistic is not able to reach a maximum of one because if the full

model perfectly predicts the outcome the equation always subtracts from one which will

evidently result in the pseudo R square being less than one. Because of this shortcoming, the

Nagelkerke measure was introduced as an alternative method which adjusts the Cox and Snell's

statistic and allows for the maximum value of one to be reached. More often, Nagelkerke's

Pseudo R square will be higher than Cox and Snell's measure because of the manual adjustment

that has been added. Overall, Cox and Snell's statistic is more conservative because it has not

faced any adjustments. Thus, Cox and Snell's measure will be reported in the current analysis.

Last, the chi-square value indicates whether the model is best at predicting the outcome after

adding the predictor variables.

Mertler and Vannatta (2013) advise that the second component within logistic regression

analyses is the classification table. This table applies the generated model which includes all

predictor variables when forecasting group membership of the outcome variable. These

predictors are compared to actual participant values and the percentage of participants correctly

classified is calculated and serves as another indicator of model fit.

The third component of a logistic regression output is the summary of model variables (Mertler and Vannatta, 2013). The first statistic is the values labelled B or the regression coefficients. This statistic represents the effect the predictor variables have on the outcome variable. S.E. is the standard error of B. Wald is a measure of significance for B or regression coefficients and represents the significance of each variable's ability to contribute to the overall model. Additionally, degrees of freedom and level of significance are also reported in relation to Wald, where R is the partial correlation of each predictor variable with the outcome variable. The final statistic included in the summary of model is Exp(B), which is the calculated odds ratio for each variable. The odds ratio represents the increase (or decrease if Exp(B) is less than one) in odds of being classified in a category when the predictor variable increases by one unit.

In summary, the current study used a quasi-experimental design with 70 DDT&MHC participants. All data was collected from Pinewood Centre of Lakeridge Health. There were a total of 124 variables that were collected based on previous studies, an unidentified file and an interview with addiction counsellors. Majority of the collected variables were eliminated, resulting in a total of eight variables being included in the analysis. The eight variables are: gender, education, marital status, drug of choice, number of days in program, disposition, ED use during DTC and ED use post DTC. The following chapter presents the demographics results of participants and the two identified logistic regression analyses.

Chapter 4: Results

The following chapter presents the results of Hypothesis One and Hypothesis Two. First, descriptive statistics for DTC participants' demographics and the dependent variables will be discussed, followed by the logistic regression analyses which predict, first, DTC completion, and second, emergency department use.

Univariate Statistics of Drug Treatment Court Participant Demographics

A total of 70 participants were included in the analyses and their demographics will be discussed below (see table 2). There were significantly more female participants than males. Overall, there were 61.4 percent (n=43) female participants and 38.6% (n=27) male participants. It appeared that all participants had some level of education. More precisely, 32.9 percent (n=33) of the participants, did not graduate high school. This data implies that a portion of the sample had less than high school or some high school experience. In contrast, 62.9 percent (n=44) of the sample did graduate high school and 28.6 percent (n=20) of those had received some form of post-secondary education. In relation to familial conditions, data was collected on participants' marital status. A majority of participants, 64.3 percent (n=45) reported being single. There were 77.1 percent (n=54) of participants who reported not having a significant other, which included being single, separated or divorced. In contrast, 17.2 percent (n=12) of the participants reported having a significant other, whether their relationship was reported as common law or married/widow. There were four missing cases.

Data was collected in relation to participants' history of drug use, specifically, participants' primary drug of choice. The results suggest that 50 percent (n=35) of the participants reported that crack was their primary drug of choice. This suggests that the remaining half (n=35) of the participants reported that other substances were their primary drug

of choice. More specifically, 24.3 percent (n=17) of participants reported that their primary drug

of choice was prescription opioids, followed by, 11.4 percent (n=8) of participants reported

cocaine and 2.9 percent (n=2) of participants reported each of the following: alcohol, heroin,

amphetamines, benzodiazepines, and cannabis.

Table 2

Descriptive Statistics for Demographics of Drug Treatment Court Participants (n=70)

Variable	Attribute	Frequency	Valid Percent
Gender	Male	27	38.6
	Female	43	61.4
	Total	70	100
Education	Less than HS	7	10
	Some HS	16	22.8
	HS	24	34.3
	Post-Secondary	20	28.6
	Missing	3	4.3
	Total	70	100
Marital Status	Single	45	64.3
	Separated	4	5.7
	Divorced	5	7.1
	Common law	6	8.6
	Married/Widowed	6	8.6
	Missing	4	5.7
	Total	70	100
Drug of Choice	Crack	35	50
	Alcohol	2	2.9
	Cocaine	8	11.4
	Heroin	2	2.9
	Prescription Opioids	17	24.3
	Amphetamines	2	2.9
	Benzodiazepines	2	2.9
	Cannabis	2	2.9
	Total	70	100

Univariate Statistics of Dependent Variables

Outlined below are the univariate statistics of the two dependent variables (see table 3). Drug treatment court completion is the first dependent variable measured in the following analyses. This variable measures the manner in which participants exit from DDT&MHC. Under a quarter of the participants, 21.4 percent (n=15) successfully graduated from DTC. An additional 2.9 percent (n=2) of the participants received a certificate of completion which measures some form of improvements relating to their drug use and/or productivity. In contrast, 12.9 percent (n=9) of participants exited the program as a result of reoffending, followed by, 11.4 percent (n=8) of participants who were discharged because of not complying with program rules, 27.1 percent (n=19) of participants who were expelled, 15.7 percent (n=11) of participants who were absent without leave, 2.9 percent (n=2) of participants who were no longer interested in the program, 1.4 percent (n=1) of participants who were diverted to a more appropriate program and 4.3 percent (n=2) of participants who failed to appear at court. Overall, 24.3 percent (n=17) of the sample reported some form of successful completion of the program. The remaining 75.7 percent (n=53) of the sample were unsuccessful in completing DDT&MHC.

Emergency department use post DTC enrollment is the second dependent variable measured in the following analyses. This variable measures the frequency that participants use ED services one year following DTC programming. The response for number of times participants attended the ED ranged from 0 through 17. The modal response was 0 at 71.4 percent (n=50) and the median was also 0. The average number of times participants used ED services post DTC was 1.10. There was a standard deviation of 3.037, which indicates that this is the average of how much the responses deviate from the mean after being squared. Overall, just under three quarters of the sample did not report any ED use one year post DTC.

Table 3

Descriptive Statistics for Dependent Variables (n=70)

Variable	Attribute	Frequency	Valid Percent
DTC	Graduated	15	21.4
Completion	Certificate	2	2.9
	Reoffended	9	12.9
	Discharged	8	11.4
	Expelled	19	27.1
	AWOL	11	15.7
	No Longer interested	2	2.9
	Diverted	1	1.4
	FTA	3	4.3
	TOTAL	70	100
ED Post DTC	0	50	71.4
	1	8	11.4
	2	5	7.1
	3	1	1.4
	4	2	2.9
	5	1	1.4
	13	2	2.9
	17	1	1.4
	TOTAL	70	100

In addition to the descriptive statistics, cross tabulations were conducted to determine how ED use, both pre and post DTC, vary by primary drug of choice. The first cross tabulation considers the relationship between participants' primary drug of choice and their use of ED services prior to entering DTC (see table 4). The results suggest that 59.3 percent (n=16) participants who report that their primary drug of choice is all other substances did not use ED services prior to DTC programming, where slightly more crack/cocaine users 69.8 percent (n=30) did not use ED services prior to entering DTC. In contrast, 40.7 percent (n=11)

participants whose primary drug of choice is all other substances used ED services prior to DTC

programming and 30.2 percent (n=13) participants whose primary drug of choice is

crack/cocaine used ED services prior to receiving treatment from the DTC program. These

results suggest that there are more participants who report crack/cocaine as their primary drug of

choice compared to all other substances who used ED services prior to entering DTC. The cross

tabulation suggests that the relationship between participants primary drug of choice and ED use

prior to DTC is not significant.

Table 4

Emergency Department Use Prior to Drug Treatment Court by Participants Primary Drug of Choice (n=70)

		Primary Drug of Choice		
		Other	Crack/Cocaine (1)	Total
ED Prior to DTC	No	16 (59.3%)	30 (69.8%)	46 (65.7%)
	Yes (1)	11 (40.7%)	13 (30.2%)	24 (34.3%)
Total		27 (100%)	43 (100%)	70 (100%)
Chi-Square		.813		
P value		.441		

A second cross tabulation was conducted to consider the relationship between

participants' primary drug of choice and ED use post DTC (see table 5). The results are very

similar to those discussed in the previous cross tabulation. There are 63 percent (n=17)

participants whose primary drug of choice is all other substances who did not use ED services

post DTC, compared to 76 percent (n=33) crack/cocaine users who did not use ED services after

exiting DTC. In contrast, 37 percent (n=10) of all other substance users did use ED services post

DTC, whereas, 23 percent (10) of crack cocaine users did use ED services post DTC. If these

results are compared to the first cross tabulation very minor changes can be noted. However, the

changes that can be discussed indicate that there was a small decrease in ED use post DTC for

participants who report that their primary drug of choice is both crack/cocaine and all other

substance. The cross tabulation indicates that the relationship between participants primary drug

of choice and ED use post DTC is not significant. This means that although there were patterns

noticed in Table 4 and Table 5, these trends are relevant to this study and this sample only and

cannot be generalized to other DTC participants.

Table 5

Emergency Department Use Post Drug Treatment Court by Participants Primary Drug of Choice (n=70)

		Primary Drug of Choice		
		Other	Crack/Cocaine (1)	Total
ED Post to DTC	No	17 (63.0%)	33 (76.7%)	50 (71.4%)
	Yes (1)	10 (37.0%)	10 (23.3%)	20 (28.6%)
Total		27 (100%)	43 (100%)	70 (100%)
Chi-Square		1.543		
P value		.279		

Hypothesis One: Predicting Drug Treatment Court Completion

This section presents the results found for the following question: Can successful

completion of DTC be correctly predicted from knowledge of gender, education, marital status,

primary drug of choice and number of days in the program? A preliminary multiple regression

was conducted to calculate Mahalanobis distance and examine multicollinearity among the five

predictor variables. Tolerance for all variables is greater than 0.1, indicating that

multicollinearity is not an issue. The calculated Mahalanobis distance was used to determine

which cases exceeded the critical chi-square value (p<.001 with df = 5, Chi Square (crit) =

20.515) and four cases (20, 21, 32 and 67) did not met this critical value and therefore were

deleted from the present analysis.

There were a total of 66 valid cases included in this logistic regression analysis (see table

6). Prior to including the predictor variables, which is identified as the constant value, the model

correctly classifies 74.2 percent of DTC completion. The constant value is the natural odds of

the outcome variable occurring without the addition of any predictor variables in the analysis.

Again, when considering just the constant, the model indicates that respondents are 0.347 less

likely to successfully graduate DTC. This is significant at the 95 percent confidence interval

(Wald 14.144, p<.05).

The -2 Log likelihood decreases from 52.760 to 46.436 with the addition of the predictor

variables gender, education, marital status, primary drug of choice and number of days in the

program. The omnibus tests indicates that gender, education, marital status, primary drug of

choice and number of days in the program improve the prediction of completion of DTC (X^2

28.870, p,.05). The Cox and Snell's pseudo R square shows that gender, education, marital

status, primary drug of choice and number of days in the program explain 35.4 percent of the

variance in DTC completion.

Once taking the predictor variables into consideration, the model correctly classifies 80.3

percent of DTC completion. The variables in the equation values indicate that participants who

have a higher education are 2.946 more likely to successfully graduate from DTC. Whereas,

participants who have a significant other are 0.136 less likely to successfully graduate from

DTC. Meanwhile, participants are 1.008 more likely to successfully graduate from DTC with

each additional day they are enrolled in the program. Participants' education level (Wald 4.824,

p<.05), marital status (Wald 4.805, p<.05) and number of days in the program (Wald 10.650,

p<.05) are significant predictors of DTC completion. Finally, gender and primary drug of choice

are not significant predictors of completion of DTC.

Table 6

Logistic Regression Predicting Drug Treatment Court Program Completion (n=66)

Predictor Variables	Coeff.	SE	Odds Ratio
Gender (Female = 1)	-1.114	.856	.328
Education	1.081	.492	2.946*
Marital Status (Yes = 1)	-1.998	.911	.136*
Primary Drug of Choice (Crack/cocaine = 1)	.442	.758	1.556
# of Days in Program	.008	.003	1.008*
(Constant)	-3.723		
Pseudo R-Square =	.357		
F =	28.870		
Significance =	.000		

Note. Model chi-square is significant at p<.05
Note. The effects of respondents' age, employment and income were also tested, but did not
appear statistically significant. Thus, these variables were dropped in the final analysis for the
purpose of parsimony.
*p<.05.

Based on the results of the logistic regression analysis, the null hypothesis is partially

rejected because participants' education level, marital status and number of days in the program

are significantly related to the probability of successfully graduating DTC.

Hypothesis Two: Predicting Emergency Department Use Post Drug Treatment Court

This section presents the results found for the following question: Can ED use post DTC

enrolment be correctly predicted from knowledge of gender, education, marital status, primary

drug of choice, number of days in the program, final disposition and ED use during DTC? A

preliminary multiple regression was conducted to calculate Mahalanobis distance and examine

multicollinearity among the seven predictors. Tolerance for all variables was greater than .1,

indicating that multicollinearity was not an issue. The calculated Mahalanobis distance was used

to determine which cases exceeded the critical chi-square value (p<.001 with df = 7, Chi Square

(crit) = 24.322). Five cases (20, 21, 32, 60 and 67) exceeded this critical value and therefore

were deleted from the present analysis.

Based on the deletion of five cases, there were a total of 65 valid cases included in this

logistic regression analysis (see table 7). Prior to including the predictor variables, the model

correctly classifies 75.4 percent of ED visits post DTC. Again, when just considering the

constant, which is the natural odds of the outcome variable measure to occur without the

addition of any predictor variables, the model indicates that respondents are 0.327 less likely to

use the ED post DTC. This is significant at the 95 percent confidence interval (Wald 15.109,

p<.05).

The -2 Log likelihood decreases from 57.743 to 55.074 with the addition of the predictor

variables gender, education, marital status, primary drug of choice, number of days in program,

final disposition and ED visits during DTC. The omnibus test indicates that gender, education,

marital status, primary drug of choice, number of days in program, final disposition and ED

visits during DTC improve the prediction of ED visits post programming (X^2 17.475, p<.05).

The Cox and Snell's pseudo R square shows that that gender, education, marital status, primary

drug of choice, number of days in program, final disposition and ED visits during DTC improve

the prediction of ED visits post programming explain 23.6 percent of the variance in ED visits

post DTC.

Once taking the predictor variables into consideration, the model correctly classifies 78.5

percent of ED visits post programming. The variables in the equation values indicate with each

unit increase in number of ED visits during DTC, participants were 1.650 more likely to use ED

services one year after exiting the program. Participants' ED use during DTC (Wald 5.840,

p<.05) is a significant predictor of ED use one year post DTC. Finally, gender, education,

marital status, primary drug of choice, number of days in program and final disposition are not

significant predictors of ED use post DTC.

Table 7

Logistic Regression Predicting Emergency Department Use Post Drug Treatment Court (n=65)

Predictor Variables	Coeff.	SE	Odds Ratio
Gender (Female = 1)	-.761	.810	.467
Education	-.437	.359	.646
Marital Status (Yes = 1)	.837	1.092	2.309
Primary Drug of Choice (Crack/cocaine = 1)	1.042	.801	2.835
# of Days in Program	.001	.002	1.001
DTC Disposition (Graduated = 1)	1.537	1.091	4.649
# of ED Visits During DTC	.500	.207	1.650*
(Constant)	-3.089		
Pseudo R-Square =	.236		
F =	17.474		
Significance =	.015		

Note. Model chi-square is significant at p<.05
Note. The effects of respondents' age, employment and income were also tested, but did not
appear statistically significant. Thus, these variables were dropped in the final analysis for the
purpose of parsimony.
*p<.05.

Based on the results of the logistic regression, the null hypothesis is partially rejected

because number of ED visits during DTC is significantly related to the probability of ED use

post DTC.

The results of testing Hypothesis One and Hypothesis Two find that there are significant predictors for both DTC completion and ED use post programming. First, the results indicate that participants with a higher education level are more likely to successfully graduate from DTC. In regards to marital status, specifically having a partner, negatively influences participants' ability to successfully complete DTC. Next, the results suggest that the longer participants spend as a member of the program the higher their chances are to be successful. Furthermore, when testing Hypothesis Two, ED use during DTC was a predictor of participants' use of ED services one year post programing. Participants who used ED services frequently while they were enrolled in DTC were more likely to use these services one year post programming. These results will be discussed in relation to the previous literature that has already been reviewed in the following chapter.

Chapter 5: Discussion and Conclusion

In this chapter, findings from the current study are situated into the broader context of DTC outcomes and public policy implications. First, the results are discussed in relation to previous literature on DTC evaluations and second, the use of ED services by DTC participants. Regarding public policy implications, emphasis is on hospital readmissions which are a salient issue within the population of drug abusers. Methodological limitations related to data restrictions are presented.

Predicting Drug Treatment Court Completion

The results of Hypothesis One suggest that participants' education level, marital status and number of days in DTC significantly predict program completion. First, the Unstandardized B value of participants' education level reveals that with each unit increase in education increase the probability of graduating from DTC. Schiff and Terry (1997) also found that an increase in education significantly predicted successful graduation from DTC. In the same authors study and in the current study, it is argued that graduating from high school rather than having some high school increases the probability of graduating from DTC.

The Unstandardized B value of marital status reveals that participants who have a significant other are less likely to successfully graduate from DTC. The results are consistent with previous findings of Newton-Taylor et al. (2009) who advise that DTC graduates are more likely to be divorced or separated from their partner. Shannon et al. (2014) find different results that marital status is not a significant predictor of program completion. Despite some contradictions in the findings to date, based on the results of the current study, it is argued that DTC participants who are single, separated or divorced have a greater chance of successfully completing the program.

The number of days participants are in DTC appears to be a significant predictor of program completion. The Unstandardized B value of number of days in the program reveals that the longer participants are in DTC the more likely they are to successfully graduate. To date, DTC evaluations have not measured participants' length in the program as a possible predictor of success because on average participants need one year to complete all requirements. Therefore, this finding reflects the general structure of DTC programs where the longer participants are members of the program the more likely they are to be successful. There appears to be some indication from previous literature that also supports this claim. For example, Somers et al. (2012) study recidivism rates for non-graduates and indicate that the longer participants stayed in DTC significantly predicts their recidivism. In a similar case, Gallagher (2014) reports that if participants violate DTC rules within the first 30 days, their probation period, they are more likely to recidivate. This again suggests that a shorter time spent as a participant of DTC will reduce the chances of positive outcomes. Overall, there is evidence that the longer participants remain in DTC the more likely they are to benefit from the program. In this case, a benefit could be successfully graduating from the program.

Predicting Emergency Department Use Post Drug Treatment Court

Hypothesis Two sought to determine which participants' characteristics, program completion and previous ED use significantly predict the use of ED services one year following DTC. In the logistic regression analysis, the Unstandardized B value indicates that gender, age, education, marital status, primary drug of choice and final disposition are not significant predictors of ED use post DTC. Meanwhile, ED use during DTC increases the likelihood of participants using ED services one year post DTC.

Emergency department use during DTC programming predicts and increases the likelihood of ED use post enrollment. This finding cannot be directly compared to previous

research because this appears to be the first study that measures this association. However, the

literature on repeated hospitalizations of substance abusers supports the current finding. The

continuous use of ED services by former DTC participants may be explained by the argument

that ED services are used by drug abusers as their sole provider for medical care (Brubacher et

al., 2008), which increases participants' reliance on ED services. More precisely, the same

authors argue that patients with substance abuse problems have more readmissions into the

hospital during the one year follow-up period than those without substance abuse conditions. In

another study, Smith and colleagues (2015) find that in the 12 months after being discharged

from the hospital, 16.4 percent of patients with substance abuse conditions report another ED

visit. This information supports the finding that DTC participants who use ED services while

enrolled in the program have a greater chance of continuing to use these services post

programming. However, based on the cross tabulations that were presented, there was a small

reduction in ED use post DTC for both participants who reported that their primary drug of

choice was crack/cocaine and all other substances. There were 30.2 percent (n=13)

crack/cocaine users who use ED services prior to DTC compared to 23 percent (n=10) who used

ED services post DTC. In contrast, 40.7 percent (n=11) participants who reported that their

primary drug of choice was all other substances used ED services prior to DTC, whereas, 37

percent (n=10) used ED services post DTC. This suggest that a smaller percent of DTC

participants, despite their primary drug of choice, report less use of ED services post DTC.

Therefore, despite any indication of reduced ED use post DTC through the logistic regression

analysis, less participants are using these health services following treatment. Perhaps with

stronger methods in future evaluations, such as longer follow up periods, the results may imply

a reduction of ED use by DTC participants.

Drug Treatment Court Implications

The findings of the current study suggest many implications for DTC programs. Despite any indication that engagement in DTC has an effect on participants' use of ED services, this does not imply that the program lacks the ability to achieve social benefits. Previous DTC evaluations support the notion that the program is capable of reducing criminal recidivism. This indicates that DTC programs are achieving the mandated goal, reducing drug crimes and that these programs should continue to be implemented.

Unfortunately, given the results, the argument that DTC programs have a relationship with a reduction in participants' use of ED services cannot be implied by this study. The current study suggests that DTC programs do not have the assumed effect on participants' use of ED services. This implies that DTC programs do not appear to be effectively saving health care costs. However, the result which indicates that participants who use ED services while enrolled in DTC increases their probability of continuing to use these services following programming, provides DTC programs with innovative objectives relating to participants' use of ED services. To further address DTC participants' repeated use of ED services some suggested policy implications are outlined below.

Policy Implications

The findings from the current study could have important health policy implications in relation to drug abuse interventions. First, it is important to bring awareness to the findings of the current study. That is, DTC programs should have an educational/training session which seeks to give understanding to the claim that participants' use of ED services while enrolled in DTC predicts the ongoing use of ED services following programming. A discussion is required amongst DTC professionals to highlight that participants who use ED services while enrolled in

the program have greater chances of continuing to use them post programming. Hopefully initiating this conversation will result in adequate proactive measures that will attempt to prevent the ongoing use of ED services by DTC participants. This educational session would create an increased awareness for the programs' possible capability to contribute to additional social benefits.

Another policy implication seems to be that DTC counsellors would benefit from identifying participants who are using ED services while enrolled in DTC. Following identification of such participants, the assigned professions could begin to address some of the barriers to ED readmissions by providing the participants with adequate support and services. This may be achieved from incorporating information of participants' ED use into their ongoing case management. Case management of DTC participants includes providing social supports necessary to achieve social reintegration, which is a principle of DTC. Supporting DTC participants to achieve social reintegration could include creating working partnerships with a family physician and local hospitals in order to provide participants with health support and allow ED data to be transparent. First, the literature suggests that substance abusers often use ED services as their sole health care provider (Parker et al., 2012). This may be a result of drug abusers not having the skills or resources to obtain a family physician. Therefore, DTC programs would benefit from establishing a working partnership with a general practitioner who would be willing to take on the programs' participants. Second, in addition to creating working partnerships with local hospitals, DTC counsellors would need to encourage participants to report any ED use on an ongoing basis. This consideration would have to be approved of by participants and could potentially become a part of the waiver signed by all participants prior to entering the program. Counsellors may want to explore and encourage more ambulatory care and discourage emergency room care among participants.

The findings of this study highlight the need to identify public health strategies tailored at meeting the unique needs of substance abusers when they use ED services. Vlahaki and Milne (2009) indicate that the goal of The Canadian Emergency Department Triage and Acuity Scale is to accurately define patients' needs for timely care and provide operating objectives to standardize this care. Therefore, emergency departments would benefit from obtaining and maintaining administrative data on frequent users and establishing a program which provides them with the necessary resources and support systems. Connecting frequent ED patients who have substance abuse issues with community support could potentially reduce some of the associated health care costs.

The results from Hypothesis One suggest that participants who stay in DTC longer have an increased probability of graduating from the program. This insinuates that DTC programs should attempt to keep their participants engaged in the program for as long as they can, given that they don't exceed the typical 12 to 18 months enrollment in the program. Based on deterrence theory which suggests that individuals weigh out pain and pleasure, the sanctions and rewards system that is integrated into DTC programs should continue to be expanded. Often times DTC participants engage in the program because if they are successful they will avoid a jail sentence. However, this reward lacks tangibility and therefore, DTC programs would benefit from implementing an interval awards system. That is, the program should present participants with tangible rewards that increase in value at one month, three months, six months and nine months of being enrolled in the program. This mechanism could be used as an incentive to encourage participants to remain in the program longer, which evidently increases the probability that they will graduate.

There are only six federally funded DTC programs in Canada and DDT&MHC is not one of the specialized courts that receive government funding. As a result, there remains a

limited amount of stakeholders who are involved in DDT&MHC. Provided this program

receives funding there could be a substantial increase in community partners who are involved

in delivering services to participants. The mandated goal of DTC programs is to reduce drug

crimes which can be achieved by participants becoming and remaining clean from their primary

drug of choice and to develop and re-establish themselves as productive members. To become

productive members of society participants must obtain safe housing, employment, volunteer

work and/or vocational skills training. However, without having stakeholders who work in these

fields as part of the DTC team, the odds of participants achieving these goals becomes limited.

It is suggested that DTC programs would benefit from including members on their team

from employment and housing programs. For example, specific to DDT&MHC, the program

would benefit from including Durham Region Employment Network to their stakeholders

memberships. Having a member from this organization would ensure that participants are

receiving the necessary services to obtain and maintain employment. Likewise, Durham Access

to Social Housing Corporation would bring a great deal of knowledge regarding how to access

stable housing in the region. Introducing these stakeholders to DDT&MHC could help the

participants become productive members of society and also address some health concerns

outside of emergency departments.

Methodology Limitations

Previous research demonstrates that DTC evaluations often to have sample sizes of at

least 100 drug court participants and a similar number of comparison offenders in control groups

(Belenko, 1998). The current study has a small sample size as a result of the limited number of

years that DDT&MHC has been operational. As this program is relatively new and lacks

government funding, a limited number of participants have been enrolled in this program to

date. Following the exclusion of participants based on date and age restrictions, a total of 70

participants were included in the analyses. Future DTC evaluations should seek to include more

participants and/or create control groups.

A highly recognizable research design is randomized controlled trial (DeMatteo, Dilone

& LaDuke, 2011). In this type of research a large number of participants are randomly selected

and assigned to either a treatment group or comparison/control group. However, DeMatteo,

Filone and LaDuke (2011) argue that random assignment research appears to be an unrealistic

approach when doing research within the CJS. In addition, DTC participants ultimately self-

select to engage in the program which results in low generalizability (Tucker & Roth, 2006). As

a result of public safety and legal concerns, DTC research cannot typically implement a

randomized controlled trial design, which is also a limitation in the current study.

Another limitation of this study is the lack of diverse ED data. The findings do not

account for ED use outside of the geographical area of Oshawa, specifically, Oshawa's

Lakeridge Health Hospital. Researchers who are interested in measuring the association between

DTC participants and their use of ED services may be better off with data that includes diverse

ED information. For example, researchers would benefit from requesting access to more than

one hospital organization because DTC participants could be using alternative ED locations. Not

all of DDT&MHC participants reside in the area of Oshawa, therefore, participants could be

using ED services in their residing city. Future research on DTC participants' use of ED services

should attempt to investigate a larger geographical surrounding which would include multiple

hospital agencies.

The final methodological limitation is that this study has a short follow-up period of one

year. Merrall and Bird (2009) suggest that measuring reconviction two years post program

enrollment appears to be an ideal primary outcome in DTC studies. With that being said,

considering this study seems to be the first which measures ED use post program enrollment, a one year follow-up period is sufficient. However, future studies should attempt to use a two year minimum follow-up period. As previously stated, Krebs et al. (2007) argue that DTC researchers must examine whether DTC programs provide benefits over an extended period of time. The authors support this argument with the finding that the effects of DTC on recidivism are delayed. This implies that DTC evaluations which measure ED use may show positive effects should the researchers provide a follow-up period longer than one year.

Future Research

This thesis accessed secondary data in order to explore the relationship between DTC programs and ED services. This study may offer a more holistic approach to DTC impact evaluations which measures both punitive and health service outcomes (recidivism and ED use). This research project generates additional research questions such as "How does having a significant other decrease participants' ability to successfully complete DTC?" and "Why do DTC participants exit the program and continue to use ED services frequently?"

This study reveals that marital status appears to be a predictor of DTC completion. Participants who have a significant other are less likely to successfully graduate from DTC. It is recommended that this concept be explored more in depth. A qualitative study which seeks to explore themes relating to DTC participants' significant others, specifically their personal characteristics and lifestyles, may provide a better understanding as to why marital status is a significant predictor of program completion.

Future research should attempt to discover the reasons why participants continue to use ED after DTC. Attempts should be made to measure the reasons why DTC participants access ED services. This information could help researchers establish whether former DTC participants

are using ED services as a result of drug abuse or other health concerns. Further examination is required to determine whether DTC participants' reasons for ED use can only be addressed from this type of health care, or if the visits can be avoided by the patient seeking treatment from a family physician.

Conclusion

This thesis explores the idea that participation in DTC has substantial social impacts by influencing recidivism and may also affect the use of ED services. With the ongoing implementation of DTC programs across the world, evaluations are pertinent in redefining this diversion program to meet peak success. Belenko (1998) argues that there are three types of evaluations: process or operations evaluation, cost saving analysis and impact evaluations. Building on the typical impact evaluations which often measure recidivism, this thesis expands DTC evaluations by considering emergency department use.

Traditionally impact evaluations take the stance of measuring criminal recidivism because the overall goal of DTC is to reduce participants' substance use and in turn reducing future criminal behaviours. As this is the goal, evaluations measure the programs' ability in achieving success through this means. Research finds that, in general, this program is effective in reducing criminal recidivism (Holloway et al., 2006; Latimer et al., 2006; Mitchell et al., 2012; Shaffer, 2011; Wilson et al., 2006). Drug treatment court evaluations indicate that participants are more likely to recidivate if they are older (Krebs et al., 2007), are employed or a student (Dannerbeck et al., 2006), are a high school graduate, are married (Shaffer et al., 2009), are Caucasian participants (Dannerbeck et al., 2006; Krebs et al., 2007) and successfully complete the DTC program (Gifford et al., 2014). In this thesis, recognition is awarded to DTC programs' ability to reduce criminal recidivism because researchers most often use this as their

outcome measure. More importantly, in the current study the first model measures program completion. When reviewing the literature, DTC participants' gender, education and marital status are predictors of program completion, while other researchers did not find such results. Therefore, these associations are tested.

There is also a body of literature that identifies a strong relationship between substance abuse and ED use. Brubacher et al., (2008) argue that patients with substance abuse problems have more readmissions into the hospital during the one year follow-up period than those without substance abuse conditions. Hospital admission and readmission of individuals with substance abuse conditions are prevalent and occur at high costs. The literature demonstrates that readmission of substance abusers to ED services are a result of patient related factors, disease related factors and system related factors (Wong et al., 2010). Review of the literature indicates that most often patients' gender, education and primary drug of choice are predictors of ED use, whereas, marital status is not yet tested. These relationships are tested in the current study.

To date, there are no DTC studies that ventured into measuring any changes related to health services, specifically ED use. This line of inquiry was at the forefront of the current research. It is with hopes that this study provides a new way of understanding the possible social impacts which DTC programs can provide to both the criminal justice and health care systems. This research study advances our understanding of DTC impact evaluations on multiple levels. First, there are demographic factors which influence successful completion of DTC. Specifically, participants who have a higher level of education, who remain in the program for a longer period of time and those who do not have a significant other are more likely to graduate from DTC and obtain the maximum benefits. Second, the study shows the importance of considering additional benefits which DTC programs can bring forth for health care services.

Drug treatment court programs are based on criminal justice and treatment, therefore, future

evaluations should attempt to measure both outcomes. Third, this research indicates that there

are systematic issues which result in substance abusers ongoing readmissions to ED services

even after receiving intensive treatment such as DTC. Based on these finding, DTC

professionals can play an important role in addressing the elevated rates of ED use by

participants through careful identification and community resources

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