University of Alberta

Edmonton's Crime Zones: Criminal Profiling Techniques Reveal Patterns of Violent Crime

by

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A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Master of Arts

Department of Sociology

For my family who makes all the effort worthwhile
through their constant support.

ABSTRACT

The purpose of this thesis is to examine the nature of murders and attempted murders in the City of Edmonton with a particular focus on the demographic and geographic distribution of these crimes across the city and its inhabitants. By examining violent crimes in a specific urban setting, this thesis explores the application of the well-established techniques of criminal profiling and its subset geographical profiling. Specifically, this research incorporates both statistical and spatial analysis techniques to the demographic and geographic attributes of murder and attempted murder victims and offenders in Edmonton between June 6, 2006 and December 31, 2012. The intention of this thesis is to identify exemplars and arrive at a comprehensive profile of murder and attempted murder.

ACKNOWLEDGEMENTS

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CHAPTER 1: **INTRODUCTION**

Within the last forty years, contemporary models of crime intended to facilitate offender apprehension techniques of criminal investigators have increasingly emphasized the importance of geography (Douglas, 2007; 2006; 2000; 1999; 1997; Ressler, 1997; 1994; 1992; 1988; Brantingham & Brantingham, 1981; 1984; 1993a; Canter, 2008a; 2008b; Rossmo, 2000). Beginning in the 1970s, the Federal Bureau of Investigation (FBI) in the United States advanced its criminal profiling model under the direction of former FBI agents John Douglas and Robert Ressler. This model was developed in order to assist criminal investigators and profilers at leading police agencies around the globe in tracking down violent serial killers based on their exhibited predatory actions. One of the subsets of the overarching criminal profiling model is the geographical profiling model; that is, tracking and predicting offender movement through the use of maps. The principles and applications of geographical profiling were expanded in the 1990s by British Criminal Psychologist David Canter and Canadian Criminologist Kim Rossmo to include Geographic Information Systems (GIS) mapping techniques, mathematical algorithms, and psychology-based analyses of offender-specific cognitive processes. Canter and Rossmo undertook their respective research in order to better predict an offender's travel patterns between his/her residence and the crime scene. Current geographical profiling models, then, are applied by criminologists and police investigators in order to identify an offender's most likely base location (e.g. home, work, social venue) in terms of a distinct geographic location.

Geographical profiling models draw on historically significant research (Snow, 1854; Jefferson, 1928) and long-standing environmental criminology theories from the second half of the twentieth century advanced by scholars that include such noted researchers as: Brantingham and Brantingham (1981; 1984; 1993a), Cohen and Felson (1979), Cornish (1986), Goodall (1987), Gould (1974), Kind (1987), Lynch (1960), Stea (1969), and Taylor (1977). Examples of their theories include Journey to Crime Theory (Canter & Larkin, 1993; Groff & McEwen, 2005; LeBeau, 1987; Levine, 2011; Lottier, 1938; Phillips, 1980; Pyle, 1974), Routine Activity Theory (Cohen & Felson, 1979; Siegel & Welsh, 2009), Rational Choice Theory (Cornish & Clarke, 1986; Clarke & Felson, 1993; Siegel & Welsh, 2009), Geometry of Crime Theory (Brantingham & Brantingham, 1981), and Crime Pattern Theory (Brantingham & Brantingham, 1981). Without question, some of these theories have been applied with varying degrees of success in crime investigations in North America (Lu, 2008: auto-theft in Buffalo, NY in 1998), Australia (Branca, 2004: a series of twenty-eight armed robberies in Victoria in the 1990s), and Europe (Wright *et al*., 2006: street robbery in England) (Canter, 2008a; Rossmo, 2000; Kind, 1987).

The majority of these spatially-oriented theories, however, direct their main emphasis of inquiry to deal primarily with delinquency, social disorder, and property crimes. The question of delinquency and geography was raised by Clifford Shaw and Henry McKay's Social Disorganization Theory (SDT) (1929) and by Travis Hirschi's Control Theory of Delinquency (1967; 1969). Shaw and McKay specifically identified the link between social disorganization and juvenile

delinquency. They applied spatial analysis techniques to determine the relationship between delinquency and neighbourhoods in the City of Chicago. The issue of social disorder and geography was examined through James Wilson and George Kelling's Broken Windows Theory (1982). This theory states that the maintenance and monitoring of well-ordered urban areas may prevent property crimes (e.g. vandalism) which are seen as a gateway to more serious crimes. More recently, spatially-oriented theories have shifted their focus from social disorder and delinquency to property crime (e.g. burglary) for the explicit purpose of tracking down an offender through the identification of his/her home base (Brantingham and Brantingham, 1981; 1984; 1993a). Not surprising then, a similar focus and exploration of the applications of geographical profiling is also evident in current criminological literature (Snook *et al.*, 2005) on property-based offences but continues to remain under-addressed in the area of homicide.

Criminology studies related to homicide, in particular those of Douglas, Ressler, Canter, and Rossmo, advocate for the application of criminal profiling and geographical profiling techniques. In doing so, these studies have long attended to offenders, crime scenes, and offender residences as the main units of analysis. Both criminal profiling and geographical profiling models operate on the fundamental assumption that offender behavior and crime scene evidence can be analyzed and interpreted in order to determine the most likely location of an offender's base or residence (Douglas *et al.*, 2006; Canter, 2008a; 2008b; Rossmo, 2000). These criminological inquiries, however, have neglected the importance of both the geographic location of victim residences and victim

demographics and, consequently, do not capture the full spectrum of influences on violent crime. I have observed a gap in both literature and criminal investigations concerning the relationship between offender and victim characteristics for homicides in Canada; in particular, victim and offender's spatial relationships to crime locations.

By situating both the offender and the victim within their contextual environment, we are able to explore the effects of demographic and geographic traits associated with victims of and offenders who commit violent crime. The inclusion of both offender-specific and victim-specific attributes in this thesis allows for a more comprehensive examination of *all* available features of murder—demographic and geographic. In this study, victim-specific attributes are explored alongside traditional offender-specific attributes in order to develop a more progressive and comprehensive profile for a distinct set of crimes than do current criminal profiling or geographical profiling models for a specific offender. This is achieved first by identifying the limitations of criminal and geographical profiling models and by systematically highlighting the interrelated roles of demography and geography in crime analysis. Specifically, this study provides an in-depth assessment of victim demographics and introduces the notion of the victim residence classifier.

1.1. **HYPOTHESIS AND RESEARCH QUESTIONS**

Although limited as a criminal investigative tool, geographical profiling is the most logical starting point for identifying patterns of offender locations for murder and attempted murder in Edmonton from a sociological perspective. The

geography of crime locations are revealing of social-economic variations in urban criminal activity. By this I mean that a number of structural factors are understood to contribute to explicit socio-economic variations across an urban region with regards to crime indicators. These factors include, but are not limited to: low economic status, poor living conditions, high levels of disruption, high concentration of minorities, high population density, population mobility, race, and city size (Porter, 2010).

From this perspective, then, I hypothesize that demographic patterns of murder and attempted murder victims and offenders (e.g. age, gender, victim-offender relationship, and method of killing) are spatially related to their corresponding crime locations (e.g. crime scene, offender residence, and victim residence) in the City of Edmonton. In order to validate this hypothesis, two specific questions are raised in relation to crimes, offenders, and victims. These questions are:

(1) What relationships are revealed between the demographic attributes of offenders and victims for murders and attempted murders in the City of Edmonton?

(2) Using well-established mapping and spatial analysis techniques of geographical profiling, how is data about murders and attempted murders visually rendered when mapped in the City of Edmonton?

In order to respond to these research questions it was first necessary to quantify the spatial and demographic distribution of homicide in the distinct geographic location of the City of Edmonton. A well-defined data set was required. The evidence examined in this study was sourced from secondary data collected by the Edmonton Police Service (EPS) as outlined in 'Chapter 4, Section 4.1-Research Data' of this paper. The parameters of this data set were determined by the

researcher in order to permit the categorization of the demographic attributes of offenders and victims and the mapping and measurement of the geographic distances between the three distinct crime locations.

1.2. RESEARCH DATA SET

The research data consists of de-identified documentation held in EPS case files. A total of 370 cases were included in the data set. Information collected includes crime classification (e.g. murder or attempted murder), victim and offender demographic information (e.g. age, gender, and victim-offender relationship), geographic information (e.g. crime scene, victim residence, and offender residence), and incident-based information (e.g. weapon or method of killing). The following table summarizes the dependent and independent variables under examination in this study.

Table 1: **DEPENDENT AND INDEPENDENT VARIABLES**

DEPENDENT VARIABLES	INDEPENDENT VARIABLES	
First Degree Murder	Geographic:	Crime Scenes Victims Residences Offender Residences
Second Degree Murder	Demographic:	Gender Age Victim/Offender Relationship
Attempted Murder	Incident:	Method of Killing/Weapon

On June 6, 2006, the EPS significantly modified its crime data collection system to what is now the current Edmonton Police Reporting and Occurrence System (EPROS) in order to become compliant with Canada's Uniform Crime Reporting (UCR) Survey. The EPS's official police reports are submitted to Canada's UCR Survey managed by the Canadian Centre for Justice Statistics (CCJS).[1] The UCR Survey was designed to measure the incidence of Canadian

crime and its characteristics. This information is used by federal, provincial, and municipal police agencies, policy makers, as well as public and private researchers. Prior to June 6, 2006, the EPS did not collect geographic data on either victim residence locations or offender residence locations. Rather, geographic data was only collected for crime occurrences in terms of the most serious criminal code violation and where this violation occurred—the crime scene. As such, the data used for this study was collected after the EPS moved to the current EPROS system.

Due to a rigorous adherence to ethical and legal Freedom of Information and Privacy Protection (FOIPP) requirements required by the current Research Agreement with the Edmonton Police Service, no personal or identifiable information about criminals and victims was accessed. This restriction was imposed by the EPS to include the race, ethnicity, family status, and type or location of work or other activities corresponding to both criminals and victims. The addition of this type of data could be used to enhance future research.

1.3. **RESEARCH APPROACH AND OBJECTIVES**

The EPS data allows me to understand whether the particular crimes of murder and attempted murder fit into an identifiable model. This understanding is realized on the basis of the following criterion: (1) where the crimes were committed; (2) where the offenders and victims reside; (3) demographic markers for victims and offenders; and (4) what, if any, relationships are exhibited between individuals and locations. From this criterion, two distinct methodological approaches are applied in this study. The first stage of this project

incorporates an analysis and application of the traditional investigative techniques of contemporary criminal profiling through an evaluation and categorization of the demographic attributes of both offenders and victims included in the data set. The second stage of this research expands upon current criminology-based applications of the basic principles of geographical profiling with the research specifically focused to address the victim's residence in conjunction with the traditional goal of identifying an offender's most likely base location. This part of the project is accomplished by attending to the following three distinct geographic elements of murder and attempted murder: (1) the crime scene, (2) the offender's residence, and (3) the victim's residence through the use of Geographic Information Systems (GIS) techniques to map and measure the distances between the distinct geographic locations. Fundamental to this research is the application of this study's crime analysis model, the *triangulation of crime model*, whereby the geographic coordinates of the three distinct crime locations are mapped, measured, and analyzed alongside the fundamental demographic variables of the offenders and victims. As a result, I am able to identify exemplars and present a comprehensive profile of murders and attempted murders in the City of Edmonton, Alberta, between June 6, 2006 and December 31, 2012.

The objectives of this study are visually represented in Figure 1 that captures how my application of criminal profiling techniques, in particular the use of geographical mapping and traditional police investigative techniques, enables a concise identification of patterns of murder and attempted murder.

Figure 1: RESEARCH APPROACH

The highlighted items denote the two-fold approach of this study.
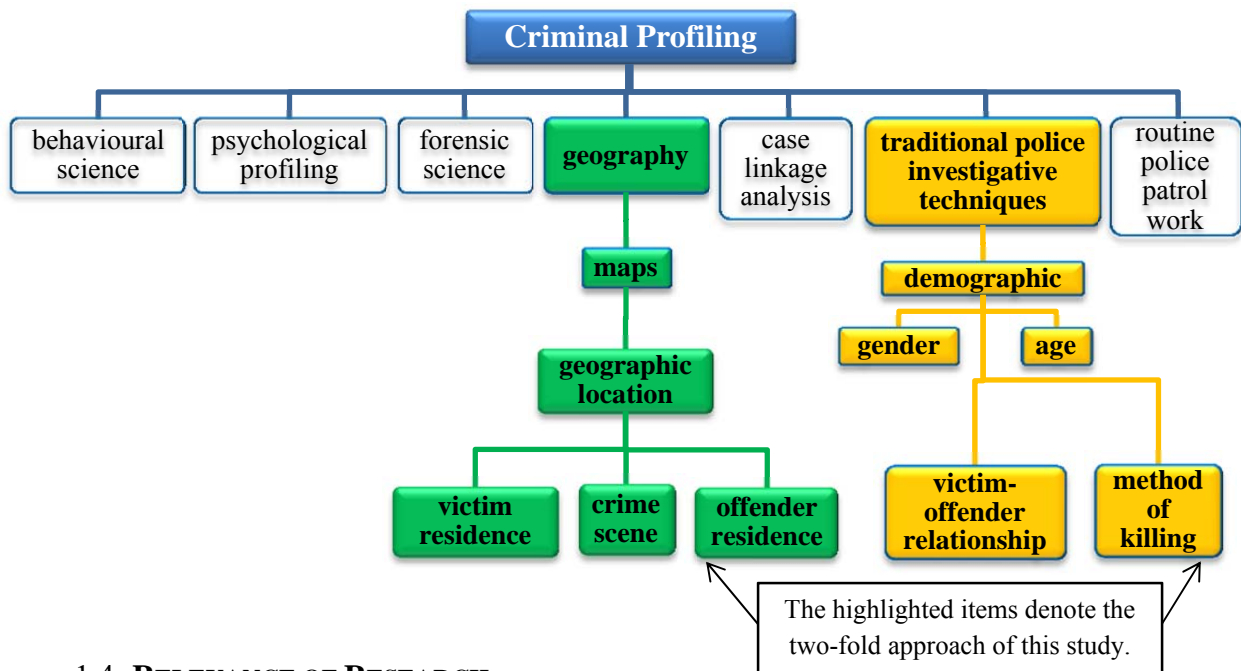
1.4. RELEVANCE OF RESEARCH

The applicability of these research results are intended to benefit not only academic research and sociological inquiry, but it can also be taken up by police agencies involved in violent crime investigations. Through the development of a documentation and dissemination plan prior to commencing my research, the results of this study will be made available to the EPS for review and, where relevant, to be utilized to engage with existing policies and procedures in their investigations of murder and attempted murder (e.g. CompStat). The possibility of influencing affirmative change such as risk assessments to profiling practices through criminology-based research means that this study has the potential to reveal connectedness with many other aspects of the Canadian criminal justice system such as suspect prioritization and defining geographical boundaries of investigative relevance.

1.5. THESIS ORGANIZATION

The study begins in 'Chapter 2: Research Location' with an overview of homicide in a Canadian context, the City of Edmonton, and the Edmonton Police Service. 'Chapter 3: A Review of Current Literature on Criminal Profiling and Geographical Profiling Models' provides a comprehensive review of relevant sociological literature both in the areas of criminal profiling as it was first conceived in the 1970s by the FBI, and of the development of current geographical profiling models applied in this study. This exploration of recent and established sociological literature presents a synthesis of ideas concerning external and internal influences of profiling, including the role of demography, geography, and visual interpretations in criminal investigations. These newly constructed theories and principles are examined here from a sociological perspective for their effect on case linkage analysis and suspect prioritization. The applicability of both criminal profiling and geographical profiling models to academic research and the study of policing is discussed and an outline is provided of the elements of these theories that were relied on for this original research.

The methods used to collect and analyze data for this study are presented in 'Chapter 4: Methodology.' The specific procedures used for data collection are outlined and the analytical methods that were used for both statistical analysis and geographical mapping are fully described. The data set was obtained through a Research Agreement with the EPS and consists of statistics collected for first degree murder, second degree murder, and attempted murder cases in Edmonton between June 6, 2006 and December 31, 2012. Moving forward, this temporal

period is referred to throughout this thesis as 2006-2012. Further, first degree murders and second degree murders are henceforth referred to as murders.

The results of the analysis and discussion on the implications of this study's findings are examined in Chapter 5, Chapter 6, and Chapter 7 respectively. 'Chapter 5: Patterns and Characteristics of Homicide in Edmonton' presents and overview of the major features of the data set including the demographic features of the individuals involved in the crimes (e.g. age, gender, offender/victim relationship, and the method of killing). 'Chapter 6: Geographic Attributes of Crime Locations' explores the geographic attributes of the three defined crime locations: crime scene, victim residence, and offender residence. 'Chapter 7: Summary of Findings' addresses the broader aspects of the research findings and explores the implications for related policies, procedures, and future research.

In conclusion, this study is designed to promote investigating beyond traditional criminal profiling and geographical profiling approaches by expanding the sociological understanding of murder and attempted murder to include all available demographic and geographic traits of the crime and the individuals involved. The chapters of this thesis are organized to present a staged progression in this research by starting with the principles and theories that lead to understanding further how sociologists view the role of demography and geography in crime analysis by analyzing the related patterns of crime-specific locations and individuals.

CHAPTER 2: **RESEARCH LOCATION AND CONTEXT**

2.1. **HOMICIDE IN A CANADIAN CONTEXT**

Murder is the most severe category of violent crime. According to 'Section 229' of the *Canadian Criminal Code* (hereafter identified as *CCC*) a murder (culpable homicide) has occurred if the following threshold is met:

(a) where the person who causes the death of a human being
    i.   means to cause his death, or
    ii.   means to cause him bodily harm that he knows is likely to cause his death, and is reckless whether death ensues or not;
(b) where a person, meaning to cause death to a human being or meaning to cause him bodily harm that he knows is likely to cause his death, and being reckless whether death ensues or not, by accident or mistake causes death to another human being, notwithstanding that he does not mean to cause death or bodily harm to that human being; or
(c) where a person, for an unlawful object, does anything that he knows or ought to know is likely to cause death, and thereby causes death to a human being, notwithstanding that he desires to effect his object without causing death or bodily harm to any human being.[2]

Deaths caused by criminal negligence, suicide, accident, and justifiable homicides such as self-defence are not included in the *CCC's* crime classification of murder, and therefore are not part of this study. Manslaughter is also not included in this study because it is not classified in the *CCC* as murder due to its unintentional nature.

In Canada, murder is classified as either first degree murder or second degree murder. First degree murder is a planned and deliberate crime. An example of first degree murder is when an individual lies in wait for the victim with the full intention of killing the victim. Other killings that are automatically classified as first degree murder include the killing of a police officer or when a killing takes place during the commission of a hijacking, kidnapping, or sexual assault. Any

murder that is not first degree murder is therefore immediately classified as

second degree murder. A second degree murder is one that generally takes place

in the heat of the moment and was not planned in advance. For example, a

husband who had no plans to kills his wife but, once they start fighting, means to

kill her, is guilty of second-degree murder (*Vancouver Sun,* 2007). The attempted

murder classification includes the attempt by any means to commit murder and

conspiracy to commit murder, but where no murder was ever committed. For

example, an individual has the intent to kill another individual, takes actions

towards that end (e.g. shooting) but falls short of actually doing so. The penalties

for these indictable crimes in Canada are listed in Table 2.[3]

Table 2: <u>**SUMMARY OF THE PENALTIES FOR MURDER & ATTEMPTED MURDER IN**</u>
<u>**CANADA**</u>

OCCURRENCE TYPE	CIRCUMSTANCES	MINIMUM SENTENCE
First Degree Murder	In general	25 years
	Where offender was 16 or 17 years old at the time of the offence	10 years
	Where the offender was 14 or 15 years old at the time of the offence	5-7 years
Second Degree Murder	With no additional circumstances	10-25 years
	Committed by an offender previously convicted of murder	25 years
	Where the offender was 16 or 17 years old at the time of the offence	7 years
	Where the offender was 14 or 15 years old at the time of the offence	5-7 years
Attempted Murder	First offence	5 years
	Second or subsequent offence	7 years

Source: *Canadian Criminal Code*.

2.2. THE CITY OF EDMONTON

As a large Canadian city, Edmonton exhibits apparent geographic areas of

criminal activity or hot spots to which the police institution typically responds

through the use of tactics such as patrol saturation and target hardening (e.g. crime

prevention through environmental design [CPTED]).[4] The City of Edmonton was

selected for this study as it, along with other prairie cities such as Winnipeg, Saskatoon and Regina, exhibits a higher crime rate than the Canadian average in recent history. Edmonton experienced a decrease in crime in the 1990s and an increase in the early 2000s.[5] Another downturn was experienced at the end of the first decade of the twenty-first century.[6] In 2012, *Maclean's* magazine ranked Edmonton as Canada's nineteenth most dangerous city.[7] In 2012, there were 29 reported homicides, down from 48 in 2011.[8,9] The geographic locations and distributions of murders and attempted murders are under examination here. High concentrations of murder and attempted murder crime scenes—crime hot spots— along with both victim and offender residences, are circumscribed by specific geographic areas of the city.

Further, both offenders and victims of violent crimes are anticipated to exhibit characteristics beyond the preliminary notion of these geographically identifiable criminal hot spots. These spatial characteristics are evaluated here along with the demographic attributes of offenders and victims in order to identify the relationships between the variables of these violent crimes. By going beyond current criminal profiling models to address both the demographic and geographic traits of victims and offenders (e.g. their residences) and crime scenes for murder and attempted murder this research contributes further knowledge on the discourse of criminal profiling. This contribution is observed based on the data indicating that the majority of murders committed in Edmonton between 2006 and 2012 did not occur randomly at the street-level; rather, they typically occurre between non-strangers behind closed doors and are, therefore, not generalizable to

commonly generated profiles for other types of criminal offenders typically

assessed using current geographical profiling models (e.g. break and enter, theft,

and mischief).

2.3. THE EDMONTON POLICE SERVICE – AN OVERVIEW

The City of Edmonton's police force is the Edmonton Police Service

(EPS). The EPS has approximately 1,500 sworn members (officers) and 500 non-

sworn civilian members.[10] The EPS's investigative jurisdiction is divided into five

geographical Divisions in order to accommodate patrol and workload distribution.

The five EPS Divisions are: (1) Northeast Division, (2) Downtown Division, (3)

Southeast Division, (4) Southwest Division, and (5) West Division. These

Divisional boundaries were defined based on population density, geography, and

historical trends relating to crime and disorder in order to allow for optimal

deployment of police resources. The geographical boundaries of each Division are

visually identified in Figure 2. The five EPS Divisions correspond to the mapping

approach of this research (see 'Chapter 4: Methodology').

Figure 2: **EDMONTON POLICE SERVICE INVESTIGATIVE BOUNDARIES AND DIVISIONS**

Source: Edmonton Police Service online:
http://www.edmontonpolice.ca/ContactEPS/EPSPoliceStations.aspx
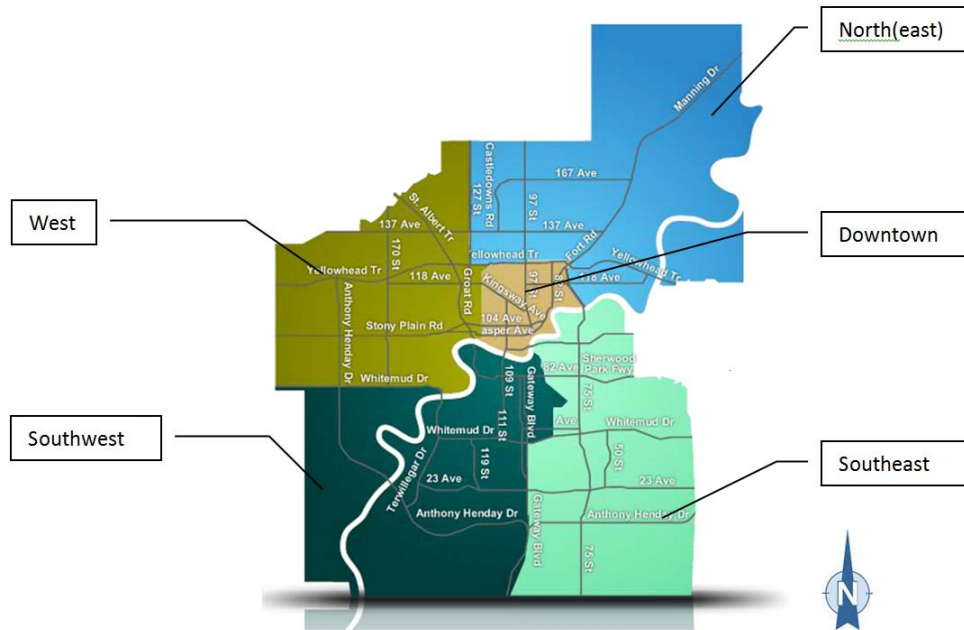
The EPS investigates all crimes occurring within the geographic boundaries identified above. These investigations take place regardless of where the victim and/or offender resides. When crimes are committed by an offender or offenders residing in or from a different jurisdiction, the EPS traditionally investigates only the crimes that occur within its jurisdiction. For serious violent crimes like the ones under study here, a joint file between the EPS and another police agency *may* be created for the purpose of investigation. If the EPS becomes aware of a crime committed outside of its jurisdiction it will report the crime to the appropriate police agency (e.g. the Royal Canadian Mounted Police [RCMP] or Calgary Police Service [CPS]).

CHAPTER 3: **A REVIEW OF CURRENT LITERATURE ON CRIMINAL PROFILING AND GEOGRAPHICAL PROFILING MODELS**

This literature review examines the dominant criminal profiling models applied in criminal investigations by police agencies in countries such as Canada, the United States, England, Australia, Sweden, Russia, Ireland, Malaysia, Zimbabwe, the Netherlands, Germany, and New Zealand (Snook, Taylor & Bennell, 2007).[11] The wealth of information that exists on the topics of criminal profiling, its subset geographical profiling, and victimization is a testament to the prevalence and significance of crime in our society and the desire to increase public safety through efficient and effective measures in the prevention, intervention, and suppression of crime. Consequently, the identification of relational factors of criminal predatory actions is imperative to understanding patterns of violent crime.

The design of strategies for the identification of geographically distinct areas of violent crime in order to correct and eliminate victimization is equally important. This literature review is advanced on the understanding that the criminal profiling model involves behavioural, investigative, forensic, and geographic aspects and is typically applied by crime investigators to identify potential suspects in 'series' of violent offences. In the strictly defined context of criminal profiling, the term 'series' refers to five or more crimes committed by the same offender or offenders (Rossmo, 2000; Canter, 2008a; Keppel & Weis, 1994). In this study, the term 'serial' refers to a repetition of a specific type of crime or crimes in a distinct geographical area which may or may not be attributed to a specific offender or offenders.

The current section reviews a representative selection of the literature on the fundamentals of the criminal profiling model and its subset the geographical profiling model. These publications act as the foundation on which all other interpretations and advancements of similar models are based. This selection includes works published within the past forty years from a variety of perspectives including: academic articles and books, educational and training literature, biographical accounts, and case studies. In particular, the observations from the founders of criminal profiling, former FBI agents John Douglas (2007; 2006; 2000; 1999; 1997) and Robert Ressler (1997; 1994; 1992; 1988), and the creators of geographical profiling, David Canter (2008a; 2008b) and Kim Rossmo (2000), will be discussed

A comprehensive analysis of the applications, limitations, underlying assumptions, and prerequisites of developing criminal profiles and geographical profiles for serious offenders found in the works of Douglas, Ressler, Canter, and Rossmo are articulated. From this analysis I will highlight the applicability of these models to this study and the development of profiles of distinct geographic areas exhibiting patterns of violent crime. This is achieved by looking beyond current offender-specific criminal and geographical profiling approaches to simultaneously address the association of demographic and geographic traits of offenders, victims, crime scenes, offender residences, and victim residences.

3.1. **THE BEGINNING – CRIMINAL PROFILING (FBI: DOUGLAS AND RESSLER)**

The discourse around criminal profiling has been observed in mainstream media since its inception and evolution out of the seminal field research

conducted in the late-1970s and early-1980s. This research was collaboratively

undertaken by former FBI special agents John Douglas, Robert Ressler, and their

team of investigators. Specifically, Douglas and Ressler were instrumental in

organizing and conducting a series of one-on-one interviews with thirty-six

incarcerated killers in the United States. The rationale behind this ground-

breaking criminological research was to identify parallels between murderers'

backgrounds (behavioural and psychological) and their motives for killing.

Douglas and Ressler's foundational work led them to aptly define 'criminal

profiling' as the identification of "the major personality and behavioral

characteristics of an individual based upon analysis of the crimes he or she has

committed."[12] In simpler terms, criminal profiling is the inference of criminal

attributes from crime characteristics.

In consultation with Ann W. Burgess, Professor of Psychiatric Mental

Health Nursing, and Allen G. Burgess, Data Technologies Expert, Douglas and

Ressler used the information divulged by the incarcerated killers to develop the

Crime Classification Manual: A Standard System for Investigating and

Classifying Violent Crimes (*CCM*) (1992). This publication has gone through

numerous editions and is regarded by authorities in the field of criminal

investigations to be the leading textbook on the classification of both violent and

non-violent crimes.

Among the theories and motives considered in the development of

criminal profiling, the most predominant ones identified by experts in the field of

criminal profiling, including Douglas and Ressler, include: Robert Merton's

Strain Theory (Merton, 1957; 1968; Siegel & Welsh, 2009, p. 125-6), Stephen

Giannangelo's Diathesis-Stress Model (2000), Trait Theory (Siegel & Welsh,

2009, p. 70), various biological theories (Fisher & Fisher, 2003; Douglas, 1997;

Kiehl, Bates, Laurens, Hare, & Liddle, 2006), and other non-biological factors

(Clinard, 1942; Shelley, 1981).[13] These theories demonstrate the

interconnectedness between crime scene behaviour and developing an offender

profile and how, when examined in the appropriate situational context they can be

extended to other features of the crime, in particular the victim and the crime

scene.

The limitation in some of these theoretical approaches, in particular Trait

Theory, is discernible when the examination of offender behaviour is limited to

internal dispositions and the situational context in which the crime occurred is

overlooked. Not surprising, given its inductive approach, any engagement with

criminal psychology and behavioural science was initially met with resistance

from the policing community. Some police agencies including the FBI felt that

these methods were examples of holdovers from past unreliable or unproven

approaches such a phrenology (the study of the human skull shape to identify

certain mental faculties and character traits developed in 1796 by German

Physician F.J. Gall and revived in the early twentieth-century with the work of C.

Lombroso) and psychic predictions. Through perseverance and dedication by

Douglas, Ressler, and their team, criminal profiling was demonstrated to police

agencies, including the FBI, to be an immensely powerful tool in directing police

investigations in the identification and apprehension of violent offenders.

Moving back and forth between behaviour and the individual offender, analysis by criminal profilers is structured in such a way as to answer three primary questions summarizing the key principles of criminal profiling. The three primary questions are:

1. *WHAT* took place? This includes everything that might be behaviourally significant about the crime.
2. *WHY* did it happen the way it did? Why, for example, was there mutilation after death? Why was nothing of value taken? Why was there no forced entry? What are the reasons for every behaviourally significant factor in the crime?
3. *WHO* would have committed this crime for these reasons?

These principles, it could be argued, also apply to other components of crime (e.g. the victim and the crime scene). More importantly, crime linkage (comparative case analysis) can inform investigators about the timing, circumstances, location, and *modus operandi* (M.O.) of certain crimes (e.g. murder). This knowledge further enables criminal profilers to determine if it is likely they are dealing with the same offender(s) for all identifiably similar crimes—that is, the more cases that can be connected, the more evidence there will be to assess, resulting in a more exhaustive profile.

The FBI's criminal profiling model is not without its flaws and has received a significant amount of criticism, specifically for its typological approach (Wilson *et al*., 1997; Ainsworth, 2001; Howitt, 2009). When examined in the context of the critical application for which this research is intended, Douglas and Ressler's data set presents as an apparent limitation as it consists of a very small sample of only thirty-six incarcerated killers. Their data exhibits a further empirical analysis problem based on its reliance on an individual criminal's memory recall (narrative) as this may be (un)intentionally distorted or

manipulated. Ainsworth (2001) and Howitt (2009) note that there have been few serious attempts to verify the validity of the FBI's offender typologies through the use of scientifically verifiable methods.

The majority of police investigative techniques do, however, rely on the empirical and scientific status of the evidence related to a crime to generate leads. These aspects of a crime can differ greatly from one crime scene to the next (e.g. blood spatter, wound patterns, forensics, deoxyribonucleic acid [DNA] evidence, and body positioning). Criminal profiles are typically developed through an examination of crime scene evidence in conjunction with the profiler's judgment about what the evidence reveals about the offender and his/her behavioural attributes. If the crime scene evidence is limited, destroyed, contaminated by human or natural means, or is open to interpretation, this may lead a profiler to draw conclusions based on speculation. Additionally, the FBI's typological approach operates on the assumption that violent criminals fall into consistent and specific categories. It has been suggested by researchers that this assumption is incorrect on the basis that the majority of violent criminals exhibit both organized and disorganized attributes and that these attributes can be altered over time (Wilson, Lincoln & Kocsis, 1997). This presents as a serious limitation in terms of the effectiveness of criminal profiles because different and conflicting profiles may be developed from the same evidence which may, in turn, impede an investigation.

It is important to consider that not *all* criminal profiling models are relevant to *all* types of crime. The FBI criminal profiling model is best suited to

cases where the crime scene reveals evidence of unusual, violent, sexual, or repetitive actions indicating that some form of psychopathology is exhibited by the offender.[14] These types of cases are more likely to reveal an offender-victim-crime scene relationship, that is, the individuals come into physical contact with each other and with the crime scene.

Brantingham and Brantingham (1981; 1993a; 1993b) have conducted research on property crime which typically lacks offender-victim personal contact. A close reading of their research reveals that the deficiency of offender personality and behavioural traits gleaned from the crime scenes of property-related offences is the main reason why spatial analysis is so critical to their model for crime selection. It is my observed connection between the offender and the victim in terms of geography that provides the impetus to investigate the existence of relationships between geographic characteristics of crime scenes, offender residences, and victim residences for the crimes of murder and attempted murder in Edmonton.

3.2. **THE PROGRESSION – GEOGRAPHICAL PROFILING (CANTER AND ROSSMO)**

Investigating the spatial distribution of events including, but not limited to, crime across geographic areas has been a long-standing interest of scholars, sociologists, and criminologists over the past two centuries (Burgess, 1925). Geographical profiling techniques have long been employed in non-criminal contexts. For example, in 1854, English physician John Snow mapped deaths from cholera contracted via polluted water distributed by a centralized pump in the neighbourhoods of Broad Street, Golden Street, and adjoining streets in

London, England.[15] Snow published his findings in *On the Mode of Communication of Cholera* (1855). As part of his research, Snow created a visual representation of the cholera outbreak by hand-marking houses where deaths had occurred and the locations of publicly accessed pumps of varying water quality on a street map. Snow then used these maps to determine that the cholera-related deaths were most numerous (500 deaths in 10 days) in proximity of the pump that could be most easily accessed—the Broad Street pump.

Another non-criminal application of spatial analysis is found in the work of American geographer Mark Jefferson. In 1928 Jefferson undertook a spatial analysis of railroad networks in order to advance the concept of "buffer zones" (Jefferson, 1928). A buffer zone is the extent of area around a geographic element (in this case, railroads) that is influenced by it in some manner.[16] Jefferson used buffer zones to determine the influence of railroad networks on settlement patterns in different societies around the globe (Jefferson, 1928; Corbett, 2004; Steinberg & Steinberg, 2006). Additionally, the work of regional planner Michael Dear (1988) is among the leading research incorporating location and social geography into theory about everyday life. The subsequent use of an originally non-criminal approach—geographical mapping—to a criminal context over the past two centuries is indicative of the progression of thought surrounding the implications and interrelatedness of geography and crime.

The roots of geographical crime mapping upon which the predatory travel patterns aspect of the FBI criminal profiling model is based can be traced to the pioneering work of the Cartographic School of Criminology experts, Andrew-

Michel Guerry (1802-1866) and Lambert-Adolphe Quetelet (1796-1874).

According to Criminologist Stephen Schafer (1969), Guerry and Quetelet are regarded as the founders of moral statistics which led to the development of criminology, sociology, and, ultimately, modern social science. The most well-known spatial studies pertaining to crime are those conducted on juvenile delinquency and social disorganization in the 1920s by Chicago School sociologists, Robert Park (1924), Ernest Burgess (1924; 1925), Clifford R. Shaw, and Henry D. McKay (1929). Their study was undertaken in the "natural urban contexts" of individuals along the margins of society: criminals, gang members, hobos, immigrants, and slum dwellers, in an attempt to "triangulate the subjective human perspective with more objective demographics."[17] Shaw and McKay specifically identified the link between social disorganization and juvenile delinquency and applied spatial analysis techniques to determine the relationship between delinquency and neighbourhoods in the City of Chicago. Park and Burgess developed the Concentric Zone Theory—the classification of urban land uses (e.g. residential, industrial, and commuter)—on which Shaw and McKay based much of their spatial analysis work. Shaw and McKay's research produced important benchmarks for other criminology researchers and the police to follow.

Not surprisingly, the development of law enforcement tactics involving the geography of crime has been researched at length by various scholars in the fields of criminology, environmental criminology, urban sociology, psychology, and police sciences (Canter, 2008a; 2008b; Douglas, 2007; 2006; 2000; 1999; 1997; Greene, 2007; Kitchin *et al.*, 1997; Ressler, 1997; 1994; 1992; 1988; Rossmo,

2000). Some of the founders of and contributory researchers to this field were identified in Chapter 1 to include Cohen (1949), Cohen and Felson (1979), Cornish (1986), Brantingham and Brantingham (1981; 1984; 1993a), Lynch (1960), Goodall (1987), Stea (1969), Taylor (1977), Kind (1987), and Gould (1974). The result has been significant research interests conducted at micro, macro, and mezzo levels. The seminal work on crime scene locations by these contributors is best summed up by their attempts to describe the following crime/criminal attributes: (1) movement and distance, (2) mental maps,[18] (3) awareness space and activity space, (4) centrography, and (5) nearest neighbour analysis. The work of environmental criminologists is primarily aimed at predicting areas "that are likely to be vulnerable to crime because of the way they fit into people's routine activities and travel patterns."[19] The notion that an individual's perception of geography or their environment is influenced by an understanding of attractiveness, barriers, familiarity, and distance related features of their surroundings is simplistic, yet demonstrative of how the least-effort principle (e.g. people will naturally choose to follow the path of least resistance or effort) must take into account both objective (physical) and subjective (cognitive) factors. From research conducted into the spatial understanding of crime in an effort to reduce the search area for an offender, the following two models emerged in the years prior to the development and labeling of geographical profiling in 1990:

Model #1: P.J. Taylor (1977): Geographic patterns should be viewed through the processes that produce them.

Model #2: Brantingham and Brantingham (1981; 1984; 1993a): Crime Pattern Theory is an algorithm for locating offender residences by interpreting offender activity spaces in order to define areas where crimes are most likely to occur.

When examining these models, however, one must not overlook valid real-world factors that will influence or distort the proposed patterns, for example, street layouts, land use and zoning, traffic flows, and target backcloth. Directional bias (assuming the final destination of an offender based on his/her direction of travel from the point of origin) has played a major role in the research by Brantingham and Brantingham (1981; 1984), Rengert and Wasilchik (1985), Canter and Hodge (1997), Baldwin and Bottoms (1976), Taylor (1977), and Rossmo (2000). This assumption, however, should be approached with caution due to its extensive reliance on presumed human behaviour and travel patterns, such as the least effort principle. Due to an understanding that it would be problematic to compare the violent crimes of murder and attempted murder with crimes against property, this researcher had to look beyond the traditional theories of environmental criminologists' focus of attention on social disorganization, delinquency, and property crimes.

A sustained interest in environmental criminology, in particular the use of geography to look at the distribution of violent crimes, was first observed in England and more recently in North America. During the late-1980s and early-1990s two of the leading researchers in the field of what is now known as 'geographical profiling'—British Criminal Psychologist David Canter (2008a;

2008b) and Canadian Criminologist Kim Rossmo (2000)—undertook exhaustive research that frames current discourse on the spatial behaviour patterns of criminals. A close reading of their respective works reveals a significant reliance on the generative work and research findings by the previously discussed founders of environmental criminology published between the 1950s and the 1990s. Without question, Canter and Rossmo's respective models for geographical profiling emerged from the foundational work of the pioneers of the spatial analysis of crime.

The major distinction between the FBI criminal profiling model's geographic analysis and Canter and Rossmo's geographical profiling model is that the latter is based primarily on empirical, quantitative, and statistical methods while the former relies more on qualitative data and investigative experience. This is not to say, however, that geographical profiling is not influenced by the other subsets of criminal profiling, such as traditional police investigative techniques, psychology, behavioural science, and forensic science. This influence is evident in the advancement of concepts such as 'awareness space' and 'mental maps' discussed in the previous section.

There are four fundamental conceptual and theoretical frameworks drawing on criminology, environmental criminology, urban sociology, and psychology within which geographical profiling is observed to function. Notionally referred to by Canter and Rossmo as 'first principles,' these four frames of reference—Routine Activity Theory, Rational Choice Theory,

Geometry of Crime, and Crime Pattern Theory—are outlined below including their applications and limitations with respect to this study.

Routine Activity Theory (Cohen & Felson, 1979; Siegel & Welsh, 2009): Routine Activity Theory is based loosely on the previously discussed work of the Chicago School of Criminology. This theory uses behavioural regularities to predict crime victimization from a macro-level by arguing that the potential criminal must be motivated and that there must be a suitable target lacking a capable guardian. In equation form, Routine Activity Theory is expressed as:

$$crime = (offender + target - guardian) * (place + time)$$

Consequently, the following seven different components of crime analysis have been identified with respect to offender, target, and environment:

1. Offender – typology.
2. Victim – typology.
3. Environment – neighbourhood, landscape, situation.
4. Offender/Target – victim preference and specificity, hunting style.
5. Offender/Environment – transportation, offender's mental maps and activity space, hunting ground.
6. Target/Environment – target backcloth, neighbourhood, rhythms, encounter site.
7. Offender/Victim/Environment – crime and crime scenes. [20]

The interrelatedness between these seven different crime components is illustrated by the Venn diagram shown in Figure 3.

Figure 3: ROUTINE ACTIVITY THEORY DIAGRAM

Source: Clarke & Felson, 1993.

At the micro-level, however, the results from research into violent crime have not been consistent with the predictions of Routine Activity Theory (United States: Miethe & Meier, 1994; Canada: Kennedy & Forde, 1990; England: Sampson & Wooldredge, 1987). Additional factors still need to be considered, such as demographic attributes of the individuals involved and structural aspects of the community.

Rational Choice Theory (Cornish & Clarke, 1986; Clarke & Felson, 1993; Siegel & Welsh, 2009): This theory approaches crime from a decision-making perspective noting that criminal behaviour is both voluntary and utilitarian and is further understood as being influenced by the offender's rational consideration of effort—that is, risks and rewards. The origins of Rational Choice Theory can be traced back to "the economic model of 'rational man' and the classical school of Cesare Beccaria and Jeremy Bentham."[21] Rational Choice Theory advances a model of crime based on three distinct assumptions: (1) *criminals are rational* and make *choices* and *decisions* in order to benefit themselves; (2) a *crime-specific focus* is required; and (3) there

is a distinction between *choices related to criminal involvement* and *decisions related to criminal events*.[22]

Boudon (1998) provides a thorough review of these theories to explain that despite their perceived attractiveness, they are not necessarily generalizable because different people have different experiences leading to different choices and decision-making processes, criminal or otherwise. This limitation is based on Routine Activity Theory's assumption that the offender's actions are instrumental and are intended to serve a specific function, namely to commit a crime (Cohen & Felson, 1979). Boudon argues that action is not always purely instrumental (some actions are egoistic) nor can non-instrumental actions be converted into instrumental actions, demonstrating that this theory is unable to be held as a general theory of action. Boudon also challenges the empirical validity of Rational Choice Theory by arguing that "it has never succeeded in explaining satisfactorily important classes of phenomena."[23]

Geometry of Crime Theory (Brantingham and Brantingham, 1981): This theory was developed from an environmental criminology perspective. According to this theory, crime is not randomly distributed; rather, crime exhibits clear and defined spatial patterns. These patterns are understood in terms of how an offender interprets opportunity, motivation, and environmental cues corresponding to a criminal act. The Geometry of Crime Theory identifies the two key components in determining patterns of crime as: (1) activity nodes (e.g. residences, places of employment, and shopping, leisure, or entertainment

centres) and (2) travel paths (e.g. routes travelled between activity nodes).

Activity nodes and travel paths are assumed to influence the 'activity space' and 'awareness spaces' of individuals. This influence, then, is seen to contribute to a potential offender's behaviour when selecting a target. Brantingham and Brantingham argue that by predetermining an offender's activity and awareness spaces, they can determine where crimes may occur. Examples of crime sites anticipated by this approach include shopping malls and transit hubs in large Canadian cities (these sites are referred to as 'Criminal Attractors').

Geometry of Crime Theory is, however, severely constrained in the following ways: (1) it places an overt emphasis on the awareness space and, more specifically, the directionality of offenders who are believed to commit crimes along the way to their intended destination,[24] and (2) it proceeds from the assumption that all paths originate from the offender's home location. The majority of the models developed by Brantingham and Brantingham and their colleagues focus on developing distance algorithms and awareness space algorithms for burglary offences (Malleson, 2010; Andresen & Malleson, 2010; Malleson *et al*., 2010; Malleson, Evans & Jenkins, 2009; Malleson & Brantingham, 2009). The Geometry of Crime Theory, therefore, requires further investigation in order to determine its applicability to violent crimes exhibiting potential offender-victim relationships, such as murder and attempted murder.

Crime Pattern Theory (Brantingham & Brantingham, 1993a): Crime

Pattern Theory draws extensively on Brantingham and Brantingham's

Geometry of Crime Theory and exerts the strongest influence in the

geographical profiling model because it assumes that the nature of crime

opportunities and crime sites are non-random. Building on Geometry of Crime

Theory's emphasis on the interaction between an offender's awareness space

and environmental cues, Crime Pattern Theory applies the concepts of

opportunity, motive, mobility, and *perception.*[25] Brantingham and

Brantingham's research is well-known for its visual representation of "a

dynamic process of target selection, with crimes occurring in [the] areas where

suitable targets overlap the offender's awareness space" (see Figure 4 below).[26]

Figure 4: CRIME SITE SELECTION GEOGRAPHY
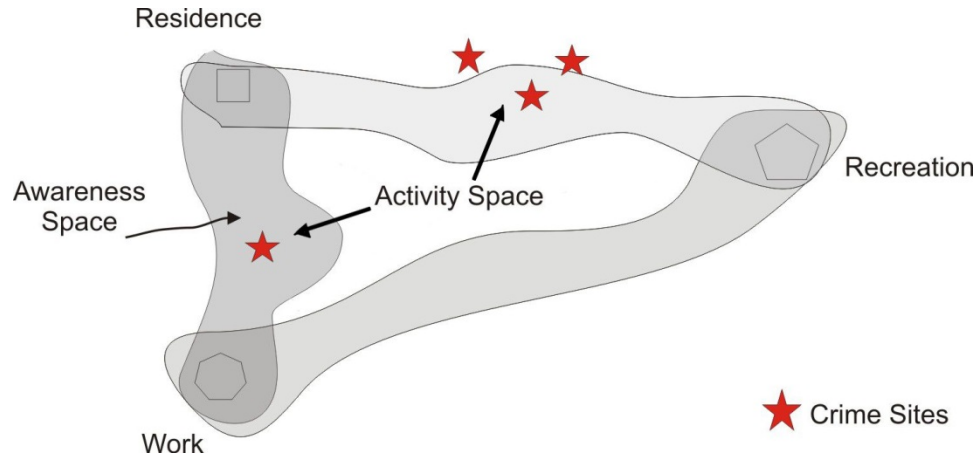
Due to its reliance on Geometry of Crime Theory, Crime Pattern Theory is constrained in a similar manner by attempting to act as a general theory of crime. Crime Pattern Theory further attempts to demonstrate a criminal's preferred target areas through its reliance on Routine Activity Theory.

The geographical profiling models advanced by Canter and Rossmo were formulated based on these four 'first principles.' Their models attempt to define the most probable area of offender residence through an analysis of the locations of a connected series of crimes. This is accomplished by using identifiable criminal patterns, methods, and locations of crimes as the basis for predicting the most probable area of a criminal's residence or workplace.[27]

Of significance to my study is how Canter and Rossmo's approaches move beyond spatial analysis by drawing on geographical aspects of crime scenes in coordination with the behavioural features of offenders found in the FBI's profiling approach. This combined approach is best summarized through the following four stages: (1) the prediction of an offender's characteristics, (2) crime

scene assessment, (3) establishment of crime series, and (4) provision of investigative advice.[28] Consequently, geographical profiling is based on three distinct approaches which overlap my study's approach shown in parentheses: practical detective expertise, behavioural science theory, and the spatial and statistical analysis of solved cases [traditional police investigative techniques and geography]. The current literature is very candid in its assertion that geographical profiling in and of itself is not responsible for solving criminal cases and presents limitations. These limitations include its primary focus on serial offenders and its inability to differentiate between multiple offenders using the same *modus operandi*.

The relevance and strength of geographical profiling in my research is found in its ability to provide valid methods to manage large quantities of crime investigation-generated information. This makes geographical profiling an extremely valuable approach when used in conjunction with other valid and proven investigative tactics. Contemporary geographical profiling models are comprised of software programs such as Rigel (Rossmo), Dragnet (Canter), Predator (Godwin), and CrimeStat (Levine). These overly sophisticated computer systems, however, are only as good as the accuracy of their programmed algorithms and the underlying assumptions upon which they are based and, in turn, interpreted.[29]

From the preceding sections on the approaches and research of Douglas, Ressler, Canter, and Rossmo, the significance of crime site locations and crime-scene clues for investigations involving violent crimes has been illustrated. This is

especially true when investigators are attempting to ascertain the probable spatial location of a criminal in conjunction with the demographics of the individuals involved in the crime and the geography associated with the crime scene. How and when to take advantage of the power of mapping techniques and the capacity for visual interpretation identified in these models is a major feature of this study.

The proposed visual mapping approach for this project provides a unique opportunity to go beyond traditional uses of crime mapping for the purpose of identifying a serial offender's most probable home/base location to the application of spatial analysis techniques in order to explore how murders and attempted murders are geographically distributed in the City of Edmonton in recent years.

3.3. **MOVING BEYOND CURRENT CRIMINAL AND GEOGRAPHICAL PROFILING MODELS**

In the preceding sections, I have demonstrated that, under the overarching framework of criminal profiling, geographical profiling is but one of the numerous critical aspects to be considered in a criminal investigation. I have further demonstrated that the FBI's criminal profiling model acts as a critical support system upon which a valid and reliable geographical profile of a criminal can be developed with a primary focus on the offender- and crime scene-based elements of the crime itself.

Without question, Douglas's research addresses the necessity of a criminal profiler to be able to cognitively process a wide range of evidence and data concerning both the criminal *and* the victim with a high degree of accuracy. I would argue, however, that the data concerning the criminal and the victim should

move beyond personality and behavioural traits to include their demographic and geographic attributes when developing the means to identify patterns of violent crime. The relevance of geographic attributes of offenders to the analysis of spatial relationships between offender, victims, and crime scenes has been discussed at length in the previous sections. Aside from attempts to understand victims in terms of the spatial dimension of fear of crime and perceptions of crime in urban environments (Curtis, 2012; Dorna, 2012; Lipton *et al.* 2013; Spicer, 2012), the spatial attributes of victims, however, are under-researched. This study addresses this research gap by applying the principles of Geographic Information Systems (GIS) in its analysis of victim residences, offender residences, and crime scenes in order to conduct an analysis of the spatial relationships between offenders and victims.

The spatial analysis of these three crime locations is enhanced by knowing as much as possible about the individuals involved and the make-up of the environment they inhabit. By this I am referencing the demographic makeup of victims, offenders, and crime locations. Crime rates tend to vary widely with regards to city layouts, size, and rate of growth and expansion. Two of the earliest sociologists, Emile Durkheim and Max Weber, recognized the connection between city life and higher crime rates (Crutchfield, 1989). Despite the "general consensus among criminologists that urban areas have higher rates of crime than rural areas, not all cities or neighbourhoods experience similar levels of crime and violence; there is widespread variation in crime levels across urban spaces" (Crutchfield, 1989, *passim*). These variations are understood in terms of the urban

composition. For example, population density and age structure tend to be important predictors of crime in small American cities. Larger Canadian cities of comparable size to that of the City of Edmonton (>500,000 population), however, exhibit slower increases in crime (Ackerman, 1998; Porter, 2010) and age structure becomes a much weaker predictor of crime trends. The demographic attributes of the individuals involved in the violent crimes under examination in this study include: the gender and age of both victims and offenders; the classification of offender-victim relationship; and the method of killing or weapon involved.

There are two leading bodies of literature concerning gender and crimes involving lethal violence that are relevant to this research; that is, the masculinity of homicide. One body of literature explores how masculine disputes emerge and escalate (Benson & Archer 2002; Brookman 2000, 2003; Felson & Steadman 1983; Felson 1984; Greenberg 1981; Gilmore 1990; Leary 1976; Leyton 1995; Levi 1980; Luckenbill 1977; Polk, 1994, 1995; Wolfgang 1958). This approach, however, relies on a pre-existing knowledge of the manner in which confrontations develop and escalate—that is, motive—and is not applicable to my study due to aforementioned EPS data restrictions. The second relevant body of literature examines the structural, cultural, and social conditions under which homicide exists (Giddens, 1976, 1984; Connell, 1987, 1995; West & Zimmerman, 1987; West & Fenstermaker, 1995).

These approaches acknowledge the need to explore the maleness of crime by moving beyond the (male) professionalism confines (e.g. patriarchal sex role

expectations) of the early feminist work of the 1970s (Sachs & Wilson, 1978; Adler *et al*., 1975) to address the contexts in which crime acquires male attributes. Specifically, these relevant approaches attempt to answer two pertinent questions: (1) why is crime an overwhelmingly male activity? and (2) why do such a small number of women commit crimes? They do so by positing that sex is not directly correlated with crime and violence; rather, they explore how social processes create masculinity or male identity as a way for us to understand gender disparities in criminal activity. According to Winlow (2001) and Davies (2011), both historical and global changes such as wars, industrialization, globalization, and modernity have manifested themselves in changing gender roles and challenging traditional gender dichotomies including masculine identities affecting behaviours exhibited in crime.[30]

In a North American context, the American frontier was labelled the 'Wild West' for good reason. As populations moved westward following opportunities such as gold, farming, and ranching, towns sprang up before law and order could be established and many people chose to protect themselves. As a result, the frontier tended to be dangerous for a number of reasons: drinking and gambling, train robberies, gun fights to resolve disputes, and limited law enforcement to cover such a large geographical area (Salak, 1995, p.11). This setting attracted outlaws who were typically young males, some of them achieved celebrity status (e.g. Jesse James [1847-1882] and William H. Bonney, better known as Billy the Kid [1859-1881]). During the Prohibition Era of the early twentieth-century, gang violence escalated as did the notoriety of crime bosses like Al Capone during the

battle between mobsters and American Prohibition agent Elliot Ness and his team of agents nicknamed The Untouchables. Today, violence is a highly recognized spectacle featured in mainstream media depictions and daily headlines that help shape the public's perception of violence and its impact on society worldwide (Salak, 1995).

Australian criminologist Raewyn Connell (1977; 1987) first became known for the development of her theory that gender identities are not formed naturally; rather, they are historically and socially constructed in a structured world.[31] According to Connell (2002; 2000; 1995; 1987; 1977), there are three structures associated with gender relations: labour, power, and cathexis (emotional attachment).[32] These structures are dependent on how an individual relates masculinity to their own social ideal in a given social setting, based on cultural norms. These social constructions further reveal the way in which the varied interpretations of masculine stereotypes can lead to the creation of both dominant masculinities and subordinate masculinities. These masculinities may then come into conflict resulting in unstable behaviour or lethal actions which are explained in terms of hegemonic masculinity.[33]

According to criminologist James Messerschmidt (2014; 2000), not all individuals experiencing masculinity challenges are motivated towards violence, but certain situational opportunities (e.g. access to an appropriate victim) may provoke a violent response. Not unlike the criminal profiling model approach, a case study was undertaken by researchers in England who adopted a psychoanalytical approach emphasizing the internal struggles males experience

with their masculinity and how it may be exhibited in their crimes. This research

included interviews of serial, sexual murderer Peter Sutcliffe (the Yorkshire

Ripper who committed his crimes between 1975-1980) conducted by Jouve

(1988) and Smith (1989). Additionally, an in-depth examination of the 1993

James Bulger case (two-year-old Bulger was abducted, tortured, and murdered by

two ten-year-old boys in England) was conducted by Jackson (1995).[34]

From these schools of thought, a number of studies have established that

males dominate as both killers and victims in cases of homicides in most countries

(e.g. England, Wales, United States, Australia, and Canada) (Brookman, 2005;

Daly & Wilson, 1990; Polk, 1994, 1995; Smith, 1989; Wilson, 1983). The results

of these studies have allowed researchers to identify certain characteristics of

those involved in masculine homicides. First, homicides typically involve both

male offenders and male victims (Newburn & Stanko, 1994; Messerschmidt,

2000). Second, homicides typically take place amongst non-strangers (47%) or

strangers (20%). The individuals comprising the non-stranger category is further

broken down to identify the composition of acquaintances (64%), friends (21%),

or family members (15%). Third, males involved in homicides tend to be

relatively young adults; the average age of male homicide victims is early-thirties

and the average age of male murderers is late-twenties (Farrington *et al*., 2006;

Messerschmidt, 2000; Salak, 1995).

In Canada, homicide victims typically know their killers. The victim-

offender relationship is widely explored in the study of homicide (Maxfield, 1989;

Pokorny, 1965; Silverman & Kennedy, 1987; Wilson, 1993; Wolfgang, 1958).

The 1958 research by Wolfgang examining victim-offender relationships in

Philadelphia still resonates today as illustrated by the following statement:

> Criminal homicide is probably the most personalized crime in our
> society. Because motives do not exist in a vacuum, the subject-object,
> doer-sufferer relationships is of prime importance in this particular
> crime […] homicide is a dynamic relationship between two or more
> persons caught up in a life drama where they operate in a direct,
> interactional relationship. More so than in any other violation of
> conduct norms, the relationships the victim bears to the offender plays
> a role in explaining the reasons for such flagrant violation (Wolfgang,
> 1958, p. 203).

The victim-offender relationship is typically classified as stranger or non-stranger.

The rates of non-stranger homicides in Canada have historically ranged between

35-50% for friends and acquaintances and between 30-45% for family members

and relatives (Dauvergne, 2010; Lundesgaarde, 1977; Wolfgang, 1958).

Averaging over 2004-2009, Canada's solved homicides were committed by

strangers in 16.6% of cases and non-strangers in 80.8% of cases. In Canada,

almost half of the victims of the 2011 solved homicide cases were killed by an

acquaintance or friend and a third were killed by a family member. Only 15% of

these victims were killed by a stranger (*Canada Year Book, 2011*). Based on

literature addressing victim-offender relationships, the common denominator

appears to be the emotional bonds; that is, the complete breakdown of emotional

bonds between the victim and the offender to the point of lethal violence being

employed.

In Canada, stabbing is the most common method of killing (35%) and is

typically employed by male offenders (Dauvergne, 2010). The method of killing

or weapon used in murders and attempted murders are customarily coded by the

UCR Survey into six categories: (1) firearm (e.g. handguns, rifles, shotguns, and automatic weapons), (2) knife or other cutting/piercing instrument (e.g. broken bottles, screwdrivers, and scissors), (3) club, (4) physical force, (5) other weapon, and (6) unknown. The long-term trends for method of killing or weapon used in Canadian homicides can be summarized as follows: approximately one-third are gun related, approximately one-third are stabbings, approximately one-third are beatings or manual strangulations, and the remaining cases are of unknown methods or weapons (Dauvergne, 2010; Trussler, 2010). These figures have remained relatively stable in Canada during the past twenty years. Table 3 offers a snapshot of Canada's homicides based on the two dominant methods of killing— shooting and stabbing—for the years 2007 2008, and 2009.

Table 3: **CANADA'S HOMICIDES BY METHODS, 2007-2009**

YEAR	SHOOTING	STABBING
2007	31.6%	32.0%
2008	32.7%	32.7%
2009	29.3%	34.4%

Source: *Canada Year Book, 2011*

Research conducted at Ohio State University has shown that the method of killing or type of weapon used in murders and attempted murders directly affects the clearance rate of these cases. Weapons requiring close proximity between the offender and the victim (e.g. knives or physical force) are understood to produce more physical evidence necessary to solve murders (Puckett & Lundman, 2003).

This research project presents an analysis of murders and attempted murders in Edmonton. Based on recent Canadian trends, these crimes are anticipated to involve a large proportion of young males who are non-strangers. For this reason, the focus of current criminal profiling models must be redirected

from serial killers who typically murder strangers (Rogers *et al.*, 1991; Godwin & Canter, 1997) to murders and attempted murders committed by non-strangers.

3.4. **THE FINDINGS**

This literature review has led me to concur with Douglas' assessment that the ideal model for criminal investigations involving serious violent offenders is that of "a perfect symbiosis between profiling and crime analysis and traditional police and forensic techniques."[35] To this ideal model, the addition of the proven geographical mapping techniques purported by Canter and Rossmo regarding crime scene, offender residence, and victim residence and this researcher's understanding of influential demographic characteristics of both victims and offenders is imperative.

Furthermore, the extent to which profilers' data input and information management approaches are oriented towards computer data processing and mapping systems including the use of GIS is expanding and is observed by this researcher to be essential to any spatial analysis of criminal activity patterns. This observation is based on the current trend in Canadian policing institutions towards the implementation of new methodologies for the preparation of GIS map summaries for senior staff briefings and the deployment of resources along with the other features of CompStat (Paulsen, 2004; Porter, 2010). This trend is further supported by the growing interest from both police agencies and the public to develop publicly accessible online computer-aided crime mapping programs across Canada (e.g. Edmonton Police Service, Calgary Police Service, Ottawa Police Service, Halifax Regional Police Service, Vancouver Police Department,

and York Regional Police) and around the globe (Kindynis, 2014; Chainey & Tompson, 2008).

3.5. THE OPPORTUNITY

By tracing through the limitations, underlying assumptions, and prerequisites of criminal profiling and geographical profiling models and their theoretical foundations, it is possible to visualize how the implications and interrelatedness of geography, demography, and crime are paramount in the proposed development of a crime analysis model. Specifically, this study's crime analysis model focuses on what is considered to be triangulation of the geographic components of the crime—offender residence, victim residence, and crime scene—with an emphasis on the demographic features of the individuals involved. This model, henceforth referred to as the *triangulation of crime model*, is both novel and, when applied in conjunction with the well-established research, principles, and applications of criminal profiling and geographical profiling models, has the potential to become effective in the search for an understanding of violent crime in a Canadian context. The research hypothesis is that demographic patterns of murder and attempted murder victims and offenders are spatially related to their corresponding crime locations in the City of Edmonton. Specifically, the *triangulation of crime model* draws out evidence of the hypothesized existence of relationships between the independent variables— individuals' demographic features (e.g. gender, age, victim/offender relationship, method of killing/weapon) and the geographic characteristics of three distinct crime locations (e.g. crime scene, victim residence, and offender residence)—and

the dependent variables (e.g. the serious crimes of murder and attempted murder) in the geographically distinct region of the City of Edmonton. A visual representation of the *triangulation of crime model* is shown below:

Figure 5: TRIANGULATION OF CRIME MODEL
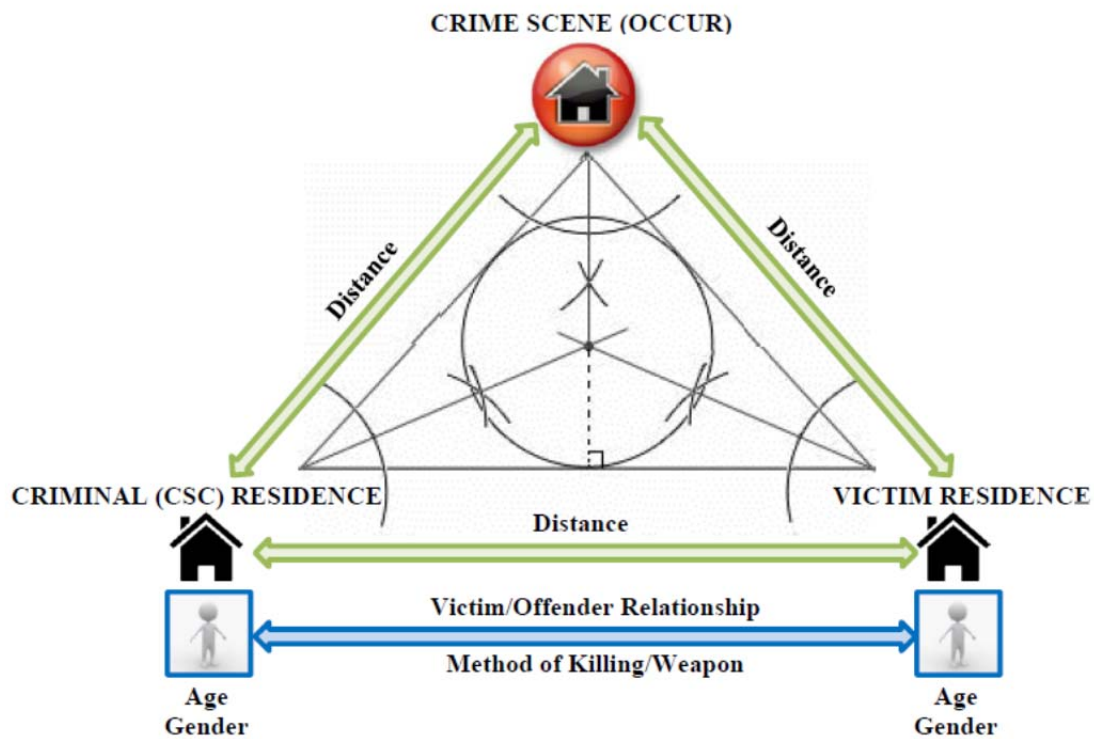
DEPENDENT VARIABLES	INDEPENDENT VARIABLES	
First Degree Murder	Geographic:	Crime Scenes Victims Residences Offender Residences
Second Degree Murder	Demographic:	Gender Age Victim/Offender Relationship
Attempted Murder	Incident:	Method of Killing/Weapon

The *triangulation of crime model* is further strengthened in terms of discrimination and utility of the researcher's development of a computerized crime linkage analysis based on secondary data collected from the EPS. This system has the ability to make simultaneous comparisons between multiple

variables. A possible weakness of a computerized crime linkage system, however, is the fact that the ultimate determination of crime association is left to the individual analyst who is subject to human error and bias. The longitudinal case-study approach utilized in this study (e.g. examining all murders and attempted murder committed in Edmonton between the years 2006-2012) offsets this observed limitation. The positive effect of this approach is understood in terms of the well-established assumption that geographic profiles are only effective for series of five or more crimes committed by the same offender or offenders. Consequently, the defined spatial patterns of these crimes will apply only to that individual series and its offender(s).

This thesis reframes this understanding to demonstrate that a longitudinal analysis of a large, non-random data set permits a detailed analysis whereby I extrapolate visual patterns of violent crime. This model is much more applicable to murder and attempted murder in a Canadian context because it pushes the boundaries of current criminal and geographical profiling models. This extension is demonstrated by the spatial analysis of *all* murders and attempted murders in Edmonton including *all* individuals involved in the crime, not just the offender(s), and *all* crime locations, not just the crime scene and the offender's residence. In taking this approach, I develop a profile for murder or attempted murder rather than a profile for a sole offender. Consequently, other researchers are able to use the results of this study to state whether particular crimes fit into an identifiable demographic and geographic profile for murder and attempted murder.

CHAPTER 4: **METHODOLOGY**

While the fields of criminal profiling and environmental criminology have researched and developed independent theories of crime, their respective paths have not yet intersected at a nexus that studies the demographic relationships of murder and attempted murder victims and offenders in a geographic context. This thesis adds to the existing literature in the fields of crime, geography, and demography by incorporating a new spatial perspective of the relationships attributed to violent crime found in the techniques of geographical profiling and the traditional police investigative techniques of criminal profiling. Through an examination of the three defined geographic categories of violent crime—crime scenes, offender residences, and victim residences—this thesis investigates the relationship between (1) the geographic regions represented by mapped boundaries of the EPS Divisions, (2) the geographic locations where murders and attempted murders are committed and, more specifically, (3) the geographic locations where offenders and victims reside. In furtherance of this analysis, this study examines the extent to which the demographic characteristics of victims and offenders feature in these spatial relationships.

This exploratory study is innovative insofar as it combines the interests of Geographic Information System (GIS) and criminological inquiry with an emphasis on the violent crimes of murder and attempted murder. GIS is a hardware/software system that follows specific procedures to capture, store, edit, manage, manipulate, analyze, disseminate, and display geographic data. Canadian-based geographer Roger Tomlinson developed the world's first

computerized GIS in the 1960s called Canada Geographic Information System. Tomlinson is known as the father of GIS. The most important function of GIS in this study lies in its powerful analytical functions to integrate different types of data into multiple layers representing different aspects of real-world social issues (see Figure 6). This useful information is then interpreted to reveal hidden relationships, patterns, and trends not readily apparent in charts and tables (Fu & Sun, 2011; Steinberg & Steinberg, 2006). This enhanced knowledge allows researchers to think spatially about social issues in order to answer crucial questions like those posed in this study and to support informed decision making.

In this study there are two methods of managing spatial data applied in the GIS mapping process: vector and raster. The vector data model is about as close as one can get to a traditional paper map. Vectors are entities represented by strings of coordinates. Elements (also referred to as entities) on the map are represented by one of three fundamental feature types: point, line, or polygon. In this study, the *x,y* coordinates associated with a crime location are represented by points, the point-to-point distances measured between two crime locations are represented by lines, and the boundaries of the five EPS Divisions are represented by polygons. The raster data model stores information in two-dimensional uniform grid cells or pixels where each cell is homogeneous (e.g. squares typically of fixed dimensions). The pixel configuration explains why some maps exhibit a blocky effect. Unlike vector data which is stored in tables, raster data is stored directly in the cell (Fu & Sun, 2011, p. 22-3). Where spatial detail is paramount to the researcher, raster maps are preferred. Raster maps of this

magnitude, however, may require significant data storage and faster computers. Raster data is more suitable for modeling. Vector data is suitable for typology analysis and provides high quality outputs. For this research, vector maps are primarily used as they are adequate in demonstrating the significance of geographic features such as large bodies of water and major freeways. Further, vector data is more appropriate for socio-economic analysis.

Figure 6: GIS LAYERING CAPABILITIES
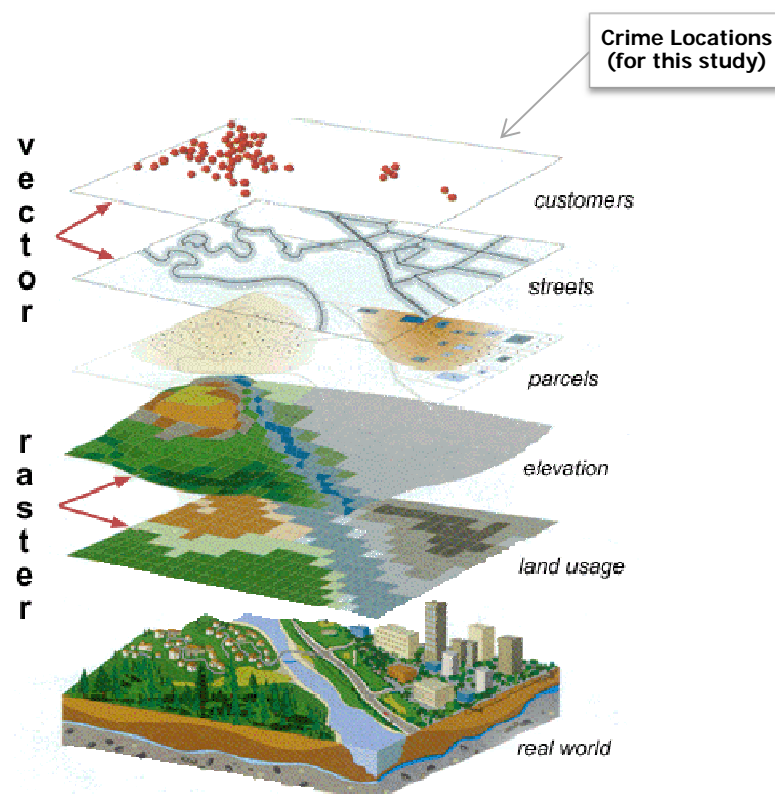
Source: Fu & Sun, 2011, p. 6.

While historically it has been difficult to provide effective geographical profiles of violent offenders, the development of a larger understanding of the nature of spatial patterns pertaining to crime locations will prove beneficial in advancing new criminal profiling strategies. The results of this study provide a visual of demographic and geographic features that correspond to the City of

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Edmonton. This information offers direction for future sociological investigations and policy development in the realm of homicide investigations.

The independent variables for geography are defined by the five EPS Divisions identified in Chapter 2 as Northeast Division, Downtown Division, Southeast Division, Southwest Division, and West Division. The independent variables for offender and victim demographic characteristics include gender (coded male or female); age (divided into eleven categories due to a potentially non-linear relationship: under 10 years of age, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-60, and over 60 years of age); and victim/offender relationship (coded stranger or non-stranger). The independent variables examining non-discretional offense characteristics include three distinct factors. First, the method of killing or weapon used is coded into six categories: (1) firearm (e.g. handguns, rifles, shotguns, and automatic weapons), (2) knife or other cutting/piercing instrument (e.g. broken bottles, screwdrivers, and scissors), (3) club, (4) physical force, (5) other weapon, and (6) unknown. Second, the locations of crime scenes, victim residences, and offender residences are coded into two categories: (1) residential and (2) non-residential. Third, population densities for each EPS Division are based on the averaged Census Metropolitan Areas (CMA) defined by Statistics Canada. Based on the City of Edmonton's 2012 Municipal Census (April 1, 2012), Edmonton's population is approximately 817,498.

Through its reliance on the well-established theoretical background, criminology literature, criminal profiling and geographical profiling models, and

applied GIS practices outlined in previous chapters, this empirical research is specifically designed to explore the issues facing academic sociological researchers and violent crime investigators.

4.1. RESEARCH DATA

The development of a valid visual representation of identifiable spatial patterns corresponding to areas of violent crime occurrences in the context of the City of Edmonton was approached through the analysis of documentation held in EPS case files. A single crime database called Edmonton Police Reporting and Occurrence System (EPROS) under the control of the EPS was accessed by the EPS data manger. Access to the EPS records was approved in September 2012 and formalized following an enhanced security clearance by the EPS in January 2013. Collection of this data took place at EPS headquarters between March 2013 and September 2013 in order to accommodate the length of time it takes for the information to be downloaded and de-identified by the data manager and converted into Microsoft Excel format for use by the researcher. For further information on ethical and confidentiality considerations refer to 'Chapter 4, Section 4.6: Ethical Considerations.'

It was my intention to access supplemental data through the EPS regarding methods of transportation and race/ethnicity for both offenders and victims. Due to a rigorous adherence to ethical and legal freedom of information and privacy protection requirements required by my Research Agreement with the EPS, however, no personally identifiable information about offenders and victims was accessed. These data restrictions include the following personal attributes for both

offenders and victims: race, ethnicity, family status, and type or location of work

or other activities. Unarguably, the sparsity of offender- and victim-specific

information makes it more difficult to define the individuals involved and, in turn,

affects the empirical outcomes of homicide profiles. Owing to unforeseen data

restrictions and requirements of Alberta's *Freedom of Information and Protection*

of Privacy Act (*FOIPP*), this portion of the project was not carried out. This issue

will be addressed at greater length in the discussion on directions for future

research.

In order to represent diversity and ensure validity, *all* murders and

attempted murders reported by the Edmonton Police Service to Canada's Uniform

Crime Reporting Incident-Based (UCR) Survey are explored in this study. Since

this study is primarily concerned with the geographical distribution of three

specific and equally important aspects of crime as the unit of analysis—crime

location, offender residence, and victim residence—the data set includes all

geographical coordinates entered into EPROS for murders and attempted murders

reported between June 6, 2006 and December 31, 2012. The logical selection of

this timeframe was discussed in Chapter 1. It is important to note that geographic

data for crime scenes is only collected by EPROS and reported to the UCR

Survey for the occurrence location associated with the most serious violation. For

example, if an assault occurred at one location and resulted in a homicide at

another location, only the latter location is entered into EPROS and reported to

the UCR Survey.

Two additional influences are considered in this study: (1) the City of Edmonton is not a closed system and (2) today's society consists of highly mobile individuals. For the purpose of this study, individuals involved in the crimes under examination were not excluded if they resided outside of the City of Edmonton.[36] The geographical coordinates associated with the respective residence of each non-Edmonton resident, however, were not available to be explored using the *triangulation of crime model*.

4.2. ISSUES OF RELIABILITY AND VALIDITY

This study includes all data received from the EPS in its visual and computational analysis. Unsolved or inactive cases were originally anticipated to have missing data (e.g. details pertaining to the un-apprehended offender or an unidentified victim). Through several analytical computations, it was determined that the missing data did not compromise the results and were not found to distort the results to a more than acceptable extent. Additionally, the extent of the geographic coordinate offset is known only to the EPS data manager and is consistent to all data within 0 to 50 meters of the actual coordinates reported in EPROS.

4.3. RESEARCH DATA FORMAT

I received all data transferred from the EPROS database in electronic format as Microsoft Office Excel files. Excel software was the used by the researcher to format and categorize the data according to the various attributes associated with the pre-defined crime categories through the production of charts and tables. Due to the large volume of data and the detailed analysis, a simple

coding system was applied in addition to the terms and acronyms used throughout

this document. This coding system was based on both the EPS and the UCR

Survey coding systems in order to allow the reader to transition seamlessly

between the text, charts, tables, and maps. An additional level of color coding was

applied by the researcher to each of the occurrence types based on the charges laid

by the EPS. Table 4 summarizes the coding system applied in this study.

Table 4:   RESEARCH PROJECT CODING SYSTEM

CODE	DESCRIPTION
OCCUR	Occurrence or Incident (criminal offense)
CSC	Charged/Suspect - Chargeable
VIC/VICTIM	Victim
x	x coordinate represents latitude (12 characters, floating decimal)
y	y coordinate represents longitude (12 characters, floating decimal)
1110	First Degree Murder
1120	Second Degree Murder
1210	Attempted Murder

Source: Edmonton Police Service

The original EPS data set included 22,296 lines of Excel data. It was

necessary to manually filter the data according to the parameters of this research

(e.g. demography and geography). Numerous entries were found for the same

occurrence (OCCUR) where each entry contained person-specific information on

the various individuals involved. This scenario is observed when an occurrence

has more than one offender (CSC) or victim (VICTIM) involved. Consequently,

the data was re-formatted to provide a single entry for each individual linked to

the occurrence as well as an entry for the linked crime location. Table 5 below

shows the frequency with which more than one CSC or VICTIM was linked to the

same crime occurrence.

Table 5: FREQUENCY OF CSC & VICTIM CASE LINKAGE

CODE	OCCURRENCE TYPE	# OF FILES WITH MORE THAN 1 CSC	# OF FILES WITH MORE THAN 1 VIC
1110	First Degree Murder	15	10
1120	Second Degree Murder	44	32
1210	Attempted Murder	22	21

Source: Edmonton Police Service

It is important to note that the coding system used by the EPS makes it impossible to identify a potential serial killer (e.g. a person responsible for three or more murders) because each CSC is assigned a unique Person ID for each crime occurrence. When a new crime occurrence is entered a new Person ID is assigned to the CSC even if that person is already entered under another occurrence. Only with in-house access to the EPROS database could such a connection between a CSC and multiple occurrences be determined. Final filtering of the data to remove duplicate and blank entries resulted in a data set consisting of a total of 370 occurrences (62 first degree murders, 191 second degree murders, and 117 attempted murders) between 2006-2012. An annual summary of the number of occurrences is shown below in Table 6.

Table 6: NUMBER OF OCCURRENCES ANNUALLY, EDMONTON (2006-2012)

UCR OCCURRENCE-YEAR	# OF UCR OCCURRENCES
1110 - First Degree Murder	**62**
1110-2006JUN06-DEC31	11
1110-2007	26
1110-2008	5
1110-2009	4
1110-2010	2
1110-2011	10
1110-2012	4
1120 - Second Degree Murder	**191**
1120-2006JUN06-DEC31	23
1120-2007	17
1120-2008	46
1120-2009	31
1120-2010	14
1120-2011	31
1120-2012	29
1210 - Attempted Murder	**117**
1210-2006JUN06-DEC31	12
1210-2007	44
1210-2008	4
1210-2009	16
1210-2010	15
1210-2011	10
1210-2012	16
Total	**370**

Source: Edmonton Police Service

Based on an understanding that a high percentage of murders and attempted murders are both discovered and reported to the appropriate police agency, a realistic picture of the frequency with which these crimes are committed in Edmonton is presented here. The intentional restriction of this research to include only murders and attempted murders ensures a minimal effect of the problems associated with the dark figure of crime, that is, under- or unreported crimes. The dark figure of homicide can be attributed to hidden or undiscovered bodies, missing persons, and undetermined causes of death.[37]

Of the 370 occurrences extracted from the EPS data, 56 were missing a geo-code for the VICTIM residence (15 for first degree murder, 26 for second degree murder, and 15 for attempted murder), 116 were missing a geo-code for the CSC residence (21 for first degree murder, 62 for second degree murder, and 33 for attempted murder), and 14 were missing a geo-code for the OCCUR location (7 for second degree murder and 7 for attempted murder). These locations had not been geo-coded in the EPS data provided to the researcher.

Missing geographic data for VICTIM residences can be attributed to any number factors typical to police investigations. For example, the VICTIM may not have been identified and, therefore, no x,y coordinates could be assigned for the VICTIM residence; the VICTIM may have been homeless or of no fixed address and, therefore, no corresponding x,y coordinates were assigned for the VICTIM residence; the body of the VICTIM may not have been found and, while there was enough evidence to determine a death had occurred in order to initiate an investigation, no corresponding x,y coordinate was assigned for the VICTIM residence; or the VICTIM information may have been incorrectly entered into EPROS resulting in an unrecognized location. As a result, the mapping software could not assign a valid x,y coordinate for the VICTIM residence.

Missing CSC residence data can be attributed to the same factors listed above for missing VICTIM residence data as well as the more overt observation that the CSC may not have been identified or apprehended in certain cases.

Missing OCCUR location data can be traced to cases where the body of the VICTIM may not have been located or the location of the crime scene had not

been determined and, as a result, the corresponding *x,y* coordinates were not assigned for the OCCUR location.

Attempts were made by the researcher to clarify missing geographical data with the EPS data manager. It was determined, however, that if the information was missing from the original data set provided to the researcher that it was highly unlikely that the EPS would be able to access the missing data. Further to this, the EPS data manager was unable to assign staff to attempt to retrieve missing geo-codes because of limited manpower at the time of the requests. Upon closer examination of the data, however, street addresses with an undisclosed offset had been included in the original EPS data set for some of the cases missing geo-codes. The researcher was then able to convert these locations into valid geo-codes (*x,y* coordinates) for mapping purposes. As a result, two options were available to the researcher in order to assign *x,y* coordinates to data entries that were missing EPROS geo-codes.

Option #1: Using Google map, the researcher could determine the location of the street addresses based on latitude and longitude and covert that data into *x,y* coordinates using the same Projected Coordinate System (see 'Section 4.4: Analytical Procedure'). This option, however, still requires the researcher to offset each *x,y* coordinate by a random distance in order to prevent case linkage. Unlike the undisclosed geo-code offset applied to the EPS data by the EPS data manager, the offset in this approach would be known to the researcher.

Option #2: Using ESRI ArcMap software the researcher could determine what neighbourhood boundaries the street addresses are located within. Once the

corresponding neighbourhood was identified, the researcher could then calculate the geometry of the centroid (the geometric centre or arithmetic mean position of a shape) for each neighbourhood. The centroid of the neighbourhood associated with the respective street intersection could then be used to represent the geo-code for the missing crime location. This second option presents as the most appropriate approach because it allows the researcher to offset the newly geo-coded *x,y* coordinates an undisclosed distance (in this case, completely unknown to the researcher) by using neighbourhood centroids, while locating the crime locations within their corresponding neighbourhood. As the data here is examined on an EPS Division-by-Division basis whereby the EPS Divisions are made up of neighbourhoods, conflicts in boundary overlaps are minimized.

As a result of undertaking additional geo-coding measures, the researcher increased the number of cases containing valid data for all three crime locations from 84 (22.7% of all cases) to 164 (44.3% of all cases). These 164 cases are comprised of 23 first degree murders (37.1%), 72 second degree murders (61.5%), and 69 attempted murders (36.1%). The *triangulation of crime model* is applied to examine these 164 occurrences. The remaining 206 occurrences are explored through visual analysis of charts, tables, and maps.

The systematic categorization of the data assisted in mapping all geographic data using a Geographic Information System (GIS). The specific GIS software system used to develop the visual maps is ESRI ArcMap10.1 (student license).[38] The creation of maps allows for the visualization of the geographic attributes of the violent crimes being studied. The creation of charts and tables

allows for the translation of demographic attributes of the violent crimes being studied. These two approaches permit a simultaneous analysis in order to determine the type and degree of geographic and demographic relationships for murder and attempted murder in Edmonton.

4.4. **ANALYTICAL PROCEDURE**

The EPS data referenced in this study includes both demographic and geographic attributes allowing for easy categorization of variables under consideration. Relevant demographic data is analyzed using advanced statistical tools available in Microsoft Office Excel software.[39] This data is translated by the researcher into spreadsheets, tables, charts, and graphs in order to allow a close examination of the demographic features of CSCs, VICTIMs, and OCCURs. These analytical products are further analyzed in order to determine the typical demographic distribution of murders and attempted murders within the population of Edmonton. Upon completing the overview analysis of demographic data, the attributes exhibiting high concentrations of offenders and/or victims, such as age groups, gender types, location type, victim/offender relationships, and method of killing, are studied extensively. The results of this detailed analysis provide a picture of the dominant demographic-based relationships between CSCs, VICTIMs, and OCCURs for murder and attempted murder.

The available geographic data was entered into a GIS spatial mapping software program, ArcMap10.1. This program allows for the analysis of geographic attributes of the data set facilitating the creation of maps depicting the OCCUR locations as well as the CSC residences and VICTIM residences. These

maps are analyzed in order to determine the patterns and spatial distributions of murders and attempted murders in the City of Edmonton. Once the spatial distributions are determined, the attributes of areas exhibiting high rates of occurrences and residences are further examined. Following the concepts of the *triangulation of crime model*, the distances between the three crime locations associated with applicable cases are measured. This data provides significant insight into the spatial relationships between CSCs, VICTIMs and OCCURs.

All maps were developed using geographic data (geo-codes) from the available EPS data. The same Projected Coordinate System (PCS) employed by the EPS was also applied. This PCS is called the national grid of Canada NAD19833TM114. The base map of the City of Edmonton was included in the data set provided by the EPS. This base map is publicly available from the City of Edmonton and includes features such as roads, waterways, and parks. The base map also includes Census neighbourhood boundaries for the City of Edmonton as defined by Statistics Canada and the boundaries of the five EPS Divisions (Northeast, Downtown, Southwest, Southeast, and West). The *x,y* coordinates of the three types of crime locations were plotted by the researcher through a conversion of Excel data into ArcMap data. All other map features were created by the researcher within ArcMap with the exception of the point density maps (Maps #2A, #2B, and #2C). The #2 series of maps were created in collaboration with Dr. Vukicevic who had access to advanced ArcMap spatial analysis tools not included in the researcher's student license version. All maps were assigned a

scale based on the geographic area under examination and the level of detail

necessary to effectively analyze the data.

Despite being able to trace the analytic capacity of mapping back to the

roots of criminology and beyond, GIS is still considered a relatively new

application in the social sciences. Over time new and different approaches of data

analysis have emerged. Maps were, however, largely ignored by criminologists

until they were revived on a large scale by Canter and Rossmo (see Chapter 3).

Meanwhile, GIS has continued to be developed and applied in many other fields.

As a result, GIS has become much more user-friendly, accessible, and affordable

making it a viable choice of analytics for many government agencies and

businesses. Not surprisingly, these user-enhancing features have made GIS much

more attractive to social science research. As more social science researchers

become acquainted with GIS and its capabilities, it is anticipated that spatial

analysis will become common place (Steinberg & Steinberg, 2006).

4.5. DEFINITIONS OF KEY TERMS, CONCEPTS, VARIABLES, AND ACRONYMS

Centrography: Thomas Poulsen defined 'centrography' as "the trend in thought…directed towards the establishment of laws of the distribution of phenomena based on the relationships and migrations of their centers of gravity" (Poulsen, 1959).

CompStat: CompStat is "a management process within a performance management framework that synthesizes analysis of crime and disorder data, strategic problem solving, and a clear accountability structure in police agencies."[40,41,42]

Circle Hypothesis: In 1994, Canter and Gregory applied the term 'circle hypothesis' to describe "the simplest way to define the area circumscribed by the crimes was to identify the two crimes furthest from each other and use the line joining them as the diameter of the circle […] the offender's home would be

within the circle so defined—'domocentricity'" (Canter, 2008a, p. 9).

Modus Operandi   *Modus operandi* (M.O.) is, according to Douglas, "learned behaviour. It's what the perpetrator does to commit the crime. It is dynamic—that is, it can change" (Douglas, 1995, p. 252). The term 'signature' was originally coined by Douglas to distinguish it from M.O. According to Douglas, signature "is what the perpetrator has to do to fulfill himself. It is static; it does not change" (Ibid, p. 252). Often the differences between M.O. and signature can be subtle.

Patrol Saturation: This common police technique involves the additional employment of police officers to targeted areas of criminal activity during select periods to detect and apprehend criminal offenders.

Point Plotting: Invented by René Descartes, 'point plotting' is an elementary mathematical skill originally developed to locate positions on military maps (e.g. grid *7A*). Point plotting techniques are based on the Cartesian Coordinate System. Each point is denoted by two dimensions (*x* and *y*) which indicate the distance of the point along the two dimensions with reference to the origin.

Serial: In this research, serial does not necessarily refer to more than one crime committed by the same offender or offenders. Rather, serial is intended to refer to a repetition of a specific type of crime or crimes (e.g. murder and attempted murder) which may or may not be attributed to a specific offender or offenders.

Serial Murder: As a consequence of the existence of over a dozen definitions for the elusive term of 'serial killer,' I will follow the approach taken by Rossmo and defer to the one applied by the FBI due to its simplicity and functionality: "Serial murderers are involved in three or more separate events with an emotional cooling-off period between homicides. This type of killer usually premeditates his crimes, often fantasizing and planning the murder in every aspect, with the possible exception of the specific victim. Then, when the time is right for him and he has cooled off from his last homicide, he selects his next victim and proceeds with his plan. The cool-off period can be days, weeks, or months and is the main element that separates a

serial killer from other multiple killers" (Rossmo, 2000, p. 7).

Target Backcloth: As found in Brantingham and Brantingham's research, target backcloth is "the equivalent of a spatial opportunity structure" and is "configured by both geographic and temporal distribution of 'suitable' (as seen from the offender's perspective) crime targets or victims across the physical landscape" (Rossmo, 2000, p. 127). It should not be assumed, however, that crime locations are random; rather many factors influence a criminal's decision-making process involving crime sites. Such factors include: (i) environmental cues influenced by natural and built physical environments; (ii) victim traits—rare or specific; (iii) offender's activity space; and (iv) victim location or mobility (Rossmo, 2000, p. 127-8).

Target Hardening: This approach is a long-standing traditional approach to crime prevention. By denying or limiting access to a crime target through the use of physical barriers (locks, alarms, security, fences, etc.) the amount of effort a criminal must expend is increased and can be seen as a deterrent to criminal activity.

CCJS	Canadian Centre for Justice Statistics
CMA	Census Metropolitan Area (Statistics Canada)
CPS	Calgary Police Service
EPROS	Edmonton Police Reporting and Occurrence System
EPS	Edmonton Police Service
FBI	Federal Bureau of Investigation
GIS	Geographic Information System
NCAVC	National Center for the Analysis of Violent Crime (FBI, United States)
PCS	Projected Coordinate System
RCMP	Royal Canadian Mounted Police
UCR	Uniform Crime Reporting Survey
ViCAP	Violent Criminal Apprehension Program (FBI, United States)
ViCLAS	Violent Crime Linkage System (RCMP, Canada)

4.6. **ETHICAL CONSIDERATIONS**

All research was conducted in accordance with the University of Alberta's Ethics Policies (approved 5 February 2013), the Edmonton Police Service's Ethics Policies (approved 2 January 2013), and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (SSHRC). See Appendix F for University of Alberta Research Ethics Board (REB2) approval notification and Appendix G for the Edmonton Police Service Research Agreement. There were no human research participants involved in this research; all quantitative data was collected from secondary sources.

4.6.1. *Confidentiality*

There was no contact by the researcher with any individual to whom the collected data relates, directly or indirectly. No personal information was used or disclosed in a form in which the individual to whom the data relates can be identified. The researcher made no attempt to link information contained in data provided by the EPS with information obtained otherwise, including information found in court records. All police case files were accessed within the EPS headquarters (9620-103A Avenue, Edmonton) by EPS staff only. Individually identifying data was removed from all relevant data by EPS staff prior to researcher access, thus fully eliminating the researcher's ability to link information to individuals within the data set.

Additional processes for the security and confidentiality of data were adhered to when the data was in the researcher's possession (e.g. access restrictions, password protection, and secure storage).

4.6.2. Informed consent

Informed consent was not required for this research project as there were no human research participants involved.

CHAPTER 5: **PATTERNS AND CHARACTERISTICS OF HOMICIDE IN EDMONTON**

The patterns and characteristics of murder and attempted murder are examined here within the framework of two types of sociological relationships—personal and spatial. Personal relationships refer to the possible links between individuals involved in a crime; that is, the CSCs (offenders) and the VICTIMs. Personal relationships are explored sociologically in terms of the demographic characteristics of both CSCs and VICTIMs (e.g. gender and age); crime occurrence (OCCUR) locations (e.g. residential or non-residential); and the degree of personal contact between VICTIMs and CSCs (e.g. stranger or non-stranger).[43] Additional consideration is given to the method of killing or the weapon involved in these crimes.

In the context of this study, spatial relationships are those observed between two or more geographical locations linked to the same crime (e.g. crime scene, offender residence, and victim residence). Spatial relationships are examined sociologically in terms of the physical proximity of these crime locations to each other and, consequently, the individuals involved. Before addressing the demographic and spatial relationships of murder and attempted murder, however, we begin with an overview of the extent of these crimes in the City of Edmonton between the years 2006-2012.

5.1. **MURDER AND ATTEMPTED MURDER RATES AND TRENDS IN EDMONTON**

Of the five EPS Divisions identified in Chapter 2, Downtown Division exhibits the highest proportion of first degree murders (40%) and second degree murders (41%) between the years 2006 to 2012. Northeast Division presents with

the highest number of attempted murders (46%) during this same timeframe. The breakdown of murders and attempted murders that occurred between 2006 and 2012 in each EPS Division is shown below in Figure 7. These crime rates have fluctuated from year to year in Edmonton (see Figure 8).

Figure 7: **S**UMMARY OF **O**CCURRENCES BY **EPS D**IVISIONS **2006-2012**

First Degree Murder (1110) Occurrences by Division
Timeframe: 2006.06.06-2012.12.31

Second Degree Murder (1120) Occurrences by Division
Timeframe: 2006.06.06-2012.12.31

Attempted Murder (1210) Occurrences by Division
Timeframe: 2006.06.06-2012.12.31
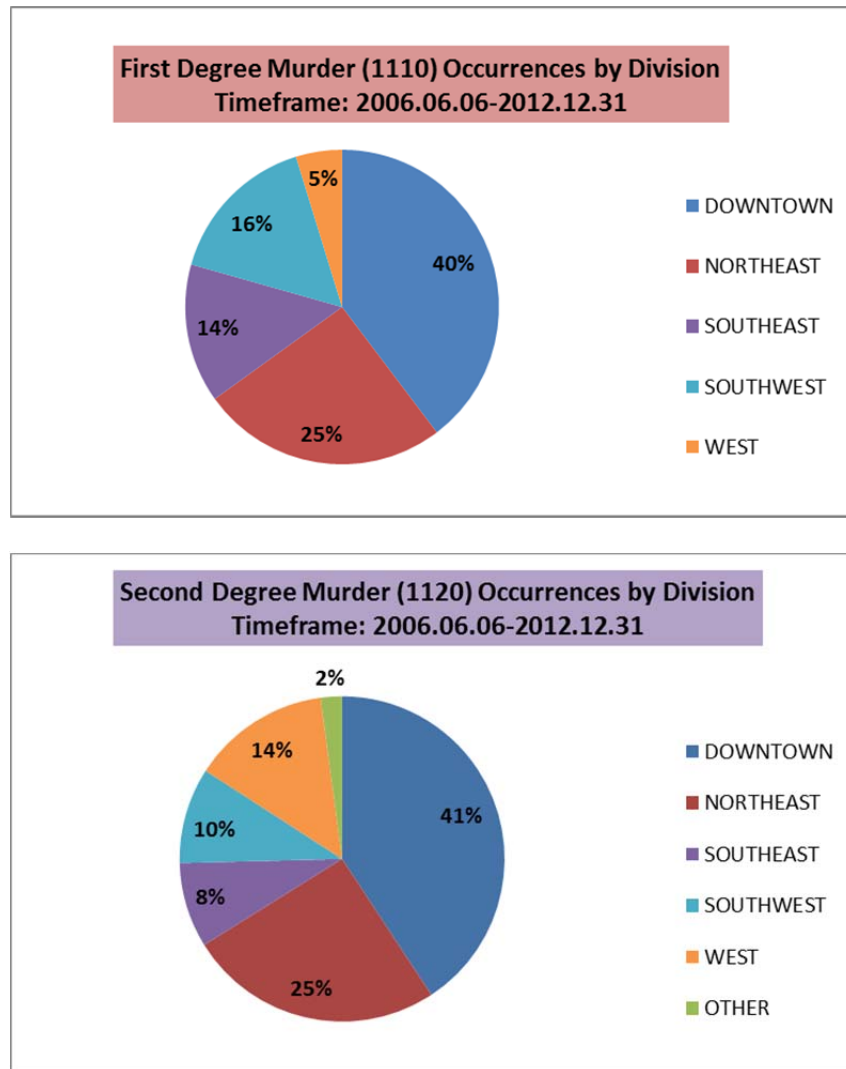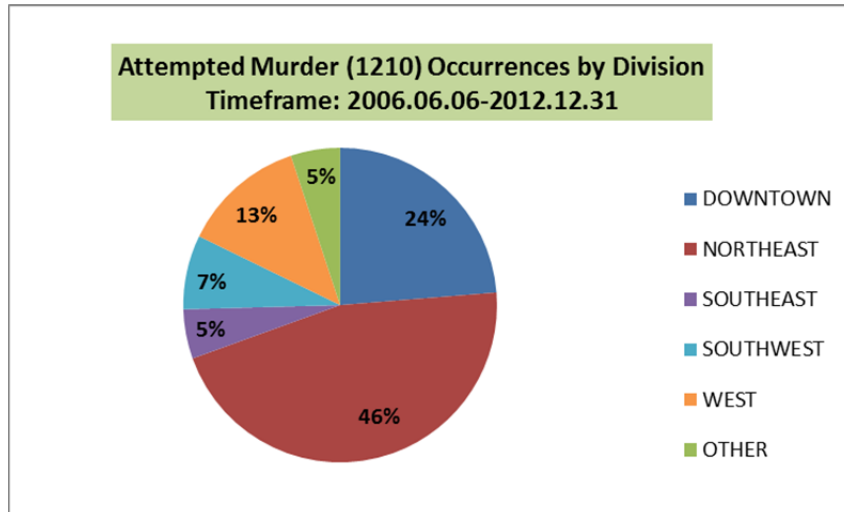
Source: Edmonton Police Service

Figure 8: ANNUAL RATES OF MURDER & ATTEMPTED MURDER, EDMONTON 2006-2012
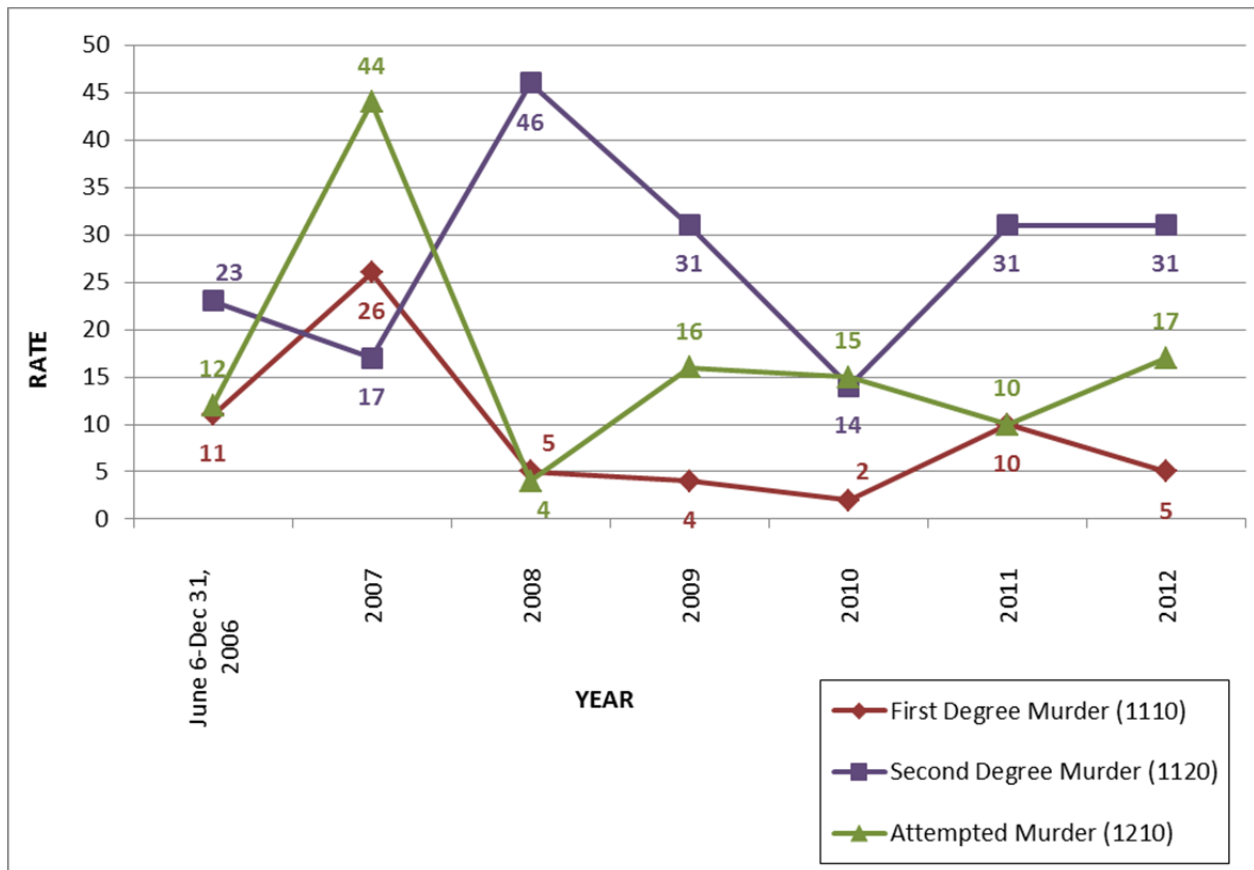
Source: Edmonton Police Service

A similar Divisional picture emerges when we look at murder and

attempted murder occurrence rates per 100,000 population in Edmonton

averaging over the period 2006-2012 (see Table 7). The averaged murder rate in

Downtown Division per 100,000 population was 3.2 for first degree murders, 6.2

for second degree murders, and 5.5 for attempted murders. Northeast Division

exceeded Downtown Division's attempted murder rate with 5.8 per 100,000

population.

**Table 7: MURDER AND ATTEMPTED MURDER RATES PER 100,000 POPULATION
(AVERAGING OVER THE PERIOD 2006-2012)**

OCCURRENCE TYPE	CITY WIDE	NORTHEAST DIVISION	DOWNTOWN DIVISION	SOUTHEAST DIVISION	SOUTHWEST DIVISION	WEST DIVISION
First Degree Murder	1.1	1.1	3.2	0.8	0.7	0.3
Second Degree Murder	2.1	2.1	6.2	0.8	0.8	1.8
Attempted Murder	3.1	5.8	5.5	0.8	0.9	2.5

Source: Edmonton Police Service and City of Edmonton.

When compared against the Canadian average murder rate of 1.56 per

100,000 population in 2012, Edmonton appears to be dangerous.[44] In an American

city of comparable size to Edmonton, the average murder rate in 2012 was

approximately 12.1 per 100,000 population. This comparison makes Edmonton

appear relatively safe.[45] These contrasting comparisons emphasize that one must

be cognizant of the sociological and environmental context in which crime rates

are being analyzed and, more so, who is responsible for these crimes, who they

are being committed against, and where they are occurring. These factors are

addressed below in detail in the context of the City of Edmonton and the

Divisional boundaries of the EPS.

As a side note, each EPS Division is assigned and patrolled by the number

of officers determined to be necessary by the EPS in order to effectively serve the

corresponding geographical area, population density, and both the frequency and classification of calls for service. The City of Edmonton has approximately 190 Edmonton Police Service officers per 100,000 population. The approximated Divisional distribution of EPS Officers is summarized in Table 8.

Table 8:   DISTRIBUTION OF EPS OFFICERS (AVERAGING OVER THE PERIOD 2006-2012)

	NORTHEAST DIVISION	DOWNTOWN DIVISION	SOUTHEAST DIVISION	SOUTHWEST DIVISION	WEST DIVISION
AREA (km^2)	209	27	149	183	131
Approx. # EPS Officers	383	212	307	394	255
Approx. # of EPS Officers/km^2	1.8	7.9	2.1	2.2	1.9

Source: Edmonton Police Service and City of Edmonton.

A further breakdown of the data shows that, when compared to the rest of the city, Downtown Division encompasses the smallest geographical footprint; has the highest population density;[46] is policed by the highest number of officers per 100,000 population; and exhibits the highest rate of murder and the second highest rate of attempted murder. Interestingly, Northeast Division has the highest rate of attempted murder, yet it is policed by the second lowest number of officers per 100,000 population. These findings further emphasize the necessity of this study to sociologically examine the ecological context and structural variables of the geographical region and the demographic make-up of the individuals under study.

5.2. **CHARACTERISTICS OF VICTIMS, OFFENDERS, AND OCCURRENCES**

This section considers specific aspects of murder and attempted murder in Edmonton in terms of VICTIM and CSC attributes and features of the associated occurrence. First, we will consider demographic characteristics of CSCs and

VICTIMs in order to identify relationships in terms of gender and age. Second, we will consider the relationships between VICTIMS and CSCs, henceforth referred to as victim-offender relationships, and the weapon used in the occurrence by the CSC. It is worth re-stating that detailed information in relation to race/ethnicity, family status, employment, and social class is lacking from the EPS data. What is presented here is an overview of what is known to the researcher.

5.2.1. Gender

In Edmonton, males comprised 68.6% of all identified CSCs and 59.5% of all identified VICTIMs. On the offending side, this can be further broken down to show that males accounted for 53.2% of first degree murderers, 61.2% of second degree murderers, and 88.9% of attempted murderers. On the victimization side, males accounted for 77.4% of first degree murder victims, 80.6% of second degree murder victims, and 87.2% of attempted murder victims.

Interesting patterns appear when examining the proportion of VICTIMs killed by male or female CSCs in relation to the gender of the VICTIM. As illustrated in Table 9, a high proportion of murders (39.7% first degree and 46.1% second degree) and attempted murders (79.7%) are all-male encounters, that is, both male CSCs and male VICTIMs are involved. Also, more males murder (12.7% first degree and 15.5% second degree) or attempt to murder (9.3%) females than vice versa.

Females account for only a minority of victims (22.2% first degree murder, 19.2% second degree murder, and 12.7% attempted murder) and an even

smaller proportion of offenders (11.1% first degree murderers, 6.2% second degree murderers, and 7.6% attempted murderers). These findings are consistent with relatively constant female perpetrated homicide rates falling between 10% and 12% in Canada, the United States, England, and Australia (Brookman, 2005; Mouzos, 2000; Silverman & Kennedy, 1993; Mann 1996; d'Orban, 1990; Stanko *et al.*, 1998).

Table 9: GENDER RATIO OF CSCs AND VICTIMs, EDMONTON 2006-2012

CSC	First Degree Murder (1110)		Second Degree Murder (1120)		Attempted Murder (1210)	
	VICTIM		VICTIM		VICTIM	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
MALE	39.7%	12.7%	46.1%	15.5%	79.7%	9.3%
FEMALE	4.8%	6.3%	4.1%	2.1%	4.2%	3.4%
UNKNOWN	33.3%	3.2%	30.6%	1.6%	3.4%	0.0%

Source: Edmonton Police Service

While males dominate as both CSCs and VICTIMs when examining the overall murder and attempted murder rates in Edmonton between 2006 and 2012, there is an exception to this pattern—intimate partner-based second degree murders and attempted murders. Only in the area of intimate partners do we see an increase in female offending. A female killed an intimate male partner in 3.1% of second degree murders and 1.7% of attempted murders.[47] In these cases, an intimate partner or ex-partner was the victim in 50.0% of second degree murders and 55.6% of attempted murders. Further to this, family members accounted for the victims in 50.0% of first degree murders, 25.0% of second degree murders, and 11.1% of attempted murders committed by female CSCs. Females kill those who are closest to them as two intimate relational categories (intimate partner and

family members) comprise over two-thirds of their victims making female-perpetrated homicides "an especially intimate act" (Stanko *et al*., 1978, p. 192).

This observed increase in female offending, however, does not approach the rate of male offending for intimate partner murder and attempted murder. A male killed an intimate female partner in 4.8% of first degree murders, 4.7% of second degree murders, and 7.7% of attempted murders. Furthermore, in Edmonton, females are twice as likely to be killed by a male intimate partner and three times more likely to have an attempt made on their life by a male intimate partner than males are by a female intimate partner. In recent years, the rate of intimate partner homicides in Edmonton has remained as stable as has the rate of intimate partner homicides across the rest of Canada (Brennan & Dauvergne, 2011).

Although limited research has been conducted in a Canadian context, recent studies show that intimate partner homicides committed by females are typically a direct response to male aggression or threat (Brennan & Dauvergne, 2011). Research concerning the notion of victim-precipitation, that is, victims who precipitated their own deaths by using force or weapons against their killer (Von Hentig, 1948; Wolfgang, 1958; Mann, 1996; Brookman, 2005), has produced two significant findings supporting the undeniable connection between domestic violence and domestic homicide—that is, domestic violence that went too far (Brookman, 2005; Busch, 1999; Chan, 2001; Goetting, 1998a; Jensen, 2001; Jurik & Winn, 1990; Polk, 1991). First, domestic-based (e.g. intimate) homicides are more likely to involve victim-precipitation than non-domestic-

based homicides. Second, intimate partner homicides committed by females are much more likely to involve victim-precipitation than those committed by their male counterparts (Brookman, 2005, p. 166). Similar findings are reported in studies explaining the phenomenon of males killing female intimate partners as the end result of a historical and well-entrenched pattern of physical abuse and threat (Browne, Williams & Dutton, 1999).

In Brookman's study (2005) of scenarios of intimate partner homicides committed by women, she finds that the most dominant explanation of female-perpetrated intimate partner murders is Walker's (1989) battered women syndrome where females are both victims and offenders. This approach addresses both immediate and long-standing battering and the level of threat perceived by the female involved against both herself and, possibly, her children. This explanation, however, is only adequate to explain why some women kill their intimate partners; it is unable to address those who do not. Further, females who kill in the absence of domestic violence are an example of the limitations to understanding male and female violence in terms of gender differences and/or similarities. Another explanation for female-perpetrated homicides is motivation of self-interest (e.g. financial benefits gained from partner's death and/or sexual gains found in pursuing a relationship with another person) (Brookman, 2005; Chan, 2001). Both the data restrictions in this study and the limited empirical and theoretical frameworks within which to examine the complexities of female offending prevent me from drawing a direct relationship between female

offenders in this study and the influence of economic, social, and political inequalities they may face.

The results of this Edmonton-based study, however, do support the prevailing scenario of masculine violence attributed to the socially and culturally constructed norms centred on some form of status challenge amongst or between males (see Chapter 3). Consequently, male-on-male homicide is understood as a direct result of other criminal behaviour. For example, distinctly masculine events such as assaults due to personal disagreements, criminal gang-initiation activities, or personal robberies, may involve economically and socially marginal males to accept higher risks to both their own life and the lives of others to the point where lethal violence may be perceived as the only remaining form of conflict resolution (Polk, 1994, 1995).

While the EPS data does not permit a complete and detailed analysis of homicides based on educational levels, employment status, income level, and alcohol consumption by both male and female victims and offenders similar to that found in studies of intimate partner homicides by Brookman, (2005), Mann (1996) and Goetting (1987), an in-depth assessment of the age of the individuals, their relationship to each other, the method of killing, and the crime location type is provided below.

5.2.2. Age

In this section we will consider the age of murder and attempted murder VICTIMs and CSCs in Edmonton. In Chapter 4, it was noted that the age variable under consideration here is divided into eleven categories due to a potentially

non-linear relationship. The eleven categories of age are: under 10 years of age, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-60, and over 60 years of age. The inclusion of ages 16 and 17 in the third category is a reflection of the penalties for a charge of murder identified in Chapter 2 (see Table 2).

The average age of male VICTIMs is 29.4 years and the average age of female VICTIMs is 29.9 years. As illustrated in Figure 9, individuals between 21-25 years of age exhibit the highest level of victimization (30.3%) for murder and attempted murder. Those between 16-20 years of age and 26-30 years of age also demonstrate high levels of vulnerability. Individuals between 16-30 years of age account for 63.0% of VICTIMs. Individuals under 16 years of age accounted for only 5 VICTIMs and 5 CSCs. These findings are consistent with current Canadian research indicating that youth-related crimes tend to be property crimes, not violent crimes (Hogeveen & Minaker, 2009).

Figure 9: AGE OF MURDER & ATTEMPTED MURDER VICs, EDMONTON
2006-2012
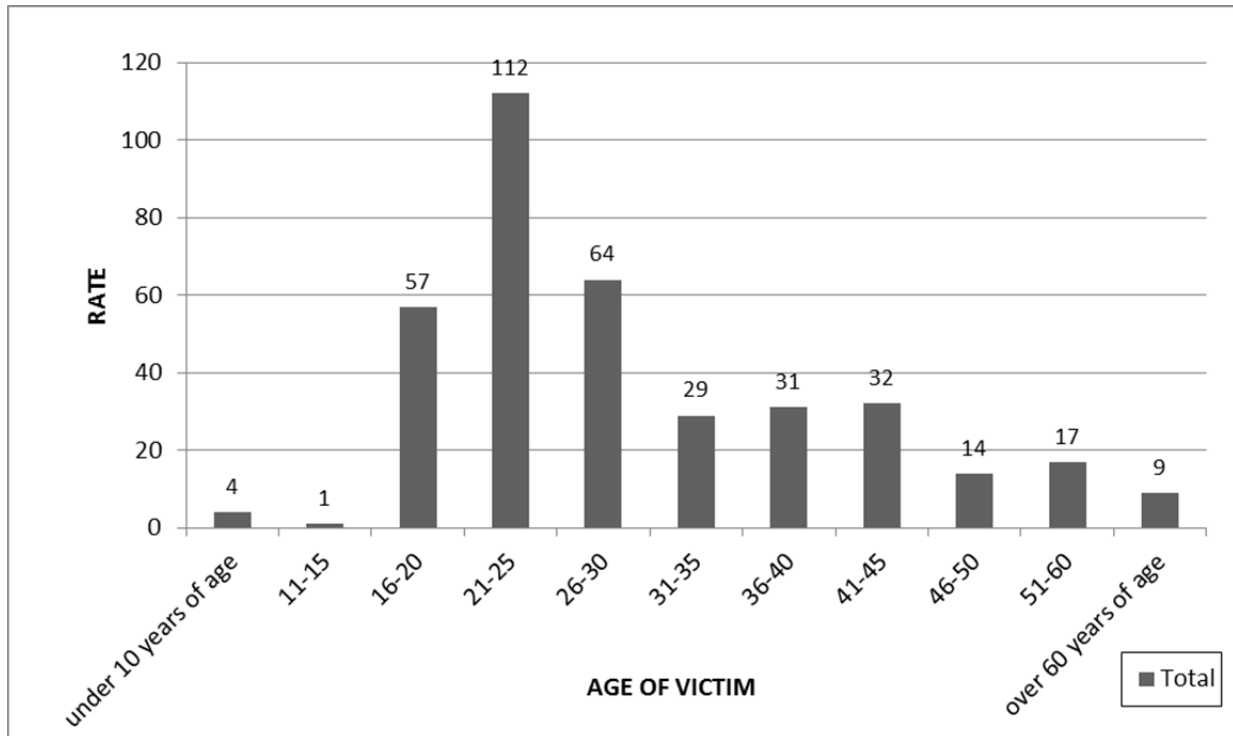
Source: Edmonton Police Service

Close examination of the ages of murderers and attempted murderers in Edmonton reveal very similar findings in terms of offending age. The average age of male CSCs is 27.5 years and the average age of female CSCs is 29.9 years. As shown in Figure 10, the peak age of offending is between 21-25 years (22.7%). CSCs between 16-30 years of age demonstrate very high levels of offending (51.1%). The 80 CSCs for which an age is not entered account for 24.1% of the cases. These entries are understood as CSCs who were either not identified, could not have their age verified, or did not have their data entered correctly into EPROS. My analysis of CSC ages is based only on the ages that were entered (75.9% of all the cases).

Interestingly, those aged 16-30 comprise approximately 19% of

Edmonton's population based on Edmonton's 2012 Municipal Census. The other

age groupings of VICTIMs and CSCs, however, do not rise and fall in accordance

with Census figures for population counts making it impossible to infer that

greater numbers in population may have a bearing on greater numbers in

victimization or offending.

Figure 10: AGE OF MURDER & ATTEMPTED MURDER CSCS, EDMONTON 2006-2012
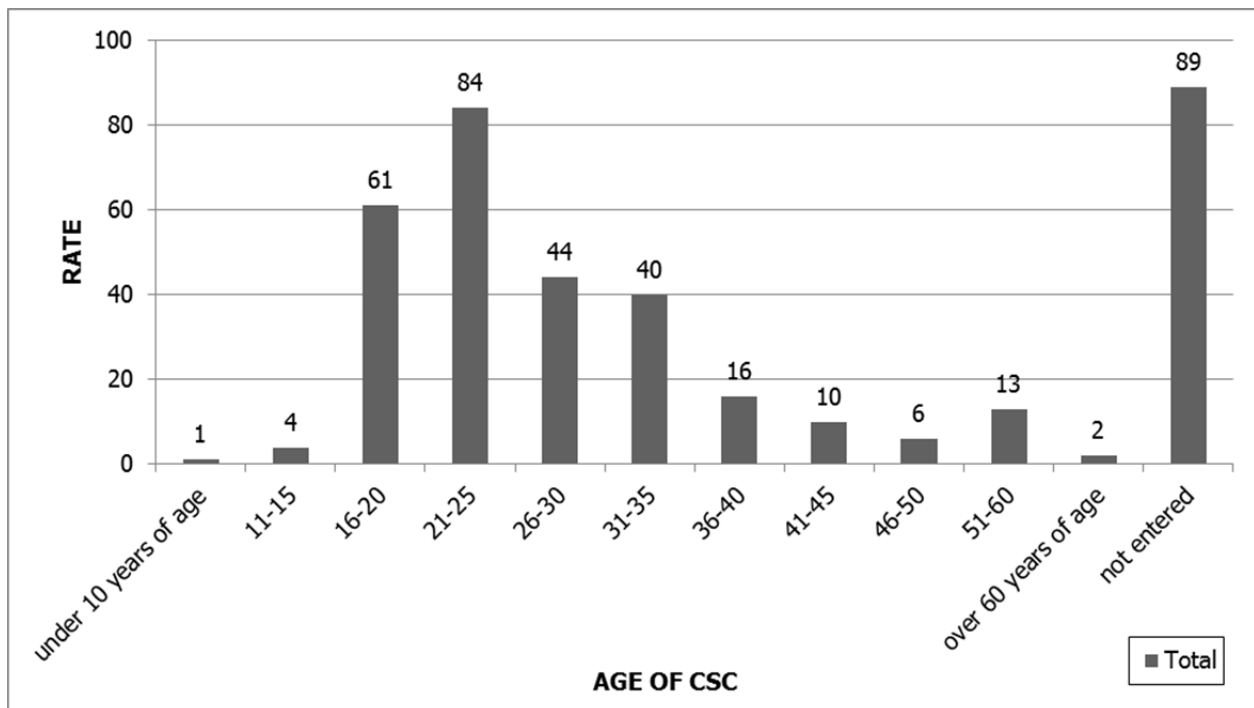
Source: Edmonton Police Service

The findings of this study on the age groupings of both CSCs and

VICTIMs support the general conclusions found in current literature where both

homicide victims and offenders tend to be relatively young adult males who are

highly marginal in a socio-economic context (see Chapter 3). This observation is

further supported by the data collected by Statistics Canada, CCJS, and the UCR Survey.

When attempting to contextualize violence amongst young adult males in Edmonton, one cannot overlook the fact that Edmonton is the largest city in proximity to Alberta's oil sands and is referred by the City of Edmonton's Chamber of Commerce as the "Gateway to the North and Canadian Rockies."[48] This ever-expanding industry has resulted in a steady migration of job-seeking young adult males to Alberta from across the country and beyond. Many of these individuals make Edmonton their temporary home resulting in the possibility of weak social and community ties (Dorow & O'Shaughnessy, 2013; Foster & Taylor, 2013; Krahn, Hughes & Lowe, 2010; Van Dyke & Loberg, 1978). Two other plausible explanations for increased male violence in Edmonton include the progressive and aggressive drug-trade and associated gang activity (discussed below) observed across Canada and the displacement of increasingly marginalized populations in Aboriginal communities from rural areas to urban centres like Edmonton (Quan, 2010).

5.2.3. *Victim-Offender Relationships*

The issue of victim-offender relationships is imperative to this study because there is a strong disconnect between the images portrayed by the media of stranger-perpetrated predatory crimes like murder and the reality offered by the EPS data (Chermak, 1995; Janhevich, 1998; Greer, 2005; 2003). In this study, individuals are victimized by people who are categorized by the UCR Survey as either strangers or non-strangers (e.g. acquaintances, friends, family members,

relatives, and business acquaintances). The EPS data indicates that the majority of

the murders and attempted murders committed between 2006 and 2012 were

perpetrated by non-strangers. As indicated in Figure 11 and Table 10, 15.9% of

murders and attempted murders in Edmonton occur amongst individuals who are,

or have been, related to each other (e.g. close family members, spouses, and

extended family members). This figure is exceeded only by the categories of

casual acquaintances and friends who, when combined, account for 34.9% of all

victim-offender relationships. Murders and attempted murders among strangers

comprise 14.6% of occurrences in Edmonton. Despite the statistics supporting

that more non-strangers are responsible for murder and attempted murder in

Edmonton, the public perception of fear continues to be fuelled by tendency of

media accounts to report mainly on stranger homicides.

When examined more closely, 17.7% of the CSCs involved in first degree

murder cases were strangers and 56.5% were non-strangers. In the second degree

murder cases, strangers accounted for 15.2% of CSCs and non-strangers

accounted for 41.9% of CSCs. In the attempted murder cases, strangers accounted

for 12.0% of CSCs and non-strangers accounted for 76.9% of CSCs. These

figures reflect well-established research findings on homicide in Canada where

almost 50% of homicide victims are killed by an acquaintance or a friend and

33% are killed by a family member or a friend (see Chapter 3). Little research has

been conducted in Canada in general concerning victim-offender relationships for

attempted murder, but the dominance of non-stranger relationships observed in

this study is similarly understood in terms of the male-dominated crimes in a Canadian context discussed above.

Although the categories of victim-offender relationships listed in Table 10 provide some insight into the nature of homicide they are unable to provide total clarity in terms of the contributing factors and situational or emotional circumstances leading up to a murder or attempted murder. This, however, does not preclude this researcher's interpretation that homicides occurring between individuals who are sexually intimate (9.2%) and non-intimate family members (6.8%) can be attributed to a breakdown of relational bonds similar to those experienced by family members and friends.

Relational bonds need not be present, however, in order for violent engagement to occur between strangers. These violent encounters can emerge out of an attempt to take advantage of an opportunity (e.g. personal robbery) or during a spontaneous encounter (e.g. altercation at a nightclub or sporting event) that quickly escalates to a violent and lethal confrontation (Luckenbill, 1977; Lundesgaarde, 1977; Cavan, 1966). In stranger-perpetrated homicides, VICTIMs and CSCs are more likely to be similar in age than in cases involving family members. As addressed in the following section, the majority of stranger-perpetrated murders and attempted murders in Edmonton occur in what can be classified as a familiar or public setting. This context suggests that the CSCs may have felt that their self-image was being publicly challenged and, as a result, they turned to lethal violence as a means to overcome the perceived challenge in order to 'save face' (Felson, 1978; Felson, Ribner & Siegel, 1984; Wilson, 1993). These

observations on stranger homicides are supported by research conducted by Dr. Melchers at the University of Ottawa. Melchers's research results demonstrate that a significant number of homicides in Canada occur "spur of the moment between people who are drinking or involved in the drug trade" (Quan, 2010).

The descriptive category of 'stranger' is unarguably problematic to this type of research as it fails to provide an understanding of what events would generate the emotional reactions typically observed in close familial or intimate ties. This issue presents a further challenge as it prevents the researcher from considering two of the predominant forms of murder amongst men: confrontational killings and revenge killings (Brookman, 2005).

Figure 11: MURDER & ATTEMPTED MURDER VICTIM-OFFENDER RELATIONSHIPS, EDMONTON 2006-2012
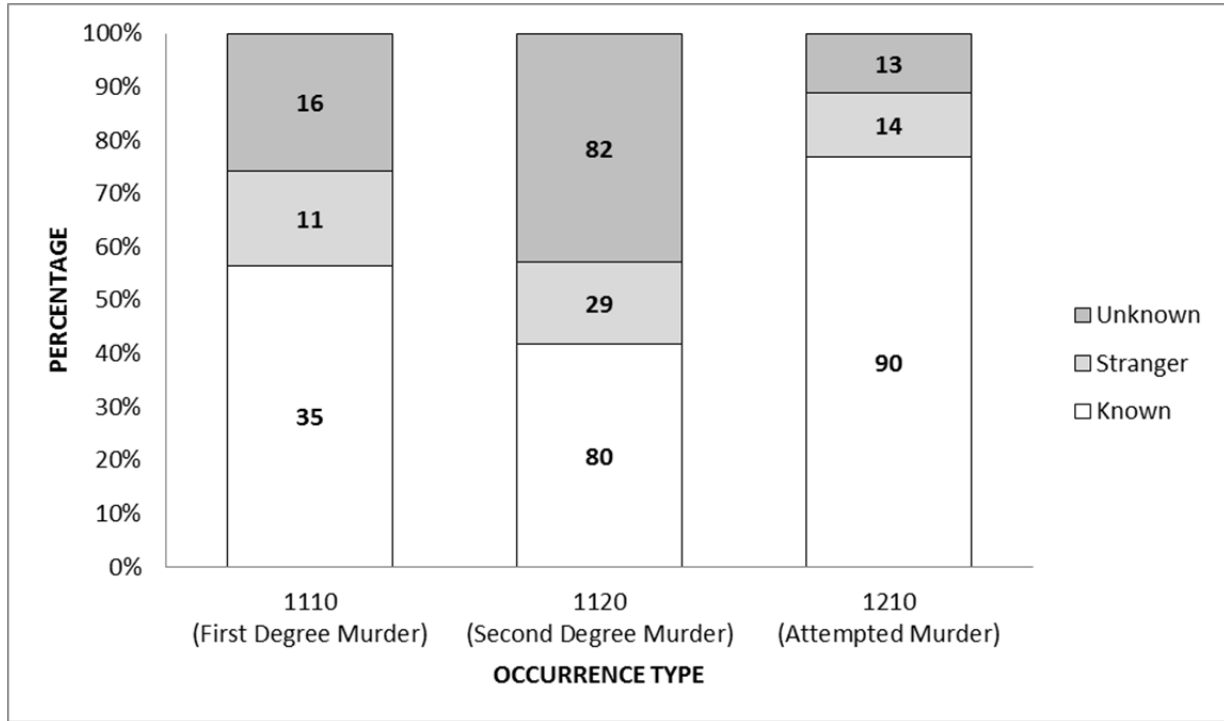
Source: Edmonton Police Service

Table 10: VICTIM-OFFENDER RELATIONSHIPS: MURDER & ATTEMPTED MURDER, EDMONTON 2006-2012

CSC RELATIONSHIP TO VICTIM	First Degree Murder (1110)	Second Degree Murder (1120)	Attempted Murder (1210)
Non-Stranger	**35**	**80**	**90**
Boyfriend or girlfriend	0	2	0
Business relationship	6	2	2
Casual acquaintance	9	32	58
Child	2	1	1
Criminal relationship	3	1	3
Ex-boyfriend or ex-girlfriend	1	1	9
Extended family	5	7	1
Friend	5	17	8
Other immediate	0	4	1
Other intimate relationship	0	0	2
Parent	2	1	0
Separated or Divorced	0	0	2
Spouse	2	12	3
Stranger	**11**	**29**	**14**
Unknown	**16**	**82**	**13**
Total	**62**	**191**	**117**

Source: Edmonton Police Service

Variations in the degree to which offences are stranger or non-stranger perpetrated are dependent on data entry both at the time of the offence and following investigative inquiry (e.g. post-CSC identification). In short, if a CSC was neither identified nor apprehended, the CSC's relationship to the VICTIM would be entered in EPROS as unknown. Further to this, if the data was not correctly entered or updated in EPROS following developments in the case, an unknown number of stranger or non-stranger CSC-VICTIM relationships may remain entered as unknown when in fact a CSC-VICTIM relationship was established.

These research results for murder and attempted murder victim-offender relationships in Edmonton reflect well-established criminology studies where almost one-half of masculine homicides take place amongst non-strangers. These findings can be interpreted based on both geographical proximity of offender and victims to crime scenes (discussed in Chapter 6) and the type and degree of association between individuals with similar lifestyles.

5.2.4. *Method of Killing/Weapons*

The EPS only collects and codes data on the most serious weapon involved in an occurrence. For example, if a VICTIM was both stabbed and shot, the data would reflect only the details of the firearm used in the shooting event. Nearly all of the murders and attempted murders under examination in this study involved weapons. The EPS data reveals the most common method of killing involves a knife (e.g. kitchen knives, pocket knives, or switchblades) or other piercing/cutting instrument (e.g. any object other than a knife whose action would

cut or pierce flesh such as a hatchet, razor blade, sword, scissors, screwdriver, or broken bottle). A knife or other piercing/cutting instrument was employed in 51.3% of all occurrences (33.9% of first degree murders, 53.4% of second degree murders, and 57.2% of attempted murders) (see Figure 12). A firearm (e.g. handgun, rifle, or shotgun, or automatic weapon) was used in 27.3% of all occurrences (53.2% of first degree murders, 21.5% of second degree murders, and 31.6% of attempted murders).

Based on a review of the existing literature on methods of killing (see Chapter 3), it was not surprising that the most common method of killing among non-strangers is a knife or other piercing/cutting instrument (58.5% of all non-stranger occurrences [28.6% first degree murders, 63.8% second degree murders, and 65.6% attempted murders]). The most common method of killing among strangers is also a knife or other piercing/cutting instrument (59.3% of stranger occurrences [63.6% first degree murders, 69.0% second degree murders, and 35.7% attempted murders]). Firearms accounted for the method of killing in 35.7% of stranger attempted murders.

It is interesting to note that while knives or other piercing/cutting instruments are the most common weapon overall, firearms were more prevalent in first degree murders. Unfortunately, the category of firearms was not further broken down in the EPS data I was provided in order to determine the more commonly used type of firearm. This data is, however, collected by EPS and reported to the UCR Survey making it reasonable to infer that the Canadian trend

of handguns accounting for 75% of all fire-arm related homicides is reflected in Edmonton's figures (Leesti, 1997).

Physical force accounts for method of killing in 7.3% of all occurrences (9.7% of first degree murders, 8.4% of second degree murders, and 4.3% of attempted murders). Once again, the descriptive category of physical force is not further broken down in the EPS data set provided to the researcher to reveal incidents of punching, kicking, pushing, and, possibly, suffocation, or strangulation.

The results of this analysis of weapons and methods of killing are reflective of those published by CCJS and Statistics Canada where the highest number of knife-related violent encounters occurred in the Prairie Provinces, driven largely by the cities of Winnipeg, Regina, and Edmonton (Dauvergne, 2010).

Figure 12: METHOD OF KILLING, EDMONTON 2006-2012
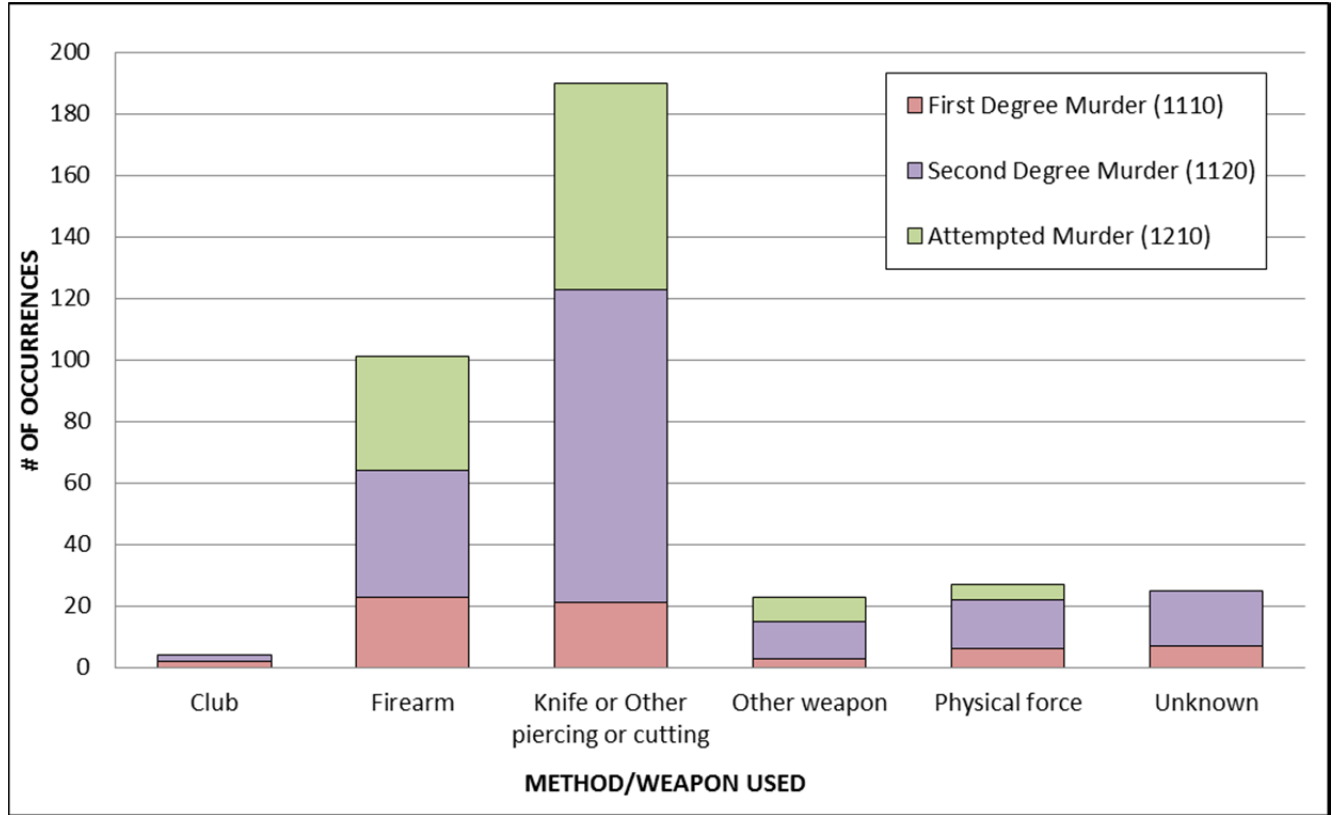
Source: Edmonton Police Service

The EPS data on methods of killing and weapons is further broken down by the researcher to reveal by whom and against whom different methods of killing and weapons are employed. The primary method of killing employed by male CSCs involves a sharp weapon (58.3%), a firearm (21.7%), and physical force (7.9%). Males between 16-30 years of age were more likely to kill using a sharp instrument (52.2%) or a firearm (27.6%). Male VICTIMs were more likely to be killed by a sharp weapon (54.9%) or a firearm (28.6%); in particular, males between 16-30 years of age were more likely to be killed by a sharp weapon (57.1%) or a firearm (26.6%). Research in Canada presents similar findings where young adult male homicide victims are more likely to encounter firearms than their older counterparts (Leesti, 1997).

The primary method of killing employed by female CSCs involves a sharp weapon (55.6%), a firearm (14.8%), and physical force (14.8%). Females between 16-30 years of age were more likely to kill using a sharp instrument (53.3%) or a firearm (26.7%). Female VICTIMS were more likely to be killed by a sharp weapon (34.8%), physical force (24.2%), or a firearm (21.2%). Females between 16-30 years of age were just as likely to be killed by a firearm (31.4%) or a sharp instrument (31.4%).

The frequency of sharp instruments in murders and attempted murders in Edmonton is not surprising when examined in the social context of these occurrences—primarily between non-strangers and in familiar settings (discussed in the following section). The dominance of sharp weapons such as knives involved in murders and attempted murders in Edmonton also parallels current literature and research conducted in Canada (see Chapter 3). As we will see in the following section, a large number of murders and attempted murders occurred in residential locations where knives and other sharp, piercing/cutting instruments are readily accessible. Further to this, knives are not a prohibited weapon in Edmonton (or in Canada) and are, therefore, easily accessible.[49] Knives are also relatively inexpensive, portable, and concealable making them attractive weapons.

The observed dominant method of killing involving sharp weapons in Edmonton (and in Canada) stands in stark contrast to our American counterparts, where firearms are the most common method of killing. This difference can be explained by Canada's strict gun control laws (1977 Bill C-51; 1991 Bill C-17; 1995 Bill C-68; 1998 *The Firearms Act*; 2003/2005 Bill C-10A; 2007 Bill C-24

tabled and failed; 2008 *Public Agents Firearms Regulations*) when compared to those of the United States and by Canada's current social climate for gun tolerance.[50] FBI research conducted in 2012 shows that in twenty-five (50%) of the United States, guns account for more than two-thirds of the weapons used to commit murder (e.g. 86% in Illinois, 81% in Louisiana and Nebraska, 79% in Michigan, and 77% in Connecticut).[51] When examined on a national level, the use of guns as murder weapons in the United States has remained relatively consistent (67-70%) between the years 2008 and 2012.[52]

The *Canadian Criminal Code* contains offensive weapons categories for the following actions related to weapons, in particular firearms: (1) possession, (2) use of a prohibited and restricted weapon (e.g. permits), (3) possessing a weapon for the purpose of committing a crime, and (4) careless use of a firearm.[53] By contrast, in the United States, "[g]uns are a part of American life" and almost 50% of American homes have some sort of gun on its premises (Salak, 1995, p. 27). The *Second Amendment* to the *United States Constitution* affords every American citizen the right to bear arms and, in 1998, the Brady Handgun Violence Prevention Act (originally signed into law in 1993 in the face of strong National Rifle Association [NRA] opposition) replaced the long-standing five-day waiting period for hand-gun sales with instant computerized background checks that no longer involved waiting periods. Consequently, guns are observed to play a critical role in the rise of violence in the United States in the last twenty years whereas violent crime has remained relatively stable in Canada.

5.2.5. *Drugs and Alcohol*

The level of drugs and/or alcohol in CSC's or VICTIM's system at the time of each occurrence was not included in the EPS data. Unlike the United States and England, this information is currently not coded by the EPS nor is it required by Canada's UCR Survey. This data would have permitted a comparison between Edmonton's crime statistics with a large body of literature devoted to the relationships between alcohol and illegal drug consumption and lethal violence in a Canadian context.

5.3. SUMMARY AND CONCLUSIONS – VICTIM, OFFENDER, & OCCURRENCE CHARACTERISTICS

This section approached many of the broad demographic patterns and trends of murder and attempted murder in Edmonton from a sociological perspective. This was followed by a detailed analysis of these crimes in terms of the demographic attributes of victims, offenders, and occurrences. This study is guided under the premise that no one single theory can explain all homicides occurring in Edmonton. Patterns and trends of the individuals involved, however, are shown to provide pertinent information concerning the most vulnerable populations (typically young adult males), the most criminal populations (typically young adult males) and the most likely method of killings or weapon involved (sharp weapons). With this in mind, the following section further addresses the geographic attributes of murder and attempted murder in Edmonton in terms of spatially-specific characteristics, patterns, and trends.

CHAPTER 6: **GEOGRAPHIC ATTRIBUTES OF CRIME LOCATIONS**

The data collected for this research warrants a detailed sociological

analysis of the geographical areas associated with murder and attempted murder.

The spatial distribution of murders and attempted murders in Edmonton is highly

dependent on the nature of the victim-offender relationship discussed above. This

dependency is observed in terms of where these crimes occur and where both

victims and offenders reside. Of specific interest to this study are the types of

locations across the city where murders and attempted murders typically occur

(OCCUR) and the areas of the city where offenders (CSCs) and victims

(VICTIMs) typically reside. The importance of the geographical areas associated

with murder and attempted murder is discussed at length in the following section

on mapping. In order to avoid the trap of ecological fallacy (e.g. spurious

correlations and causality), no GIS-based analysis of spatial relationships were

performed. All spatial analyses are derived from knowledge of the variables and

through the use of mathematical calculations.

6.1. SPATIAL ANALYSIS OF CRIME LOCATIONS

Conducting this specific spatial analysis of murders and attempted murders

in Edmonton requires the triangulation of three distinct geographic crime

locations: CSC residence, VICTIM residence, and OCCUR location (crime

scene). This method is the *triangulation of crime model* and it is fundamental to

determining the distances between the crime locations, that is, their spatial

relationships with each other. With this spatial analysis methodology (outlined in

Chapter 4) in place, the mapping of the available data is further broken down in

order to facilitate a detailed analysis of the crime types and theory of geographic

distribution. A series of maps have been created in order to visually encapsulate the relevant aspects of the UCR Survey data collected by the EPS for the three crime types—first degree murder, second degree murder, and attempted murder, between June 6, 2006 and December 31, 2012. Each map or map series is presented below with a corresponding and thorough criminological analysis.

The boundaries of the maps were systematically determined based on the following criteria: (1) Edmonton's city limits, (2) the EPS's investigative jurisdiction, (3) the EPS Divisional boundaries, and (4) the EPS data obtained for this study. All boundaries are clearly noted on the maps and reflect the geographic extents of the data in GIS. These pre-determined boundaries further preclude analysis of potential edge effects due to bordering jurisdictions (e.g. City of St. Albert, Strathcona County, and Parkland County). Consequently, without viewing similar maps for surrounding areas under the jurisdiction of other police agencies (e.g. RCMP), we have no way of knowing what is occurring beyond the edge of the study area. We must, therefore, think of this study's geographic boundary as a "cookie cutter"—everything outside the boundary is excluded from the study (Steinberg & Steinberg, 2006, p. 144).

6.1.1. Map #1 – Crime Locations in Edmonton

Map #1 is a geographic representation of the *x,y* coordinates for every crime location (OCCUR location, VICTIM residence, and CSC residence) contained in the EPS data. This map includes 63 OCCUR locations, 36 CSC residences, and 39 VICTIM residences for first degree murder; 185 OCCUR locations, 106 CSC residences, and 148 VICTIM residences for second degree

murder; and 112 OCCUR locations, 73 CSC residences, and 96 VICTIM

residences for attempted murder. A total of 858 *x,y* coordinates are plotted on this

map.[54]

When explored at the EPS Divisional level, the highest number of murders

(38.1% first degree and 37.3% second degree) occur in Downtown Division and

the highest number of attempted murders (48.2%) occur in Northeast Division

(see Table 11). The largest number of CSCs reside in Northeast Division (36.1%

first degree murderers, 45.3% second degree murderers, and 46.6% attempted

murderers). The largest number of murder VICTIMs reside in Downtown

Division (41.0% first degree murders and 48.6% second degree murder) and most

of the attempted murder VICTIMs reside in Northeast Division (40.6%).

Table 11: PERCENTAGE OF CRIME LOCATIONS BY EPS DIVISIONS, EDMONTON 2006-2012

EPS Division	First Degree Murder (1110)			Second Degree Murder (1120)			Attempted Murder (1210)		
	OCCUR location	CSC location	VICTIM location	OCCUR location	CSC location	VICTIM location	OCCUR location	CSC location	VICTIM location
Northeast	25.4%	36.1%	28.2%	27.0%	45.3%	31.8%	48.2%	46.6%	40.6%
Downtown	38.1%	16.7%	41.0%	37.3%	4.7%	48.6%	25.0%	23.3%	15.6%
Southeast	14.3%	13.9%	10.3%	8.6%	13.2%	8.8%	5.4%	6.8%	15.6%
Southwest	15.9%	25.0%	12.8%	13.0%	17.0%	2.7%	8.0%	15.1%	9.4%
West	6.3%	8.3%	7.7%	14.1%	19.8%	8.1%	13.4%	8.2%	18.8%

Source: Edmonton Police Service

The importance of these spatial distributions is discussed in depth as we progress

to more detailed maps.

CRIME LOCATIONS IN EDMONTON

Legend

- ✚ First Degree Murder (1110) OCCURRENCE Location
- ◼ First Degree Murder (1110) CSC Residence
- ★ First Degree Murder (1110) VICTIM Residence
- ✚ Second Degree Murder (1120) OCCURRENCE Location
- ◼ Second Degree Murder (1120) CSC Residence
- ★ Second Degree Murder (1120) VICTIM Residence
- ✚ Attempted Murder (1210) OCCURRENCE Location
- ◼ Attempted Murder (1210) CSC Residence
- ★ Attempted Murder (1210) VICTIM Residence

EDMONTON

N
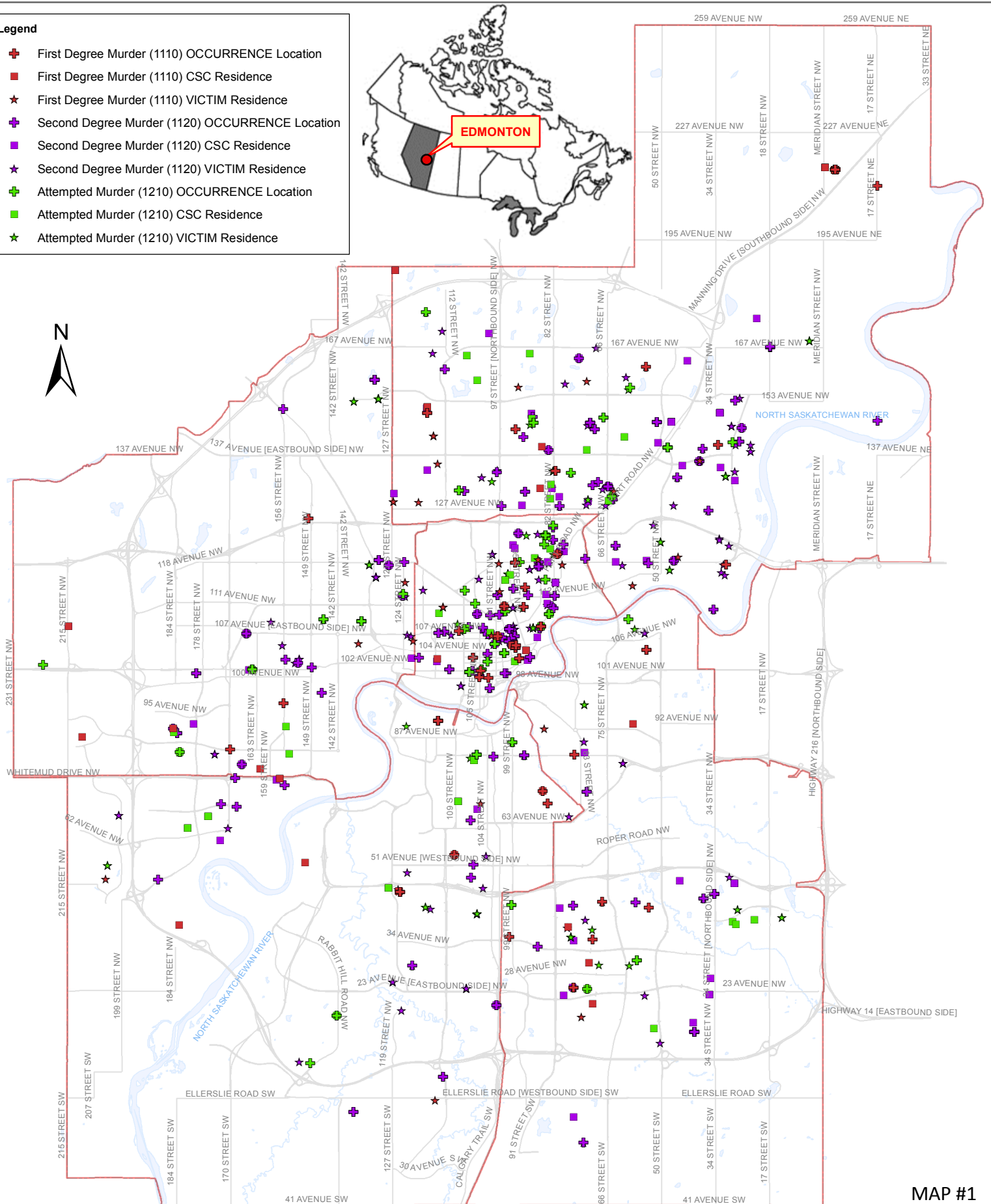
MAP #1

Prepared By: Deirdre MCDONALD
Date: 2013SEP15
* Point data based on undisclosed XY Offset

0   2.5   5   7.5   10   12.5
Kilometers
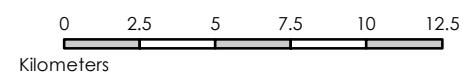
6.1.2. *Map #2A-2C – Point Density Map Series of Crime Locations*

The geographical distributions of the three distinct crime locations and the density of their distributions are clearly illustrated in Maps #2A, #2B, and #2C. These types of maps are commonly referred to as point density maps where the magnitude per unit area from point features (e.g. *x,y* coordinates of crime locations) that fall within a defined area around each cell is calculated by ArcMap based on the data points entered by the researcher. The best quality-visualisation range for the data was found using a 500 metre radius. This setting resulted in more precise maps than did maps created using the software default setting range between 700-850 metre radius while also being able to ensure adequate density and optimal visualisation. It is important to note that only points that fall within the defined radius are considered when calculating the density. Larger radius values produce a more generalized density raster while smaller radius values produce a more detailed raster. Further, the selected point density map settings are typical to the setting used by the EPS in the creation of their point density maps of similar content and scale. Map #2A is a point density map of all OCCUR locations, Map #2B is a point density map of all CSC residences, and Map #2C is a point density map of all VICTIM residences).

All three maps were manually assigned an identical classification system of eight classes in order to account for the range of occurrences ensuring optimal visualization of the distributional differences across the city. These eight classes refer to the number of crime locations for murders and attempted murders in Edmonton. The eight classes of crime locations are as follows: 0, 1-2, 2-4, 4-6, 6-

10, 10-15, 15-30, and 30-60. Each class has a corresponding color assigned to it as indicated in each map's legend. These point density maps emphasize the crime location concentrations in both Downtown Division (murder) and Northeast Division (attempted murder) and the relative sparseness of crime locations in the three remaining Divisions. Due to the distance decay effect and the structural conditions discussed below (e.g. poverty), the concentration of crime continually decreases as one moves outward from Edmonton's downtown zone. There are a small number of low- to mid-density crime location clusters in Southeast Division, Southwest Division, and West Division. These clusters are attributed to corresponding large commercial and entertainment areas, highly utilized transit hubs, and/or higher population densities due to an increase in apartment- and condominium-type dwellings in the surrounding area.

Maps #2A, #2B, and #2C succinctly capture the concentration of all three crime locations found in Downtown Division (and to a lesser degree in Northeast Division). These concentrations are explored from a criminological perspective by taking a new approach to Park and Burgess's concentric zone theory (Park & Burgess, 1925) originally applied in a study of social groupings. The observed geographical clusters of crime locations (e.g. concentric zones) exhibited in Maps #2A, #2B, and #2C represent what Park and Burgess refer to as desirability in terms of land use. As discussed earlier in this chapter, Downtown Division exhibits a very small geographical area with high population density. Downtown Division also features high density housing; a large number of Edmonton's social service and community outreach providers including low-income/subsidized

housing, homeless shelters, and halfway houses. Mandatory parole/probation

housing units for offenders are also located in Downtown Division.[55] Due to the

unique geographic and socio-economic make-up of Downtown Division, some of

the most vulnerable individuals (e.g. mental health issues, substance abuse and

addiction, and low-income households) find themselves in close proximity with

some of the most violent and high-risk to re-offend individuals (e.g. parolees and

gang members) as a result of potential lifestyle overlaps found between these two

groups including use of services.

While it is not possible to extract gang-related crimes from the EPS data,

Statistics Canada reports that between 2001 and 2011 there were 175 gang-related

homicides reported in Alberta, representing almost one in five (19%) homicides

over this period. Of these 175 gang-related homicides, 84 occurred in the CMA of

Edmonton, representing 26% of all homicides in this jurisdiction. By comparison,

between 2001 and 2011 there were 46 gang-related homicides in the CMA of

Calgary, representing 21% of all homicides in that jurisdiction.[56] Ongoing and

extensive research is conducted by government agencies like the Criminal

Intelligence Service of Alberta (CISA) on Alberta-based gangs and their routine

use of violence and weapons to enforce their criminal operations.[57] CISA's

research addresses the social, economic, and geographic factors contributing to

gang membership (e.g. neuropsychological, family, school, peers, neighborhoods,

racism, and marginalization) (Department of Justice Alberta, 2010).

In furtherance of the lifestyle and crime relationship discussion above,

Downtown Division is also home to a large number of establishments that sell

and/or serve liquor making it one of Edmonton's top entertainment districts. Some of the less desirable entertainment areas found along sections of Alberta Avenue (118 Avenue) and 107 Avenue fall within Downtown Division's boundaries. As shown in Appendix I, these two geographic areas are frequented by sex trade workers and their clients (Edmonton Police Service, 2007). Here we see the aforementioned overlap in lifestyle between Edmonton's most vulnerable individuals and high-risk violent individuals.

While the data used in this research does not permit an in-depth socio-economic assessment of CSCs and VICTIMs due to the restrictions place on the data collection by the EPS including the race, ethnicity, family status, and type or location of work or other activities corresponding to both criminals and victims, the geographic locations of CSC and VICTIM residences is revealing of the relationship between the individual, the crime location, and the crime itself. For example, Edmonton's 2012 Municipal Census data for the neighbourhoods shows that neighbourhoods located in Downtown Division exhibit low average household incomes, a high unemployment rate, and high residential property rental rates versus ownership rates when compared to the other EPS Divisions (see Table 12). This disparity is further accentuated when one looks at the inner-city region of Downtown Division where the crime locations are densest on Maps #2A, #2B, and #2C. Edmonton's inner-city area is made up of some of the poorest neighbourhoods including the McCauley-Boyle region which accounts for the majority of the city's homeless and marginalized populations. The average household income in this area is approximately half of the CMA of Edmonton's

average. Both property and violent crime rates in Edmonton's inner-city exceed

the city's average rates, sometimes by up to four times.[58] These finding are not

surprising as researchers have long observed a trend that lower income individuals

are three times more likely to experience violent crime than are those individuals

with household incomes above the corresponding region's average (Salak, 1995).

Table 12: **AVERAGED NEIGHBOURHOOD INDICATORS BY EPS DIVISIONS, EDMONTON**

EPS Division	Average Household Income ($)	Average House Assessment ($)	Average Rent Cost ($/month)	Average Rental Property (%)	Unemployed Individuals >25 years of age (%)	Individuals over 30 years old with < Grade 9 Education
Northeast	62,390	321,488	838	36.7	3.31	27.87
Downtown	52,522	302,306	742	51.7	3.28	24.81
Southeast	64,788	326,864	859	32.9	2.63	21.75
Southwest	83,154	454,312	927	28.0	2.24	13.38
West	60,258	344,989	865	46.7	2.46	23.88
City Wide	57,085	360,723	761	36.3	2.69	21.55

Source: Edmonton Census 2012

A number of structural factors are understood to contribute to these

explicit socio-economic variations across the city with regards to crime indicators.

Research by Porter (2010) illustrates that these factors include, but are not limited

to: low family status, low economic status (e.g. poverty), poor living conditions,

high levels of disruption, high concentration of minorities, high population

density, population mobility, race, and city size. Some researchers including W.

Ackerman and A. Murray of Ohio State University suggest that downtown areas

of metropolitan cities often exhibit higher crime rates that the rest of the city

because of high rates of unemployment, physical deterioration of the area (e.g.

Broken Windows Theory), and large percentages of minorities and youths

inhabiting the area (Ackerman, 1998). According to Porter (2010), the

"relationship between poverty and urban crime is long-standing, yet uncontested."

Literary reviews by Land *et al*. (1990) expose the unreliability of determinants of generalizable homicide rates due to varied research practices, sampling techniques, temporal periods, and problems of statistical analysis (Porter, 2010). Not surprisingly, the trends and predictors of crime in urban settings is a continued debate among criminologists (Blau & Blau, 1982; Crutchfield, 1989; Messner & Anselin, 2004; Messner *et al*. 1999).

Further analysis of Maps #2A, #2B, and #2C reveals how both victims and offenders are potentially restrained by physical boundaries located within Edmonton's city limits. The most obvious natural boundary is the North Saskatchewan River running along the south border of Downtown Division and east along Northeast Division's border. The North Saskatchewan River is interpreted as a formidable barrier to movement of offenders. This interpretation is premised on the assumption that some offenders and victims may be travelling on foot or using public transit as opposed to travelling in personal vehicles. There are ten crossings across the North Saskatchewan River and six of these crossings fall within Downtown Division. Additionally, a significant number of Edmonton Transit Service (ETS) bus and light rail transit (LRT) lines pass through Downtown Division making it an easily accessed region. The Yellowhead Trail (the portion of Highway 16 that passes through the City of Edmonton) runs along the north border of Downtown Division. This road is also viewed as a potential barrier for movement between crime locations as it provides limited access points to the adjacent neighbourhoods in both Northeast Division and Downtown Division. Not surprisingly, there is minimal violent crime activity along the other

major freeways (e.g. Whitemud Drive, Anthony Henday Drive, and Manning

Drive) in Edmonton due to similar access restrictions. It is possible that these

barriers and others like them also act as psychological boundaries for victims and

offenders and affect movement around the city. This type of analysis is, however,

beyond the scope of this study due to the EPS data restrictions. The application

and potential of this type of analysis is discussed at length in Chapter 3.
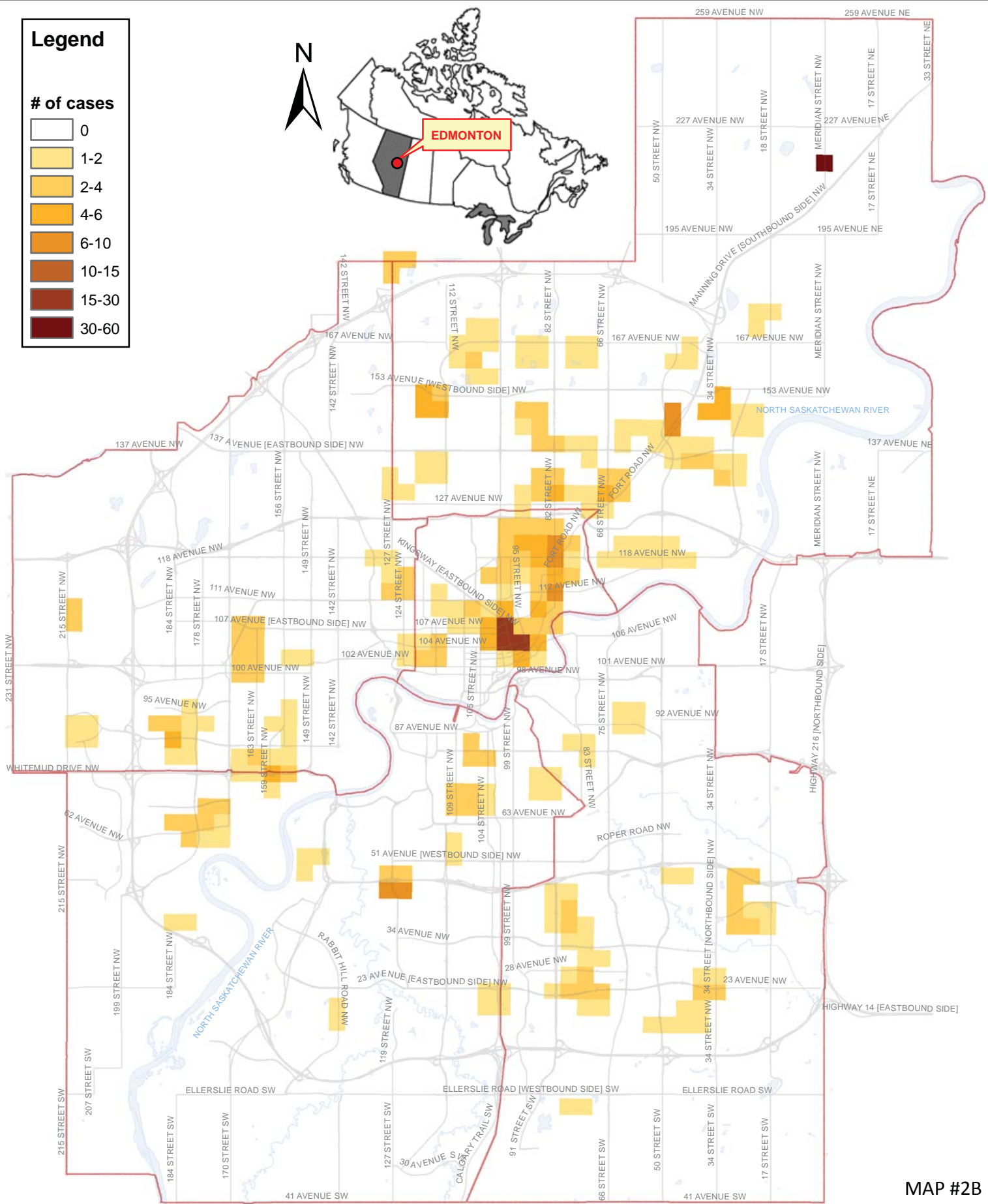
OCCURRENCE LOCATIONS IN EDMONTON

Legend

# of cases

- 0
- 1-2
- 2-4
- 4-6
- 6-10
- 10-15
- 15-30
- 30-60

EDMONTON

MAP #2A

Prepared By: Sinisa VUKICEVIC & Deirdre MCDONALD
Date: 2013NOV06
* Point data based on undisclosed XY Offset

0   2.5   5   7.5   10   12.5
Kilometers

CSC RESIDENCE LOCATIONS IN EDMONTON

Legend

# of cases
- 0
- 1-2
- 2-4
- 4-6
- 6-10
- 10-15
- 15-30
- 30-60

N

EDMONTON

NORTH SASKATCHEWAN RIVER

MAP #2B

Prepared By: Sinisa VUKICEVIC & Deirdre MCDONALD
Date: 2013NOV06
* Point data based on undisclosed XY Offset

0   2.5   5   7.5   10   12.5
Kilometers

VICTIM RESIDENCE LOCATIONS IN EDMONTON

Legend

# of cases

- 0
- 1-2
- 2-4
- 4-6
- 6-10
- 10-15
- 15-30
- 30-60

N

EDMONTON
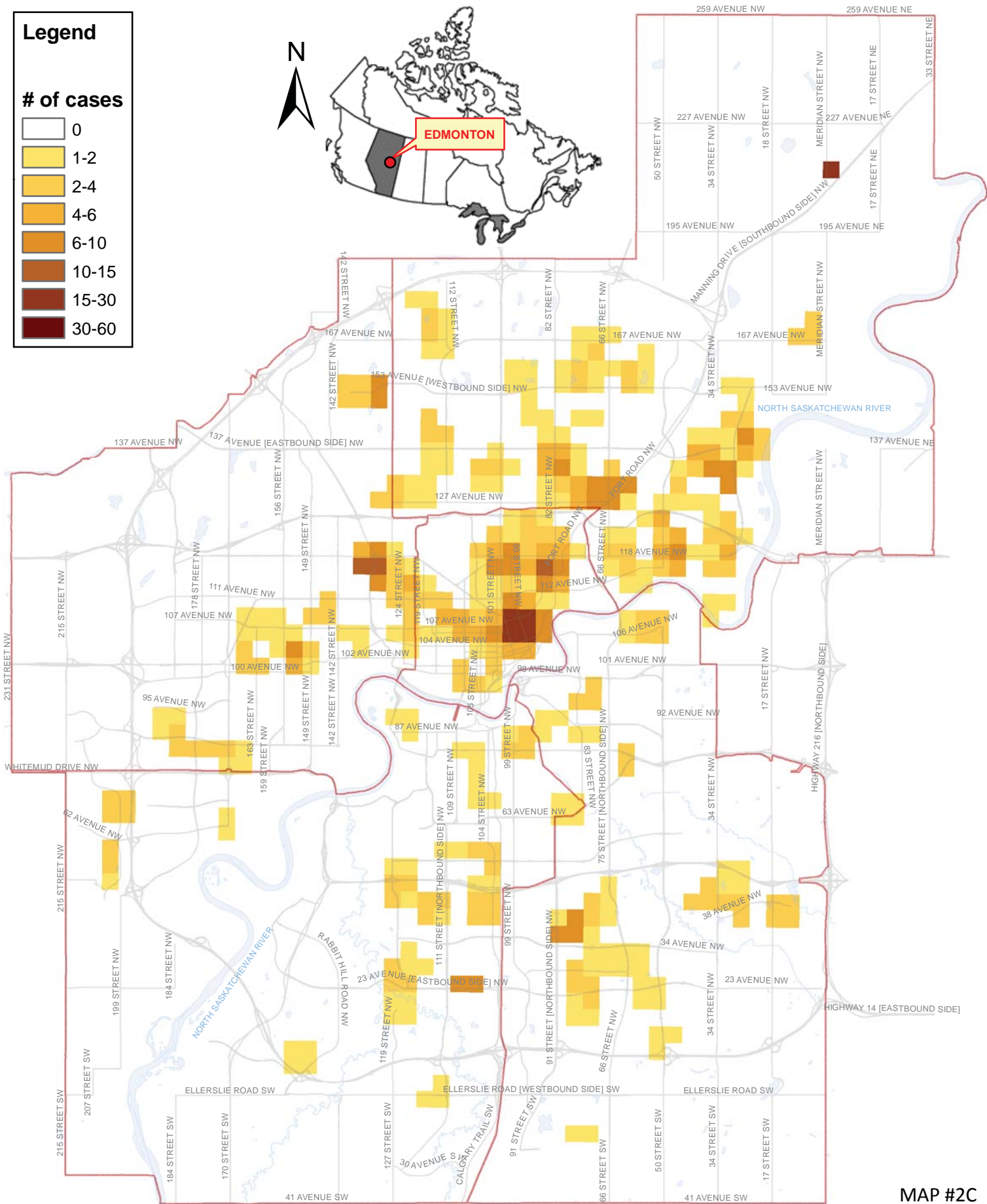
MAP #2C

Prepared By: Sinisa VUKICEVIC & Deirdre MCDONALD
Date: 2013NOV06
* Point data based on undisclosed XY Offset

0   2.5   5   7.5   10   12.5
Kilometers

6.1.3. Map #3A through #3E – Divisional Map Series of Crime Locations

This series of maps provides a focused snapshot of the geographic data available for each crime type in each of the five EPS Divisions. These maps allow us to see the concentration of the crime type and its associated crime locations (OCCUR location, VICTIM residence, and CSC residence) as identified in Table 11 in much greater detail than the point density maps above. As discussed earlier in this chapter, Downtown Division exhibits the highest number of murders, the highest population density, and the smallest geographical area. Downtown Division also includes the highest number of unsolved cases which may be explained by the anonymous nature of some neighbourhoods in Downtown Division hosting some of the poorest and most marginalized populations.

CRIME LOCATIONS IN NORTHEAST DIVISION

Legend

➕ First Degree Murder (1110) OCCURRENCE Location

🟥 First Degree Murder (1110) CSC Residence

★ First Degree Murder (1110) VICTIM Residence

➕ Second Degree Murder (1120) OCCURRENCE Location

🟪 Second Degree Murder (1120) CSC Residence

★ Second Degree Murder (1120) VICTIM Residence

➕ Attempted Murder (1210) OCCURRENCE Location

🟩 Attempted Murder (1210) CSC Residence

★ Attempted Murder (1210) VICTIM Residence

North(east)

West

Downtown

Southwest

Southeast

N

259 AVENUE NW

259 AVENUE NE

STURGEON ROAD

227 AVENUE NW

227 AVENUE NE

HIGHWAY 28

HIGHWAY 28A

50 STREET NW

34 STREET NW

18 STREET NW

MERIDIAN STREET NW

17 STREET NE

33 STREET NE

195 AVENUE NW

195 AVENUE NE

17 STREET NE

MANNING DRIVE [SOUTHBOUND SIDE] NW

112 STREET NW

82 STREET NW

66 STREET NW

167 AVENUE NW

MERIDIAN STREET NW

153 AVENUE [WESTBOUND SIDE] NW

153 AVENUE NW

153 AVENUE NW

NORTH SASKATCHEWAN RIVER

127 STREET NW

127 AVENUE NW

ST. ALBERT ROAD NW

137 AVENUE NE

KINGSWAY [EASTBOUND SIDE] NW

66 STREET NW

118 AVENUE NW

MERIDIAN STREET NW

17 STREET NE

124 STREET NW

127 AVENUE NW

17 STREET NW

107 AVENUE NW

106 AVENUE NW
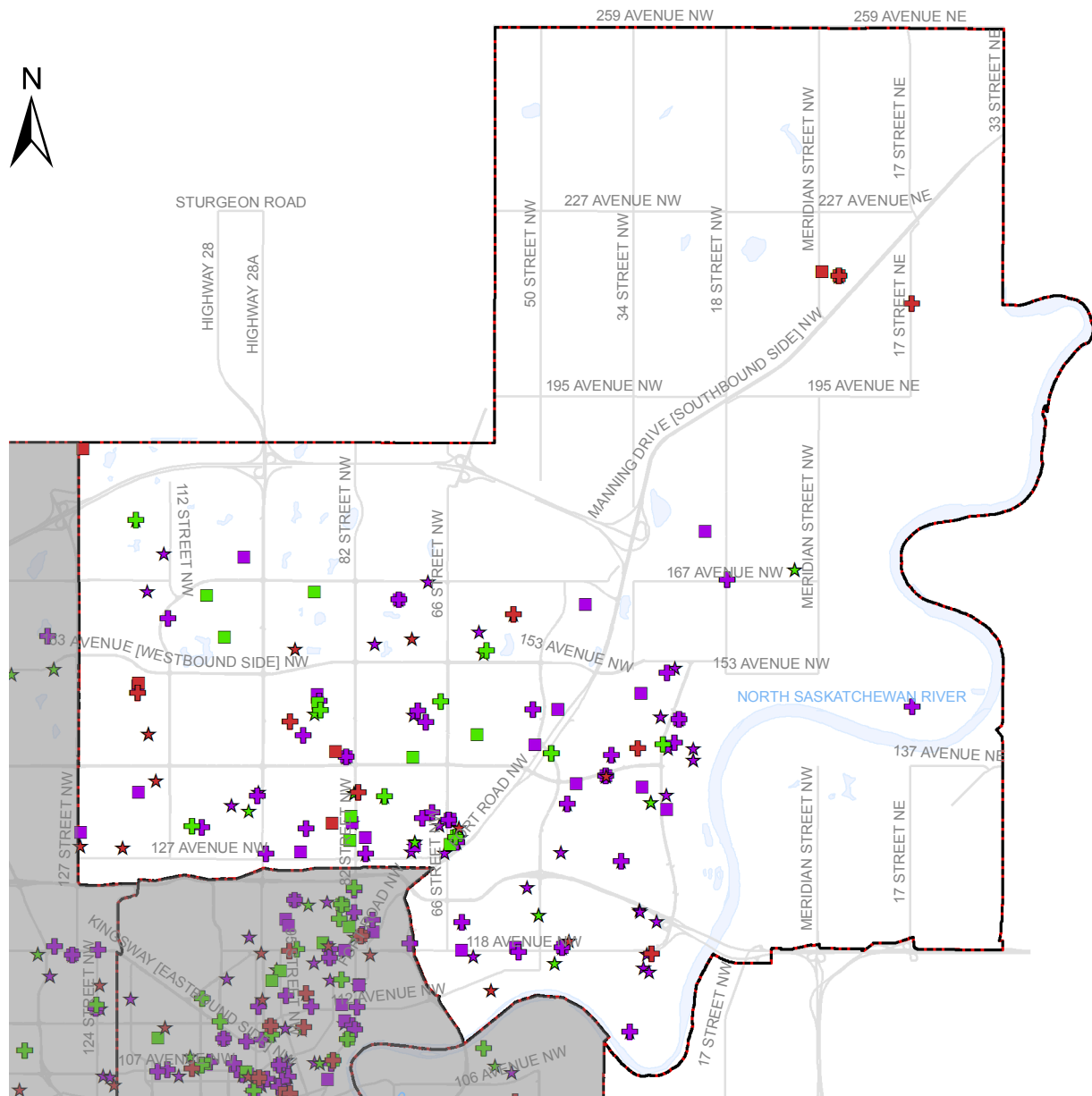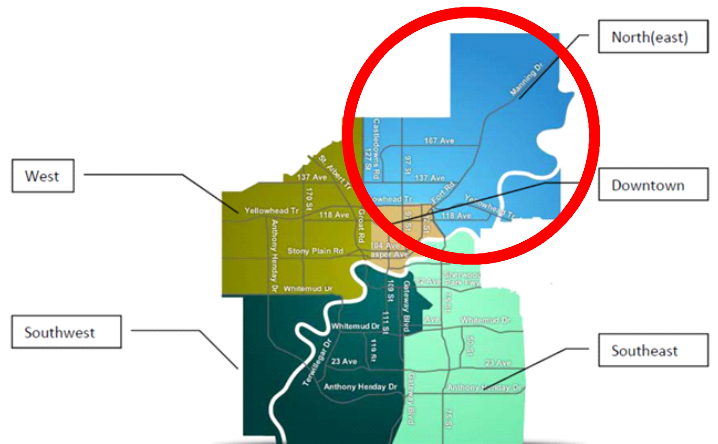
MAP #3A

Prepared By: Deirdre MCDONALD

Date: 2013OCT05

* Point data based on undisclosed XY Offset

0   2   4   6   8   10

Kilometers

CRIME LOCATIONS IN DOWNTOWN DIVISION

Legend

- ✚ First Degree Murder (1110) OCCURRENCE Location
- ■ First Degree Murder (1110) CSC Residence
- ★ First Degree Murder (1110) VICTIM Residence
- ✚ Second Degree Murder (1120) OCCURRENCE Location
- ■ Second Degree Murder (1120) CSC Residence
- ★ Second Degree Murder (1120) VICTIM Residence
- ✚ Attempted Murder (1210) OCCURRENCE Location
- ■ Attempted Murder (1210) CSC Residence
- ★ Attempted Murder (1210) VICTIM Residence

N

MAP #3B

Prepared By: Deirdre MCDONALD
Date: 2013OCT05
* Point data based on undisclosed XY Offset

0   0.8   1.6   2.4   3.2   4

Kilometers

CRIME LOCATIONS IN SOUTHEAST DIVISION

Legend

- ✚ First Degree Murder (1110) OCCURRENCE Location
- ■ First Degree Murder (1110) CSC Residence
- ★ First Degree Murder (1110) VICTIM Residence
- ✚ Second Degree Murder (1120) OCCURRENCE Location
- ■ Second Degree Murder (1120) CSC Residence
- ★ Second Degree Murder (1120) VICTIM Residence
- ✚ Attempted Murder (1210) OCCURRENCE Location
- ■ Attempted Murder (1210) CSC Residence
- ★ Attempted Murder (1210) VICTIM Residence

MAP #3C

Prepared By: Deirdre MCDONALD
Date: 2013OCT05
* Point data based on undisclosed XY Offset

0   2   4   6   8   10
Kilometers

CRIME LOCATIONS IN SOUTHWEST DIVISION

Legend

- ✚ First Degree Murder (1110) OCCURRENCE Location
- ■ First Degree Murder (1110) CSC Residence
- ★ First Degree Murder (1110) VICTIM Residence
- ✚ Second Degree Murder (1120) OCCURRENCE Location
- ■ Second Degree Murder (1120) CSC Residence
- ★ Second Degree Murder (1120) VICTIM Residence
- ✚ Attempted Murder (1210) OCCURRENCE Location
- ■ Attempted Murder (1210) CSC Residence
- ★ Attempted Murder (1210) VICTIM Residence

North(east)

West

Downtown

Southwest

Southeast

N

MAP #3D

Prepared By: Deirdre MCDONALD
Date: 2013OCT05
* Point data based on undisclosed XY Offset

0   2   4   6   8   10
Kilometers
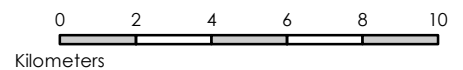
CRIME LOCATIONS IN WEST DIVISION

Legend

- ✚ First Degree Murder (1110) OCCURRENCE Location
- ■ First Degree Murder (1110) CSC Residence
- ★ First Degree Murder (1110) VICTIM Residence
- ✚ Second Degree Murder (1120) OCCURRENCE Location
- ■ Second Degree Murder (1120) CSC Residence
- ★ Second Degree Murder (1120) VICTIM Residence
- ✚ Attempted Murder (1210) OCCURRENCE Location
- ■ Attempted Murder (1210) CSC Residence
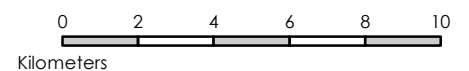- ★ Attempted Murder (1210) VICTIM Residence
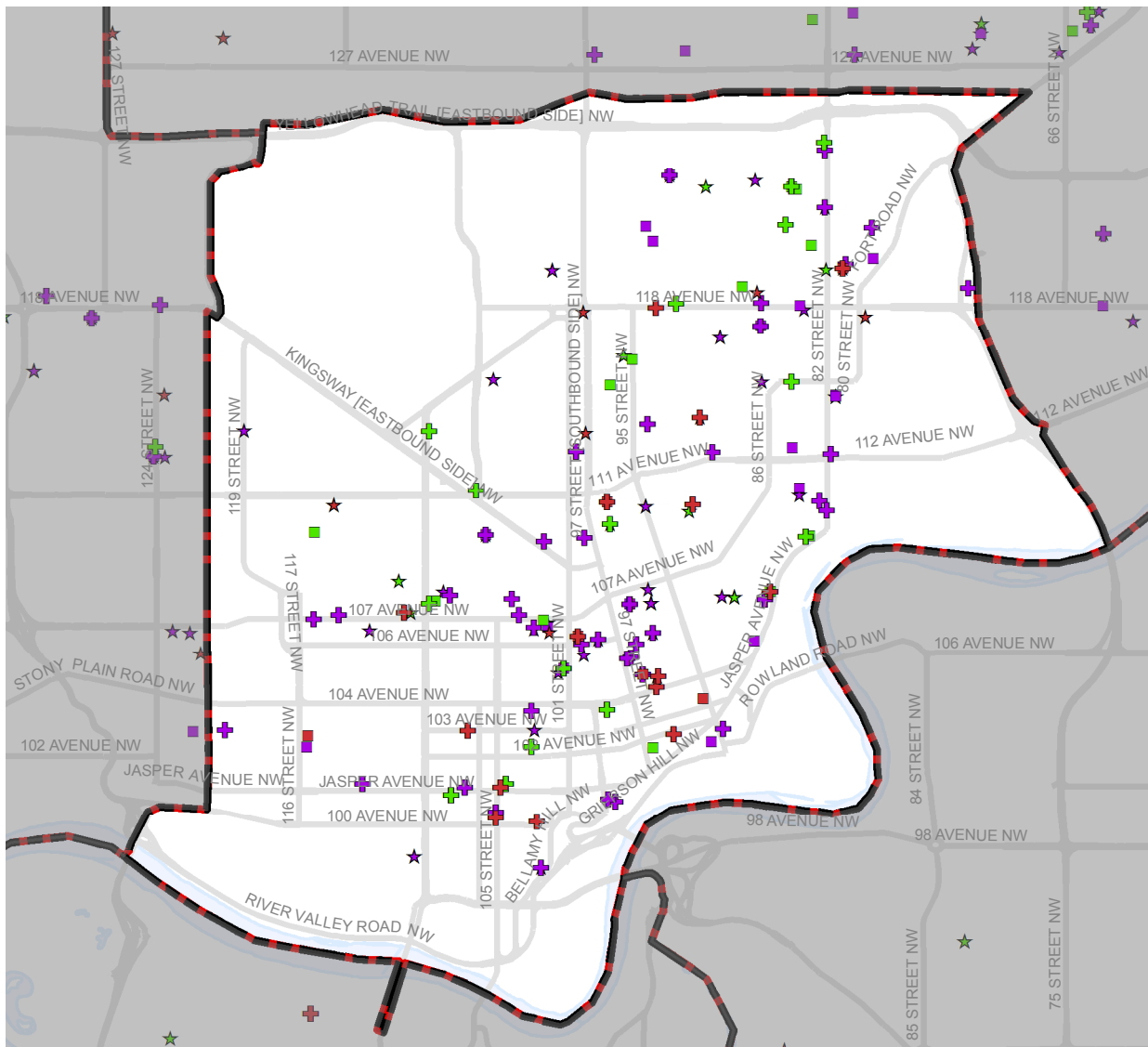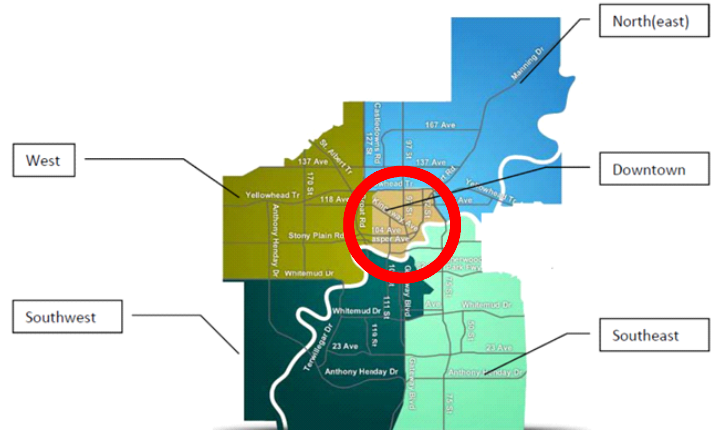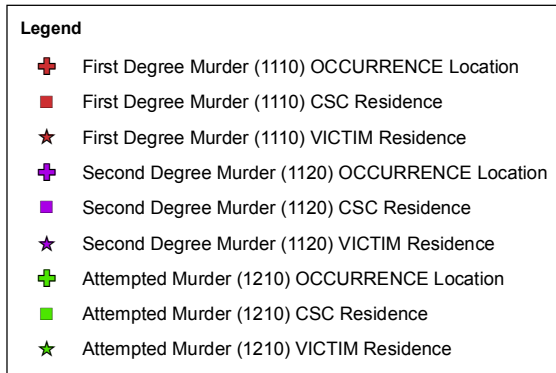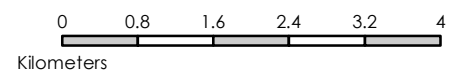
MAP #3E

Prepared By: Deirdre MCDONALD
Date: 2013OCT05
* Point data based on undisclosed XY Offset

Kilometers

6.2. **TRIANGULATION OF CRIME MODEL APPLIED**

The primary objective of this criminological inquiry is to attain an understanding of the spatial triangulation of the geographic components of murder and attempted murder—crime scene, offender residence, and victim residence—with an emphasis on the demographic features of the individuals involved. In this section, the *triangulation of crime model* is applied in conjunction with the well-established research, principles, and applications of criminal profiling and geographical profiling models. Specifically, the *triangulation of crime model* draws out evidence of the hypothesized existence of relationships between the individuals' demographic features and the geographic characteristics of three distinct crime locations for murder and attempted murder in the City of Edmonton. In order to capture the impetus for the *triangulation of crime model*, more detailed procedures and analysis were undertaken to develop the pertinent maps. These methods are outlined in detail in the following sections.

6.2.1. *Map #4 – Crimes in Edmonton with All 3 Crime Locations*

Map #4 includes only the cases where *all* three crime locations—OCCUR location, VICTIM residence, and CSC residence—were recorded in EPROS or determined by the researcher using approximated street addresses (see Chapter 4). The *triangulation of crime model* was applied by the researcher to a total of 164 crime locations in order to determine spatial relationships between the crime locations. All cases were analyzed; no sampling was involved.

CRIMES IN EDMONTON WITH ALL 3 CRIME LOCATIONS

Legend

- ✚ First Degree Murder (1110)-Triangulation Model-OCCURRENCE Location
- ■ First Degree Murder (1110)-Triangulation Model-CSC Residence
- ★ First Degree Murder (1110)-Triangulation Model-VICTIM Residence
- ✚ Second Degree Murder (1120)-Triangulation Model-OCCURRENCE Location
- ■ Second Degree Murder (1120)-Triangulation Model-CSC Residence
- ★ Second Degree Murder (1120)-Triangulation Model-VICTIM Residence
- ✚ Attempted Murder (1210)-Triangulation Model-OCCURRENCE Location
- ■ Attempted Murder (1210)-Triangulation Model-CSC Residence
- ★ Attempted Murder (1210)-Triangulation Model-VICTIM Residence
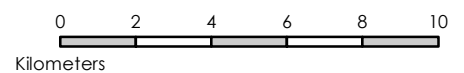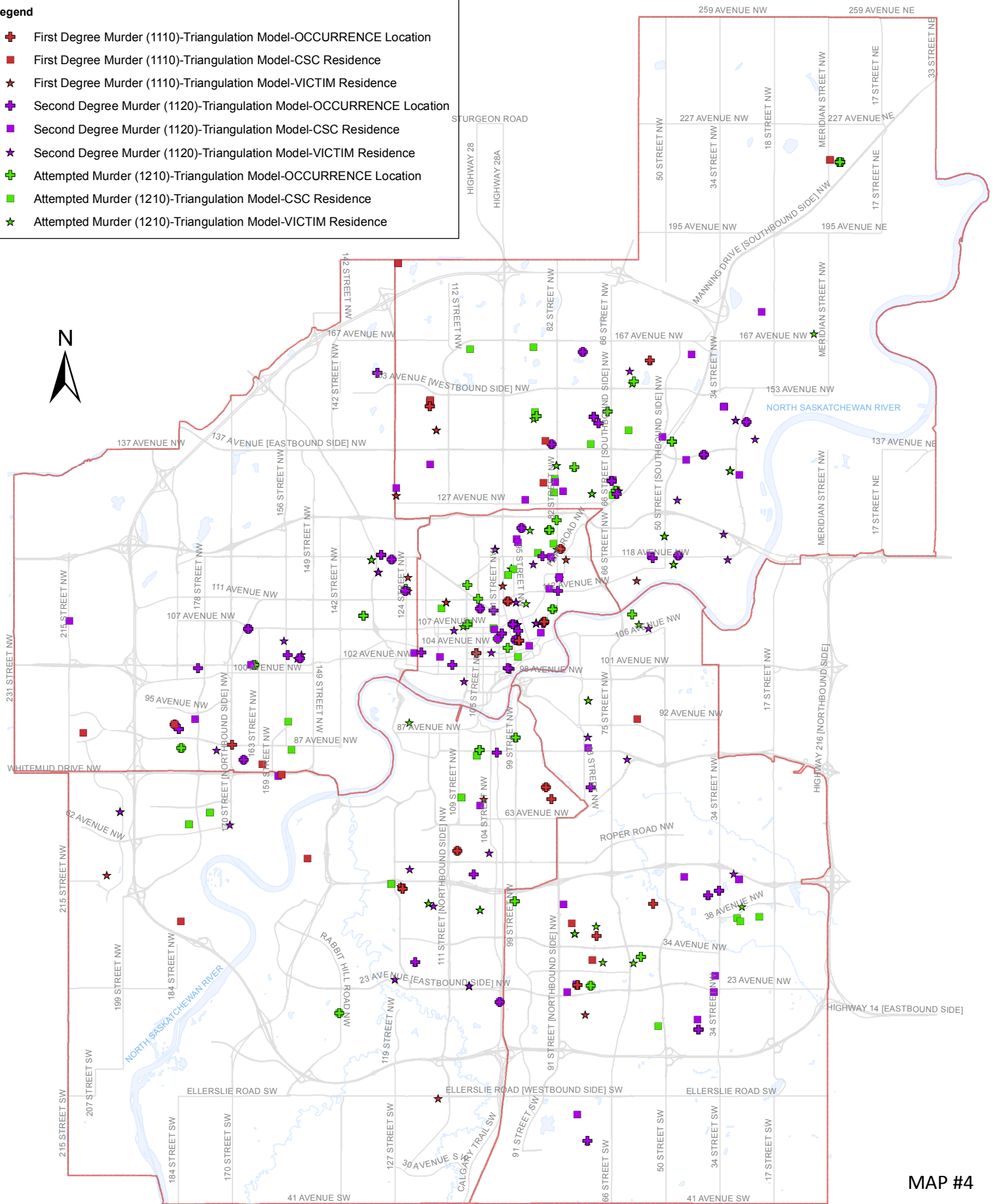
N

MAP #4

0   2.5   5   7.5   10   12.5
Kilometers

Prepared By: Deirdre MCDONALD
Date: 2013OCT21
* Point data based on undisclosed XY Offset

6.2.2. *Calculating Distances between Crime Locations*

Determining the direct point-to-point Euclidean distance between crime locations was selected over other methods such as Manhattan distance or Taxicab geometry (e.g. assuming a grid layout of streets at right angles to each other). This method of measurement was selected because the alternative methods require additional data such as the method of travel employed by the individuals involved. The EPS data does not include the method of travel used by CSCs or VICTIMs (e.g. on foot, bike, public transit, vehicle, or other) on their journey to/from the corresponding OCCUR locations, nor does it specify whether the point of origin for either individual was, in fact, their residence. For these reasons, then, it is not possible to determine if the street grid layout approach would provide any more accurate results in the context of the City of Edmonton. Additionally, the direct point-to-point Euclidean method allows the researcher to circumvent issues associated with reliance on presumed human behaviour and travel patterns typical to those found in the traditional theories of environmental criminologists focusing on social disorganization, delinquency, and property crimes (see Chapter 3). Furthermore, the direct distance approach allows for the measurement of distance between crime locations to be standardized across the data set and ensures the validity and reliability of results.

Two distinct methods were used to determine the distances between the crime locations to ensure the findings were valid. First, a mathematical model was applied using Pythagoras's Theorem:

$$d = \sqrt{dx^2 + dy^2}$$

where

   d = the distance between 2 points given x,y -coordinates
   dx = the difference between the x-coordinates of the 2 points (x_1 –

x_2)

   dy = the difference between the y-coordinates of the 2 points (y_1 –

y_2)

This distance (d) is also equal to the length of the line segment if one were to

draw a line between the two points as shown in Figure 13. This process was

repeated for all crime locations assigned to each of the 164 cases on Map #4.

Figure 13: DISTANCE BETWEEN 2 POINTS GIVEN X,Y-COORDINATES USING PYTHAGORAS'S THEOREM
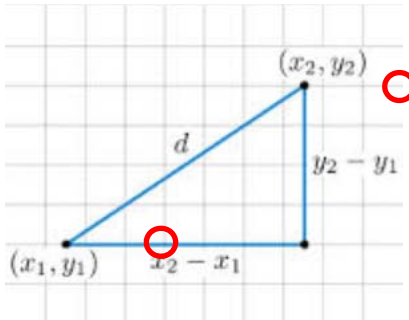
Second, the linear distance between crime locations is determined using a

spatial analysis function in ArcMap software. This function was not available to

the researcher who only had access to a limited number of functions provided in

the student license of ArcMap. The distance mapping method was undertaken by

Dr. Vukicevic who has a licence to the full software suite in ArcMap. This

method required that all coordinates were mapped with the same case

identification number for all three crime locations and an additional identification

number for each location type. The researcher formatted all data inputs for this

distance mapping method prior to importing the data into ArcMap. Once the data

was transferred to ArcMap, the distance was measured between all crime

locations linked to the same case based on the centre of the object (e.g. snap distance).

The results from both methods of determining the distance between case-specific crime locations were compared and were found to be identical and, thus, validated. These results were then analyzed by the researcher in order to determine the minimum, maximum, and mean values and standard deviation for the measured distances. The results for each distance grouping (OCCUR-VICTIM, OCCUR-CSC, and VICTIM-CSC) are summarized in Tables 13, 14, and 15 below (refer to Appendix I for a full tabular summary of all measured distances).

Table 13: DISTANCES BETWEEN FIRST DEGREE MURDER CRIME LOCATIONS, EDMONTON 2006-2012

	Distance between OCCUR - VICTIM Residence (km)	Distance between OCCUR - CSC Residence (km)	Distance between VICTIM Residence - CSC Residence (km)
Mean	3.37	7.53	7.74
Min.	0.00	0.00	0.00
Max.	8.72	16.72	18.76
Std. Dev.	2.96	5.78	5.71

Source: Edmonton Police Service

In the 23 first degree murder cases under analysis using the *triangulation of crime model* 5 (21.7%) of the VICTIMs were killed at their own residence and 4 (17.4%) of the VICTIMs were killed at the CSC's residence. In the 2 first degree murder cases, both the CSC and the VICTIM resided at the location where the VICTIM was killed. These are the cases where the distance between crime locations was measured as 0.0 kilometers. These results indicate strong VICTIM-CSC relationships for first degree murder in Edmonton. Similar findings are observed below for second degree murders and attempted murders.

The maximum distances between crime locations for first degree murder are: 8.7 kilometres between VICTIM residence and OCCUR location, 16.7 kilometres between CSC residence and OCCUR location, and 18.8 kilometres between CSC and VICTIM residences. The average distance between VICTIM residence and OCCUR location is 3.4 kilometres (this distance increases to 4.3 kilometres if we remove all distances where the VICTIM residence was the same as the OCCUR locations). The average distance between CSC residence and OCCUR location is 7.5 kilometres (this distance increases to 8.9 kilometres if we remove all distances where the CSC residence was the same as the OCCUR locations). The average distance between VICTIM residence and CSC residence is 7.7 kilometres (this distance increases to 8.9 kilometres if we remove all distances where the CSC and the VICTIM resided at the same location).

No additional discernable relationships are evident when exploring the distances between CSC residences and OCCUR locations. There is an observed relationship, however, between gender and the distances measured between CSC residences and OCCUR locations. For first degree murders, female CSCs live an average of 7.1 kilometres from the OCCUR location and male CSCs live an average of 8.4 kilometres from the OCCUR location. Further to this, non-stranger CSCs tend to reside 30.6% closer to the OCCUR location that do VICTIMs.

**Table 14: DISTANCES BETWEEN SECOND DEGREE MURDER CRIME LOCATIONS,
EDMONTON 2006-2012**

	Distance between OCCUR - VICTIM Residence (km)	Distance between OCCUR - CSC Residence (km)	Distance between VICTIM Residence - CSC Residence (km)
Mean	4.3	4.8	6.1
Min.	0.00	0.00	0.00
Max.	15.75	21.16	20.87
Std. Dev.	4.29	6.00	5.55

Source: Edmonton Police Service

In the 72 second degree murder cases under analysis using the

triangulation of crime model 19 (26.4%) of the VICTIMs were killed at their

residence, 19 (26.4%) of the VICTIMs were killed at the CSC's residence. In the

13 second degree murder cases, both the CSC and the VICTIM resided at the

location where the VICTIM was killed.

The maximum distances between crime locations for second degree

murder are: 15.8 kilometres between the VICTIM residence and the OCCUR

location, 21.2 kilometres between CSC residence and OCCUR location, and 20.9

kilometres between CSC and VICTIM residences. The average distance between

VICTIM residence and OCCUR location is 4.3 kilometres (this distance increases

to 5.9 kilometres if we remove all distances where the VICTIM residence was the

same as the OCCUR locations). The average distance between CSC residence and

OCCUR location is 4.8 kilometres (this distance increases to 6.5 kilometres if we

remove all distances where the CSC residence was the same as the OCCUR

locations). The average distance between the VICTIM residence and CSC

residence is 6.1 kilometres (this distance increases to 7.7 kilometres if we remove

all distances where the CSC and VICTIM resided at the same location).

For second degree murders, female CSCs live an average of 5.2 kilometres from the OCCUR location and male CSCs live an average of 4.7 kilometres from the OCCUR location. Non-stranger CSCs tend to reside 39.4% closer to the OCCUR location that do VICTIMs.

Table 15: DISTANCES BETWEEN ATTEMPTED MURDER CRIME LOCATIONS, EDMONTON 2006-2012

	Distance between OCCUR - VICTIM Residence (km)	Distance between OCCUR - CSC Residence (km)	Distance between VICTIM Residence - CSC Residence (km)
Mean	5.5	3.6	6.3
Min.	0.00	0.00	0.00
Max.	18.42	16.11	18.81
Std. Dev.	6.09	4.37	6.23

Source: Edmonton Police Service

In the 69 attempted murder cases under analysis using the *triangulation of crime model* 16 (23.2%) of the VICTIMs were killed at their residence, 17 (24.6%) of the VICTIMs were killed at the CSC's residence. In the 12 attempted murder cases, the CSC and VICTIM resided at the same location where the VICTIM was attempted to be killed.

The maximum distances between crime locations for attempted murder are: 18.4 kilometres between the VICTIM residence and the OCCUR locations, 16.1 kilometres between CSC residence and OCCUR location, and 18.8 kilometres between CSC and VICTIM residences. The average distance between VICTIM residence and OCCUR location is 5.5 kilometres (this distance increases to 8.2 kilometres if we remove all distances where the VICTIM residence was the same as the OCCUR locations). The average distance between CSC residence and OCCUR location is 3.6 kilometres (this distance increases to 6.4 kilometres if we remove all distances where the CSC residence was the same as the OCCUR

locations). The average distance between the VICTIM residence and CSC

residence is 6.3 kilometres (this distance increases to 9.1 kilometres if we remove

all distances where the CSC and VICTIM resided at the same location).

Female CSCs live an average of 2.6 kilometres from the attempted murder

OCCUR location. Male CSCs live an average of 6.2 kilometres from the

attempted murder OCCUR location. Further to this, non-stranger CSCs tend to

reside 78.0% closer to the OCCUR location that do VICTIMs of attempted

murder.

6.2.3. *Map #5 – Crime Locations in Edmonton - Triangulation of Crime Model*

Map #5 provides an example of the *triangulation of crime model* for the

cases shown on Map #4. As outlined above, the distance between all three crime

locations in relation to each other were plotted and measured. The measurements

for each calculated distance between the example crime locations are shown on

Map #5. This map allows for a visual understanding of cases where more than one

CSC or more than one VICTIM was involved in the crime. In these cases, a

distance was calculated for each CSC and/or VICTIM residence in relation to the

OCCUR location. All measureable distances between crime locations were treated

as unique values and were not averaged.

CRIME LOCATIONS IN EDMONTON - TRIANGULATION OF CRIME MODEL

MAP #5

Prepared By: Deirdre MCDONALD
Date: 2013OCT21
* Point data based on undisclosed XY Offset

6.2.4. Summary of Findings – Triangulation of Crime Model

The results of the application of the *triangulation of crime model* suggest three dominant relationships between the three distinct crime locations under examination here. First, when the distances between crime locations are individually examined in the context of the City of Edmonton, the average measured distances range of 3.4 to 7.7 kilometres does not present as significant. These findings do, however, suggest that CSCs in the City of Edmonton exhibit attributes distinct to marauder offenders; that is, they commit their crimes in close proximity to what environmental criminologists call their comfort zone; in this study, the comfort zone is represented by where they reside.

Second, murder VICTIM residences are closer to the OCCUR location than those of attempted murder VICTIMs. Conversely, CSC residences are further away from OCCUR locations for murder than they are for attempted murder. An in-depth analysis of the measured distances between the crime locations reveals that, on average, VICTIMs of attempted murder reside approximately the same distance from the corresponding CSC's residence than do murder VICTIMs from their killer's residence. The high probability of victimization occurring at a VICTIM's residence or a CSC's residence (39.1% of first degree murders, 52.8% of second degree murders, and 47.8% of attempted murders) demonstrates a strong relationship between crime scene locations (OCCUR) and the previously studied victim-offender relationship (non-stranger in 56.5% first degree murders, 41.9% second degree murders, and 76.9% attempted murders).

Third, aside from major bodies of water and freeways, the boundaries of the EPS Divisions do not appear to act as either a physical or psychological barrier to CSCs as the data reveals that CSCs frequently commit their crimes in Divisions other than the Division corresponding to their residence (e.g. 65% of first degree murders, 76% of second degree murders, and 75% of attempted murders). This trend is especially pronounced among CSCs living in Northeast Division who are more likely to commit their crimes in Downtown Division than any other Division including their own (45% of first degree murders, 42% of second degree murders, and 53% of attempted murders). Interpreted from a sociological perspective, these patterns of spatially distributed crime locations signify the influence of non-stranger victim-offender relationships and similar lifestyles in Edmonton.

The majority of studies on criminal offender movement patterns have been conducted in the United States. These studies typically involve two common methodologies: (1) measuring the distance from the offender's residence to the crime scene and (2) interviewing offenders to collect data on their movements (Canter, 2008b). The results of these studies vary and often contradict each other with the following exception: "[a]ll cities have areas that contain a disproportionate amount of crime due to the opportunities they present" (Canter, 2008b, p. 44). Studies on homicide result in a general pattern of minimal mobility for murderers in the United States ranging from a mean distance of 0.18 kilometres (0.11 miles) to 2.3 kilometres (1.46 miles) with varying standard deviations (Bullock, 1955; White, 1932; Godwin & Canter, 1997). Due to marked

cross-national differences between Canada and the United States including city

sizes, population density, rural and urban land use, and transportation systems,

one must be careful in drawing generalizable conclusions between the two

nations. This caution is further warranted in the context of this study as this

research does not proceed from the widely held assumption that all paths originate

from the offender's home location. Rather, this study explores the spatial

distribution of crime locations in relation to each other within the context of the

EPS Divisions.

6.3. OCCURRENCE LOCATION TYPE

A close analysis of the diverse types of locations where murders and

attempted murders typically occur in Edmonton reveals that 41.9% of murders

occur at residential locations (e.g. apartment, condominium, rooming house,

single house, townhouse, or on residential property). According to the EPS data,

33.9% of the first degree murders and 44.0% of the second degree murders

occurred at a residential location. The majority of attempted murders were

distributed between federal corrections facilities (30.8%), residences (29.0%), and

on streets, roads, or highways (25.6%). The occurrence types and corresponding

locations are summarized in Table 16.

Crimes occurring at federal corrections facilities in Edmonton (7 first

degree murders and 36 attempted murders) refer to those at the Edmonton

Remand Centre (ERC) and the Edmonton Institution Maximum Security Prison.

The ERC officially opened on March 19, 2013 at its new location in Northeast

Division (18415 – 127 Street). Between the years 2006-2012, however, ERC was located in Downtown Division (9660 – 104 Avenue). The Edmonton Institution Maximum Security Prison opened in 1978 and is located in Northeast Division (21611 Meridian Street).

Table 16: OCCUR TYPE BY LOCATION, EDMONTON 2006-2012

OCCURRENCE LOCATION TYPE	First Degree Murder (1110)	Second Degree Murder (1120)	Attempted Murder (1210)
Non-Residential	**31**	**100**	**81**
Car dealership		2	
Church		1	
Community centre		4	1
Detached garage/shed			1
Federal corrections facility (historic value)	7		36
Halfway house/social service agency			1
Hospital			2
Hospital (historic value)		2	
Hotel units/motel rooms	1		
Jail/penitentiary/corrections institution			2
Open areas	2	12	
Other commercial dwelling unit			1
Other commercial places	4		2
Other commercial/corporate places - other business		8	
Other public transportation and connected facilities		1	
Parking lots	4	15	1
Schools not during supervised hours		1	
Store	1		
Streets, roads, highways	7	52	30
Subway or subway station	2		3
Transit bus or bus shelter		2	1
Universities/colleges	4		
Residential	**22**	**84**	**34**
Residence - apartment/condominium	10	37	28
Residence - hotel/rooming house		2	
Residence - single home, house	11	42	3
Residence - surrounding property		3	2
Residence - townhouse			1
Unknown	**9**	**7**	**2**
Total	**62**	**191**	**117**

Source: Edmonton Police Service

While the total non-residential figures are higher than residential figures for OCCUR locations, there is no one specific non-residential location that exceeds the probability of a VICTIM being killed at a residential location. This observed level of familiarity of the CSC and/or the VICTIM to the OCCUR location is best understood by returning to the previous analysis of the high rate of non-stranger murders and attempted murders in Edmonton.

6.4. OCCURRENCE TIMING

Further analysis of the EPS data led to the identification of patterns for time of day and year for murders and attempted murders in Edmonton. The monthly distribution of the 214 cases (57.8%) having the date and time of the occurrences recorded in EPROS shows murders and attempted murders to be evenly distributed across the year with regards to seasons (e.g. spring, summer, fall, and winter). Applying a month-by-month analysis, however, exposes a higher number of murders committed in the months of February and July and a higher number of attempted murders committed in the months of April and June (see Figure 14). When examined in terms of time-of-day criteria, over one-half of the murders (59.4%) occurred overnight between 18:00 hrs and 05:59 hours. Attempted murders were fairly evenly distributed across the day (see Figure 15). These findings lend support to the high number of non-stranger occurrences; however, additional data on the circumstances of the nature of the crimes occurring during peak times is necessary in order to support such a conclusion.

Figure 14:PERCENTAGE OF MONTHLY OCCURRENCES, EDMONTON 2006-2012
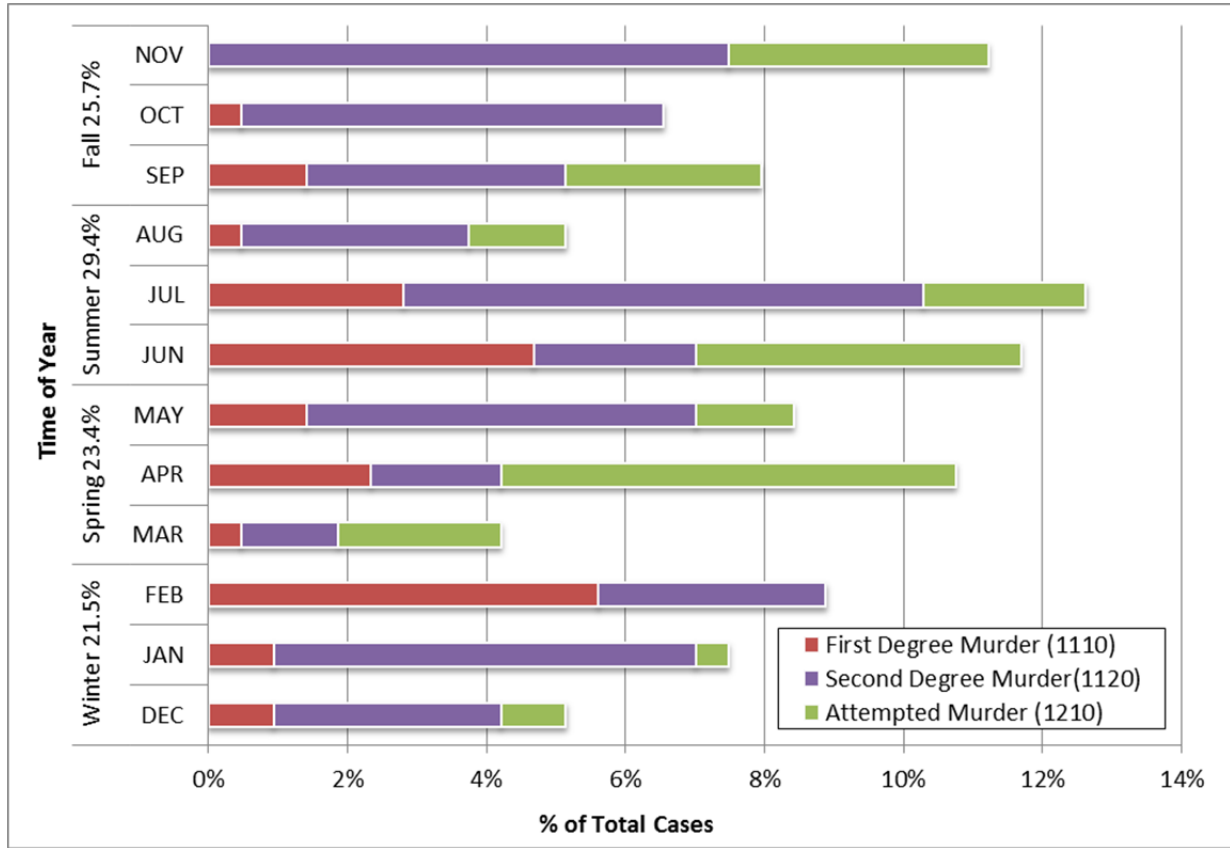
Source: Edmonton Police Service

Figure 15:PERCENTAGE OF HOURLY OCCURRENCES, EDMONTON 2006-2012
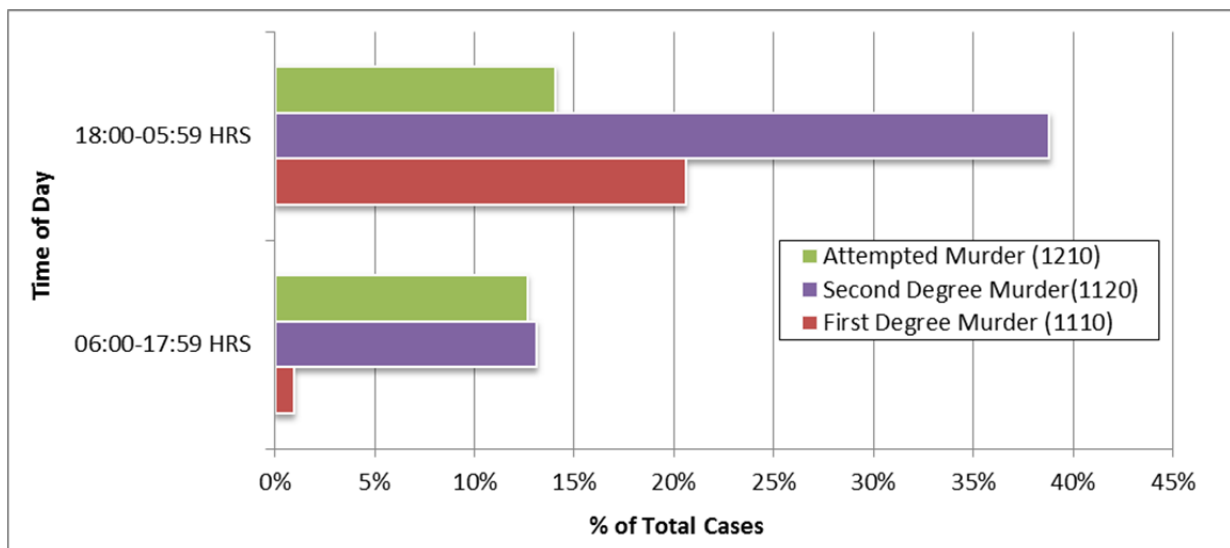
Source: Edmonton Police Service

6.5. **Summary and Conclusions – Geographical Attributes of Crime Locations**

This section considered the spatial distribution of the crime locations associated with murder and attempted murder in Edmonton. This was accomplished through the creation of detailed maps that were spatially and sociologically analyzed in order to establish the distinct geographic attributes of victim residences, offender residences, and occurrence locations. Analogous to the demographic attributes of victims and offenders, added knowledge of the geographic attributes of crime locations contributes to furthering our understanding of murder and attempted murder in the distinct social context of the City of Edmonton. The familiarity of victims and offenders with crime locations, in particular crime scenes, is not surprising considering the high ratio of non-stranger perpetrated murders and attempted murders in Edmonton. This observation is bolstered by the high concentration of victim residences and offender residences circumscribed by a specific geographic area of the city (Northeast Division and Downtown Division) and the relatively short distances measured between crime locations.

CHAPTER 7: **SUMMARY OF FINDINGS**

Discovery consists of seeing what
everybody has seen, and thinking what
nobody has thought.
(Albert von Szent-Gyorgyi, 1962)

7.1. SUMMARY OF FINDINGS AND THE RESULTANT PROFILE

There is a dearth of criminological research on the relationship between

offender and victim characteristics for homicides in Canada and, in particular,

their spatial relationship to crime locations. The research that does exist, however,

indicates a possible relationship between age, race/ethnicity, criminal background,

personal association, weapons, and patterns of offender movement. The findings

of this study confirm many of the long-standing criminological assumptions

pertaining to murder and attempted murder in the context of the City of

Edmonton. By applying the *triangulation of crime model*, this research was able

to go beyond contemporary criminal profiling models' that have a central focus

on the offender and the offender's home base to address the demographic and

geographic attributes of victims. By narrowing the research focus to the crimes of

murder and attempted murder, this study successfully navigated the pitfalls of

comparing violent crimes against persons with crimes against property noted in

the adoption of environmental criminology theories by the founders of

geographical profiling.

Through the criminological application of traditional investigative

techniques, this study was able to determine that murders and attempted murders

in Edmonton do not exhibit patterns of randomness; rather, this study led to the

identification of typical demographic attributes of both murder and attempted

murder victims and offenders and the relationships between them. In Edmonton between the years 2006-2012, a significant number of the victims of and the offenders charged with murder and attempted murder were young adult males who were in some way acquainted with one another; that is, they were not strangers. Murders and attempted murders in Edmonton during this same temporal period were generally committed using a weapon and the most common weapon classification was a sharp instrument such as a knife.

The application of geographical profiling principles further permitted this sociological inquiry to identify geographic attributes common to crime scenes, offender residences, and victim residences for murder and attempted murder. This approach, in turn, provided the unique opportunity to create a visual illustration of the geographic distribution of crime locations for murders and attempted murders in Edmonton. For murders, the crime scene is typically a residential location situated in the most dense, most populated, and most marginalized area of the city—Downtown Division. The largest numbers of murder victims reside in Downtown Division an average distance of 3.9 kilometres from the crime scene and murderers typically reside in North Division an average distance of 6.2 kilometres from the crime scene. For attempted murders, the crime scene, offender residence, and victim residence are typically residential locations in Northeast Division. Most attempted murderers reside an average of 3.6 kilometres from the crime scene and attempted murder victims reside an average of 5.5 kilometres from the crime scene.

It was my observed connection between offenders and victims in terms of both person (e.g. demography) and place (e.g. geography) that provided the impetus to investigate the existence of relationships between these quantifiable variables. This was achieved through an in-depth criminological analysis of demographic and geographic features of offenders, victims, and crime locations associated with murder in Edmonton between the years 2006-2012. The following profile is arrived at:

Figure 16: PROFILE FOR MURDER, EDMONTON 2006-2012

Offender	•male aged 16-30 years
Victim	•male aged 16-30 years
Victim-Offender relationship	•non-stranger
Weapon	•sharp weapon (e.g. a knife)
Offender residence	•EPS Northeast Division
Victim residence	•EPS Downtown Division
Crime scene	•a location in EPS Downtown Division familiar to victim and/or offender (e.g. residential)
Distance between offender residence and crime scene	•average 6.2 kilometres
Distance between victim residence and crime scene	•average 4.1 kilometres
Distance between victim residence and offender residence	•average 6.9 kilometres
Time of Day	•over night (18:00 - 06:00 hours)

A similar profile emerges for attempted murders in Edmonton during this same time period with the exception that attempted murders are typically committed in Northeast Division, victims of attempted murder typically reside in Northeast Division, and offenders reside further from the crime scene than do victims.

Figure 17: PROFILE FOR ATTEMPTED MURDER, EDMONTON 2006-2012

Offender	• male aged 16-30 years
Victim	• male aged 16-30 years
Victim-Offender relationship	• non-stranger
Weapon	• sharp weapon (e.g. a knife)
Offender residence	• EPS Northeast Division
Victim residence	• EPS Northeast Division
Crime scene	• a location in Northeast Division familiar to victim and/or offender (e.g. residential)
Distance between offender residence and crime scene	• average 3.6 kilometres
Distance between victim residence and crime scene	• average 5.5 kilometres
Distance between victim residence and offender residence	• average 6.3 kilometres
Time of Day	• overnight (18:00 - 06:00 hours)

These analytical profiles support long-standing assumptions of criminologists that both homicide victims and their killers tend to be relatively young adult males who are highly marginal in a socio-economic context (see Chapter 3). Data on the socio-economic status of victims and offenders (restricted in this study) would further allow me to investigate the assertions by some researchers about the enduring relationship between urban crime and poverty (e.g. high rates of unemployment, physical deterioration, and large percentages of minorities and youths); in particular, when crime rates are assessed in the downtown areas of metropolitan cities like Edmonton in comparison to crime rates exhibited by the rest of the city.

Additional data on the mode of travel used by both offender and victims to/from the crime scene would have allowed for an analysis of the function of

public and/or personal transportation in these crimes. This information, too, could have been measured against the socio-economic status of the individuals and the residential locations associated to the crimes to determine if any additional relationships are present.

The results of this study reiterate the necessity for sociological investigations into both demographic and geographic features of crime with an emphasis on the study of homicide. The significance of the results of this study is threefold; directions for future research initiatives, implications of this study, and consequences for police investigations.

7.2. DIRECTIONS FOR FUTURE RESEARCH

The results of this study rely heavily on data collected by the Edmonton Police Service (EPS). This data, however, is not without its limitations. These limitations are based on a rigorous adherence to ethical and legal freedom of information and privacy protection requirements set forth by the EPS for external researchers. These limitations include the restriction to data on certain demographic attributes of offenders and victims (e.g. race, ethnicity, family status, type or location of work or other activities, and method of travel). Unarguably, this type of data could be used to enhance these research results and provide input for future research.

With the noted limitations, this research makes two important contributions to sociology: (1) an in-depth assessment of victim demographics, and (2) the introduction of the victim residence classifier. Studies have long addressed offenders, crime scenes, and offender residences as units of analysis,

but have neglected the importance of victim residence and victim demographics. The introduction of victims-specific attributes into the *triangulation of crime model* allows for the examination of <u>all</u> available demographic and geographic features of murder and attempted murder. This analysis, then, leads to the development of a much more comprehensive profile for a distinct set of crimes than does the traditional criminal profiling or geographical profiling models. This progression is understood on the basis that both criminal and geographical profiling models focus primarily on offender behavior and crime scene evidence in order to determine the offender's most likely base or residence. The inclusion of the victim attributes addressed in this study bridges an observed gap in both literature and criminal investigations.

The data used in this study facilitated the development of a unique profile for murder and attempted murder in Edmonton. From this profile emerges the prevalence of the use of weapons during these offences. The use of weapons in violent crime is commonplace in Canada as a whole (Dauvergne, 2010). As such, methods of killing and weapons are an area of concern for the general public, policy makers, and criminologists. Recent amendments to Canadian firearms legislation have received both support and criticism. Although the EPS collects detailed data on the most serious weapons used in all of its violent crimes, the filtering of the data precluded my ability in this investigation to perform a detailed analysis on the types of firearms and sharp weapons commonly used to commit murder or attempted murder in Edmonton. In order to understand the effects of current legislation as well as amendments at the local level to restrict or prohibit

weapons, reliable data such as that collected by the Uniform Crime Reporting Survey on weapon classifications must be made more accessible to researchers.

As social science researchers, we continually strive to test and re-test hypothesis. Having developed profiles for murder and attempted murder in Edmonton, other similar sized Canadian cities could be compared using similar data sets in order to test the hypothesis presented in this study. This would allow other researchers, including myself, to use the results of this study to state whether particular crimes in a geographic region under study fit into the identifiable profile offered here. Additionally, this research initiative can take a step further through the inclusion of surrounding rural areas, a significantly neglected area of criminology research (Potter, 2010). Movement beyond the investigative boundaries of a specific police agency's jurisdiction will permit a much needed analysis of what effect (if any) urban crime rates have on rural crime rates and vice versa.

These implications, with the previously discussed limitations, lay the groundwork for a potentially rich line of continued investigation. By continuing the study of murder and attempted murder with expanded data sets and more encompassing geographical regions, future research can direct the recognition and incorporation of demographic and geographic perspectives into policies regarding case linkage analysis and suspect prioritization for homicides.

7.3. IMPLICATIONS OF THIS STUDY

By addressing the question of where murders and attempted murders typically occur and who the victims of and offenders charged with these crimes

generally are, we must also address the reasons why these locations and individuals are selected and their implications. In this study, clusters of crime scenes, offender residences, and victim residences are evident in both highly populated and highly marginalized areas of the City of Edmonton. These areas are represented by the EPS Downtown Division and Northeast Division. As this study has shown, boundaries drawn on a map are not representative of the boundaries between real-world spatial and personal relationships of neighbourhoods and their occupants. For instance, offenders were frequently observed to commit crimes in Divisions other than the Division corresponding to their residence (e.g. offenders residing in Northeast Division are more likely to commit crimes in Downtown Division). These clusters, however, require further analysis in order to determine if the destabilizing features of these clusters sustain the difficulty for individuals residing in these areas of avoiding crime, violence, and substance abuse.

Homicides are relatively rare in Canada making them difficult to predict. In an effort to further understand homicide in an urban context such as the one presented here by the City of Edmonton, one possible line of inquiry is the development of a risk assessment of violent crime. This type of an assessment offers researchers the opportunity to both appraise and investigate the potential for risk management and mitigation of violent crime in a specific geographical context. Risk assessments of violent crime in the context of this study may include three elements: static, dynamic, and actuarial projections. First, assessing static risks consists of an appraisal of historical values that are not typically susceptible to change over time. For example, in Edmonton, static risks include

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those associated to the historical make-up of neighbourhoods such as average household income and unemployment rates. Second, assessing dynamic risks consists of an appraisal of the variables that are susceptible to change via countermeasures or other options. In Edmonton, for instance, examples of dynamic risks are found in changes to social service providers and their programming and to government-mandated offender management policies. Third, actuarial projections of risk to experience continued crime may involve both static and dynamic factors.

Current Canadian policing models generally emphasize static risk factors over dynamic ones. If one relies on current literature addressed in this study, however, acute changes in dynamic risks at the neighbourhood-level (e.g. changes in poverty levels) are highly predictive of future crime (e.g. Broken Windows Theory). One must be cautious, however, not to use such independent demographic variables in isolation to assess the causality of crime simply based on socio-economic status. Understanding the collective environmental and socio-economic contexts in which murders and attempted murders occur can have broad implications. By this I mean that different neighbourhoods exhibit different crime problems with unique temporal patterns suggesting that equally distinct responses are necessary based on space, time, and types of crime. This research has the potential to assist researchers of government and police agencies to incorporate both types of risks in their assessment of homicide as such measures can predict crime more accurately than historical reflection alone. This approach offers the opportunity for research to reflect the external forces that bear influence on the

individuals involved in violent crime by considering both their demographic attributes and their geographic features simultaneously. For this reason, this research study has shown that the amalgamated use of statistical and geographical modeling in criminology studies into homicide in a Canadian context is a productive strategy.

7.4. CONSEQUENCES FOR POLICE INVESTIGATIONS

F. Brookman offers an in-depth account of homicide investigative procedures in her book *Understanding Homicide* (2005). Following the basic organizational structure of murder investigations there are two key activities that would benefit significantly from the *triangulation of crime model* presented in this study: (1) initial response to the crime scene by first response patrol officers and (2) secondary inquiries by senior investigators. Information gathered by officers during the initial response to the crime and their assessment of the crime scene can provide significant insight into the crime, the victim, and the offender. In cases where the identification of the offender is not immediately apparent (e.g. a "whodunnit" [Brookman, 2005, p. 252]), the timely collection of demographic information on the victim (e.g. age, gender, how they were killed) in conjunction with geographical observations of the crime scene (e.g. city zone, residential or non-residential, victim's residence or other) can significantly contribute to an investigation. This contribution is evidenced by enabling investigators to establish reasonable boundaries—both demographic and geographic—in order to narrow both the geographic search area and the pool of possible suspects. Broadening the view of homicide investigations to jointly include demographic and geographic

variables will further help to identify areas of need for both offender-related and victim-related concerns for both police and the community and will help in addressing changes within these realms. These advanced analytical approaches can effect positively on a reduction in the murder and attempted murder rates in Edmonton when they are applied in conjunction with an intimate understanding of the historical and cultural composition of a given region and its occupants.

CHAPTER 8: **CONCLUSIONS**

The results of this thesis attend to the lack of sociological studies on homicide in Canada and the ongoing difficulties associated with murder and attempted murder investigations. One of the fundamental results this study illuminates is that all homicides are unique and that a limited number of classifications of homicide have been identified that share several common attributes to reveal that homicides can exhibit non-random patterns and trends in a specific social and spatial context.

Throughout this thesis I have presented the numerous characteristics of murders and attempted murders in Edmonton starting from demographic attributes of individuals involved and moving to geographic attributes of three distinct crime locations. This study required sustained attention on several variables such as the gender question and homicide as a social construct in order to conclude that homicide in Edmonton is patterned in several distinct ways (e.g. age, gender, relationship, and EPS Division). In doing so, this research has undoubtedly identified future lines of sociological inquiry.

Overall, this research speaks to the importance of an integrated approach to developing profiles for violent crimes in urban settings. The *triangulation of crime model* presented in this study is an example of where a multidisciplinary approach is truly of greater value to criminology research and police investigations than are the sum of the individual and competing parts of a crime itself. Each of these areas is important to the study of crime and their integration into current crime prevention and policing models and further research in a broader context will prove valuable.

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APPENDIX A: THEORETICAL BASIS FOR CRIMINAL PROFILING

Strain Theory (Robert Merton)	The first and oldest theory is the strain/anomie theory. This theory posits that serial killers lack any bonds tying them to society. It is believed that family history and childhood development play large roles in this theory. With this separation from society, many serial killers believe that they should be able to do what they want, when they want (ethos of personal satisfaction). Many serial killers were adopted, or have never met one of their parents. Neglect (especially from mothers) and abuse are common themes in serial killers' childhoods. This may cause feelings of inadequacy, worthlessness, and powerlessness, which may lead to extreme sexual dysfunction. Feelings of sexual inadequacy and a rich fantasy life are common cognitive factors that influence and encourage serial killers to kill, rape, and torture their victims. It is only through these methods that the killer can be sexually satisfied.
Biological Theories	Some research points to brain anomolies in serial killers; possibly due to abnormal development during gestation or the result of an injury. A large number of serial killers studied exhibit severe damage to the frontal lobe. There is also some evidence that abnormalities in the nervous system may play a role in criminal tendencies. The autonomic nervous system (ANS), which acts as the body's 'control system,' is responsible for sexual arousal. It has been hypothesized that damage to this area of the brain may result in the serial killer's twisted sexual fantasies.
The Diathesis-Stress Model (Giannangelo 1996)	This model proposes that all potential serial killers have a cognitive susceptibility to both behave and think in ways that, if combined with environmental stressors and traumas, can lead to serial killing. Visual Representation: Biological predisposition → self-esteem and self control problems → maladaptive coping skills; → retreat into fantasy world → dissociative process → first kill (usually an accident.)
Other Factors	There has been a dramatic increase in the number of serial killers in the past 60+ years. Although some of this rise is the result of increased identification of serial killers by police, changes in society have actually increased the number of serial killers. Factors such as increased urbanization, technology, and the availability of personal vehicles has, in a sense, made serial killing easier than it was in the past.

(Developed from the Victims of Violence webpage:
http://www.victimsofviolence.on.ca/rev2/index.php?option=com_content&task=view&id=362&Itemid=52)

Journey to Crime (JtC) research explores the influences of sex, age, race, prior criminal history, nature of home location, crime type, target area features, and perceived level of gain on offender travel patterns. This theory has been undertaken in numerous criminological inquiries (White, 1932; Lottier, 1938; Turner, 1969; Phillips, 1980; Rhodes & Conly, 1981; LeBeau, 1987, 2011; Boggs, 1966; Capone & Nichols, 1975; 1976; and Canter & Larkin, 1993. The findings of JtC research can be summarized as follows: (a) even when criminals are mobile, crimes tend to occur within close proximity to the criminal's residence (e.g. time is a commodity to be conserved); (b) criminal trips follow a distance-decay function with the number of criminal events decreasing the further the criminal travels from his residence; (c) juvenile offenders are most likely to commit their crimes within their home area, and are less mobile than adult offenders; (d) differences in crime trip distances between offence types have been consistently found (e.g. violent crimes are committed closer to the criminal's residence than are property crimes); and (e) most cities contain high crime rate neighbourhoods which, through arrangement and location, influence the patterns of crime trips.[59]

Rossmo's examination of the numerous studies on the different types of crime trips associated with different types of crimes in various locations in North American and England is very informative. These studies include robberies in Northern California, serial rapists in Greater London and Southeast London, as well as rapes committed by offenders of a specific race (e.g. white or non-white) and age (e.g. older or younger). According to Rossmo, the findings of Journey to Crime studies are typically reported in one of the four following ways with their subsequent contribution or lack thereof noted in parentheses: (1) mean crime trip distance (considered weak due to the influence of spatial outliers); (2) medial circles (supply only a single measure of crime trips); (3) mobility triangles (findings are often presented in the form of percentages of crimes fitting into the neighbourhood triangle); and (4) distance-decay functions (most useful presentation of crime trip data shown on a graphical curve allowing for inspection and provides information for further analysis and a more comprehensive

understanding of the JtC).[60] It should be noted that due to the limited number of highly mobile offenders and offenders who travel extensively (e.g. less than ten percent of offending population), they should be considered immune from Journey to Crime principles. This immunity is due to their lack of fixed abode or large distances travelled in combination with the fact that research has shown these criminals tend to select high-risk victims from high-risk areas (e.g. prostitutes from red-light districts). Another important issue to consider is the role that victim availability can play in crime trips as these may illustrate distinct clusters of crimes committed by the same offender (e.g. train stations, bars, shopping areas, entertainment and recreation areas) which are beyond the offender's daily routines routes yet can still provide a Journey to Crime directionality.

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1. Chicago School ecologists' pattern of older cities with a generally concentric zonal form, and with a dense core, will have a crime pattern which clusters toward the core. There should be a relatively steep crime gradient.
2. Newer cities with a mosaic urban form (dispersed public housing and increased use of public transportation and vehicles) will have a more dispersed crime pattern with a lower concentration of crime than in older, denser cities.
3. New cities with dispersed shopping and much strip commercial development have a higher potential for property crime.
4. Development of major transportation arteries leads to a concentration of criminal events close to the highways, particularly near major intersections.
5. Areas with grid networks, in general, have higher potential crime rates than areas with organic street layouts.
6. Older cities with dispersed low income housing and public transport are likely to have a concentration of crime around the core, and nodes of higher crime around the low income housing areas.
7. The shifting of work areas out of core areas into fringe areas of a city will tend to increase crime in suburban areas.
8. Major entertainment complexes such as sports arenas are likely to produce localized associated increases in crime. If these complexes are near residential areas with many potential offenders, the associated crime should increase disproportionately.
9. Cities with a core 'red light district' are likely to have a concentration of crime in those areas due to its ability to attract potential victims and offenders. However, dispersing the activities which cluster in a 'red light district' will not necessarily decrease the total amount of crime, though the spatial patterning of crime should change.

Source: Canter, 2008a, p. 99-104.

1. <u>Suspect Prioritization</u>: In cases of serial crimes, geographical profiling can assist in resolving the common problem of *too* many suspects by reassessing and prioritizing hundreds (if not thousands) of suspects, leads, and tips.

2. <u>Police Information Systems</u>: These systems include offender profile details (e.g. M.O.) and criminal case specifics that can help further focus the search for an offender, especially when accessed through computerized police dispatch and record systems.

3. <u>Task Force Management</u>: The collection and collation of task force operation data in some form of a computerized major case management system will decrease the incidence of information overload. These criminal cases will also benefit from data prioritization and the application of correlation analysis.

4. <u>Sex Offender Registries</u>: Registries are useful for geographical profiling in cases of serial sex offenders due to the fact that violent sexual offenders must register with appropriate state or provincial agencies for a pre-determined length of time. As such, sex offender registries are "powerful tools for monitoring and controlling criminal predators."[61]

5. <u>Government and Business Databases</u>: The majority of government and business databases (+/-85%) contain an address. Examples of this type of database include: parole and probation; mental health; social services; schools; adult video rentals; and automobile service stations.

6. <u>Motor Vehicle Registrations</u>: A geographical profile can be integrated with a suspect vehicle (e.g. make, model, year, or colour) and physical descriptors (e.g. sex, race, age range, height, or hair colour) when searching provincial or state computer record systems.

7. <u>Patrol Saturation and Stakeouts</u>: these policing strategies can be directed on the basis of a geoprofile. This approach is especially effective when employed during specific time periods that can cover target searching (e.g. prowling or loitering) as it has been observed that "considerable more time is spent hunting than attacking."[62] Some criminals' hunt-to-attack ratios have been noted to exceed 10:1.

8. <u>Response Plans</u>: According to research cited by Rossmo, many offenders return to their residence directly after committing a crime (I assume this to be based on their attempt to evade detection and remove traceable evidence). A geographic profile relying on the most logical routes in a neighbourhood can direct police patrol units to probable offender residence areas as well as to the crime-scene. In the case of serial killers, body dump sites are of re-used and crime sites are often revisited and this information should be considered when developing a police response plan.

9. <u>Mail Outs</u>: Posting information to households and businesses "within the peak area of the geoprofile" allows considerable coverage and relatively low costs. The purpose of this approach is two-fold: (1) people are more likely to

respond to a threat in their neighbourhood compared to 'generalized' media broadcasts; and (2) this method typically generates high quality information. This approach is only deemed to be effective when the offender description is sufficient and reliable and may include traits from a psychological when deemed pertinent.

10. Neighbourhood Canvasses: Canvasses are common following a major crime or a series of crimes and should include the victim encounter, abduction, attack, and/or body dump site as well as the neighbourhood of the probable offender residence. The territory covered by these searches can be quite extensive; for example, a circle with a radius of four miles has a search area of fifty square miles (one hundred and thirty square kilometers) inside it.

11. News Media: The inclusion of reliable features of a geoprofile (e.g. number of crimes, rate of offending and reliable suspect descriptions) can be used by the media to generate tips. Common news media include Crime Stoppers, news broadcasts, and special crime programs.

12. Bloodings: This refers to large-scale DNA testing of all suspects from the area of the crime. Since Blooding requires considerable police and laboratory resources and costs, a geoprofile can prioritize suspects to be tested.

13. Peak-of-Tension Polygraph: This type of polygraph involves monitoring a suspect's reactions to photographs, maps, or objects as opposed to traditional polygraphs that observe reactions to questions. When used in conjunction with a geoprofile, the usefulness of the peak-of-tension polygraph is enhanced.

14. Fugitive Location: When the fugitive's identity is known, geographical profiling may be able to assist in determining probable hiding places, especially when applied in conjunction with sightings, purchases, credit card or bank transactions, telephone calls, cellular phone tower usage, types of crimes, and crime-scenes.

15. Missing Bodies: In cases of suspected homicide(s), a geoprofile can assist in determining probable body dump site(s).

16. Trial Court Expert Evidence: The secondary role of geographical profiling in demonstrated in the courtroom and as supporting grounds for search warrants. This is in addition to geographical profiling's primary role as an investigative tool. Again, we must be aware that a geoprofile is not a stand-alone solution and is insufficient for the establishment of guilt or innocence in a court case. When combined with other forensic findings (e.g. DNA), however, the geoprofile enhances the evidential strength of the forensics.

Source: Rossmo, 2000, p. 225-35.

1. Individuals exist who are motivated to commit specific offences.
   a. The sources of motivation are diverse.
   b. The strength of such motivation varies.
   c. The character of such motivation varies from effective to instrumental.
2. Given item #1 above, the actual commission of a crime is the end result of a multi-staged decision-making process which seeks out and identifies (within a general environment) a target/victim positioned in time and space.
   a. High-affect motivation: decision process will be limited in terms of stages.
   b. High-instrumental motivation; decision process to locate target/victim may be multi-staged and require careful searching.
3. The environment emits many signals or cues to the criminal about its physical, spatial, cultural, legal, and psychological attributes. These cues vary from generalized to detailed.
4. A motivated individual can commit a crime using cues (either learned through experience or learned through social interaction) from the environment to locate and identify targets/victims.
5. As an offender's experiential knowledge grows, in conjunction with motivation, s/he learns which individual cues, clusters of cues, and sequences of cues—templates—are associated with 'good' targets/victims. The process of template construction and search process may be consciously or unconsciously performed and therefore it may not be possible for the criminal to articulate them.
6. Once the template is established, it becomes relatively fixed and influences future target-search behaviour, thereby becoming self-reinforcing.
7. Target/victim multiplicity can lead to the construction of more than one crime selection template. Due to the fact that spatial and temporal distribution of offenders and targets/victims is not regular (rather it is clustered or patterned) and because human environmental perception has some universal properties, these templates will have identifiable similarities.

Source: Rossmo, 2000, p. 117-8.

UNIVERSITY OF ALBERTA

RESEARCH ETHICS OFFICE

308 Campus Tower
Edmonton, AB, Canada T6G 1K8
Tel: 780.492.0459
Fax: 780.492.9429
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Notification of Approval (Renewal)

Date:	January 23, 2014
Amendment ID:	Pro00036970_REN1
Principal Investigator:	Deirdre McDonald
Study ID:	Pro00036970
Study Title:	Edmonton's Crime Zones: the Application of Criminal Profiling Techniques to Reveal Patterns of Victimization
Supervisor:	Bryan Hogeveen
Sponsor/Funding Agency:	SSHRC - Social Sciences and Humanities Research Council
Approval Expiry Date:	February 3, 2015

Thank you for submitting this renewal application. Your application has been reviewed and approved.

This re-approval is valid for one year. If your study continues past the expiration date as noted above, you will be required to complete another renewal request. Beginning at 30 days prior to the expiration date, you will receive notices that the study is about to expire. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Sincerely,

Stanley Varnhagen, PhD

Chair, Research Ethics Board 2

Note: This correspondence includes an electronic signature (validation and approval via an online system).

RESEARCH AGREEMENT

between

Researcher(s):	**Deirdre MCDONALD**
	and
Public Body:	**The EDMONTON POLICE SERVICE** **(hereinafter referred to as the EPS)**

The Researcher(s) is/are conducting a research project for the thesis for the Master's Degree program in Sociology/Criminology at the University of Alberta titled:

"The Application of Geographical Profiling Techniques to Crime Victimization Patterns in Canada"

The Research Proposal (the "Proposal"), as attached hereto and marked as Schedule A, forms part of this Research Agreement (the "Agreement"). In the event that there is a discrepancy between the Proposal and Agreement, this Agreement will govern.

The Researcher(s) and the EPS are entering into this Agreement for the purpose of disclosing and sharing necessary personal information for research purposes.

The EPS is a public body as defined under the *Freedom of Information and Protection of Privacy Act* (RSA 2000, Chapter F-25; amended 2006 May 24), herein referred to as the "FOIPP," and is required pursuant to the Act to ensure the appropriate disclosure, use, and collection of personal information.

The Researcher(s) and EPS agree as follows:

I. Definitions

1. "Personal Information" means recorded information about an identifiable individual, including:

   i) the individual's name, geographic coordinates of home or business, home or business address or home or business telephone number, the individual's race, national or ethnic origin, colour or religious or political beliefs or associations,

   ii) the individual's age, sex, marital status or family status,

   iii) an identifying number, symbol or other particular assigned to the individual,

   iv) the individual's fingerprints, other biometric information, blood type, genetic information or inheritable characteristics,

   v) information about the individual's health and health care history, including information about a physical or mental disability,

   vi) information about the individual's educational, financial, employment or criminal history, including criminal records where a pardon has been given,

   vii) anyone else's opinions about the individual, and

   viii) the individual's personal views or opinions, except if they are about someone else.

2. "Researcher(s)" shall mean:

    i)   Deirdre McDonald (Principal Researcher)

II. Access to Information

3. The Researcher(s) will not be provided access to records related to an ongoing prosecution.

4. The EPS reserves the right to withhold any records from the Researcher(s) (and thus participation in the research project) including records that may relate to an ongoing investigation or reveal an informant's identity.

5. Data transfer will be facilitated by Joanne GRAHAM of the EPS (the "EPS Project Liaison"). Data will be transferred electronically in a secure manner, or as the EPS otherwise deems appropriate.

6. At no time will the Researcher(s) remove any EPS records from EPS property without the written permission of the EPS Project Liaison.

7. The EPS does not warrant the accuracy of the information.

III. Security and Confidentiality

8. The Researcher(s) hereby agree(s) that:

    i)   the information collected from the EPS shall not be used or disclosed for any purpose other than as set out in the Proposal, or as provided in this Agreement, without the written consent of the Chief of Police;

    ii)   all Researcher(s) have completed an Enhanced Police Information Check, conducted by the EPS;

    iii)   geographic coordinates will be offset by an undisclosed and consistent factor thereby protecting the privacy of victims of crime while maintaining the integrity of the relative locations reported;

    iv)   personal information shall be kept in a secure location to which only the Researcher(s) have access, with appropriate security measures taken to prevent unauthorized access. Security arrangements for paper and electronic files shall be as detailed in the Proposal;

    v)   there shall be no contact with any individual to whom the personal information relates, directly or indirectly, without the prior written authorization of the EPS Project Liaison;

    vi)   except as otherwise provided in this Agreement, no personal information will be used or disclosed in a form in which the individual to whom it relates can be identified without the written authority of the EPS Project Liaison. The Researcher(s) will not link information contained in data provided by the EPS with information obtained otherwise, including information found in court records or information obtained through interviews;

    vii)   a separate database, used for evaluation purposes, will be created by the Researcher(s), which will not contain any personal identifiers collected;

    viii)   all police case files will be accessed within the EPS headquarters with the permission of or under EPS staff supervision;

    ix)   individually identifying data will be removed from all police reports;

    x)   where 'de-identified' data is provided to the Researcher(s), the key code will only be accessible to the EPS data manager eliminating the ability to link information to individuals within a data set;

    xi)   data will be extracted by EPS employees and will not include names and street addresses;

    xii)   the Researcher(s) will not have direct access to any EPS systems including but not limited to EPROS, CAD and Cognos;

    xiii)   all research will be conducted in accordance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, December 2010. (Canadian Institute of Health Research, Natural

Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada);

xiv) no original documents will be removed;

xv) any non-personal information that is required to be duplicated will not be done so without approval from EPS personnel and under their supervision;

xvi) all interviews with police personnel will be conducted according to EPS procedures and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, December 2010;

xvii) note-taking of data will be undertaken as required to compile a database for the research project. Where necessary, the identities of officers and crime locations will be replaced with a coding system known to the Researcher(s) and the EPS in order to guarantee the security and confidentiality of any and all personal information custody.

xviii) all data gathered during this research project will be confined to a single dossier and an external hard drive backed up daily. Both file systems will be stored in a recently purchased fire-proof/water-proof safe when not in use by the Researcher(s);

xix) all electronic files will be password protected.

9. The Researcher(s) understand(s) that FOIPP specifies that a person who willfully violates the Act's requirements for collection, use and disclosure of personal information is guilty of an offence and liable to a fine of up to $10,000. In addition to liability for an offence, the Researcher(s) understand(s) the EPS may take legal action against him/her/them if there is contravention of the terms and conditions of this Agreement.

IV. Publication and Copyright

10. The EPS retains exclusive copyright of the information contained in the documents mentioned in this Agreement.

11. The Researcher(s) shall provide the EPS with a final copy of any publication. The Researcher(s) may publish individually or jointly with the EPS Project Liaison, an article or articles in periodic journals, magazines or any other publication based on information obtained from the EPS in the course of conducting the research project. Similarly, individual or joint papers may be presented at conferences or workshops.

12. In any written paper, article or presentation, the Researcher(s) agree(s) not to identify directly or indirectly, any particular person or persons participating in the course of the research project, unless written consent from that individual has been obtained.

13. Prior to the publication or presentation of any material related to this research project, the proposed publication or presentation materials shall be forwarded to the EPS Project Liaison for review and approval.

14. In any publication or presentation of work related to the research project, the contribution of the Researcher(s) and of the EPS shall be acknowledged.

15. Any copyright work related to the research project and published by or on behalf of the EPS or the Researcher(s) shall acknowledge that the work was performed in cooperation with the EPS.

V. Funding

16. The Researcher(s) agree(s) to pay all of his or her own costs associated with this research project. The EPS may charge the Researcher(s) fees for locating, processing, and/or reproducing records as per Schedule 2 of FOIPP.

VI. Indemnification

17. The Researcher(s) agree(s) to indemnify and save harmless the Chief of the EPS, the City of Edmonton, any police officer, any employee and any agent of the EPS of and from all manners of actions, causes of action, proceedings, claims, demands, losses, costs, damages, and expenses of whatsoever kind which may be brought or made against the Chief of the EPS, the City of Edmonton, any police officer, any employee and any agent of the EPS or which Chief of the EPS, the City of Edmonton, any police officer, any employee and any agent of the EPS may suffer, sustain, pay or incur as a result of or in connection with the negligence, willful misconduct or breach of this Agreement by the Researchers.

18. Paragraph 17 shall survive the termination of this Agreement.

VII. General

19. The Researcher shall immediately notify the EPS Project Liaison in writing, unless urgent circumstances require otherwise, if the Researcher(s) become(s) aware of any breach of this Agreement. If the Researcher(s) fail(s) to meet any of the conditions of this Agreement, the Agreement may be immediately cancelled.

20. The Researcher(s) shall be responsible for ensuring that there is no disclosure of the information related to the project by other members of the project.

21. In the event of a breach of this Agreement by the Researcher(s), the EPS may demand the immediate return of all information collected from the EPS.

22. Upon completion of the research project, the Researcher(s) shall return all information obtained from the EPS, to the EPS Project Liaison for secure disposal or provide the EPS Project Liaison with written confirmation that all documents containing personal information as provided by the EPS to the Researcher(s) have been destroyed by shredding, or in the case of a record in an electronic form by deleting, writing over or otherwise rendering the record unreadable.

23. This Agreement may be signed by fax, in counterpart.

24. The EPS may, at its discretion, cancel this agreement at any time.

IN WITNESS WHEREOF the parties hereto have executed this Agreement on the 20 day of September, 2012

THE EDMONTON POLICE SERVICE

Per: _____
Joanne Graham
Director
Business Intelligence Competency Centre

THE RESEARCHER(S)

Per: _____
Principal Researcher

Per: _____
Collaborating Researcher
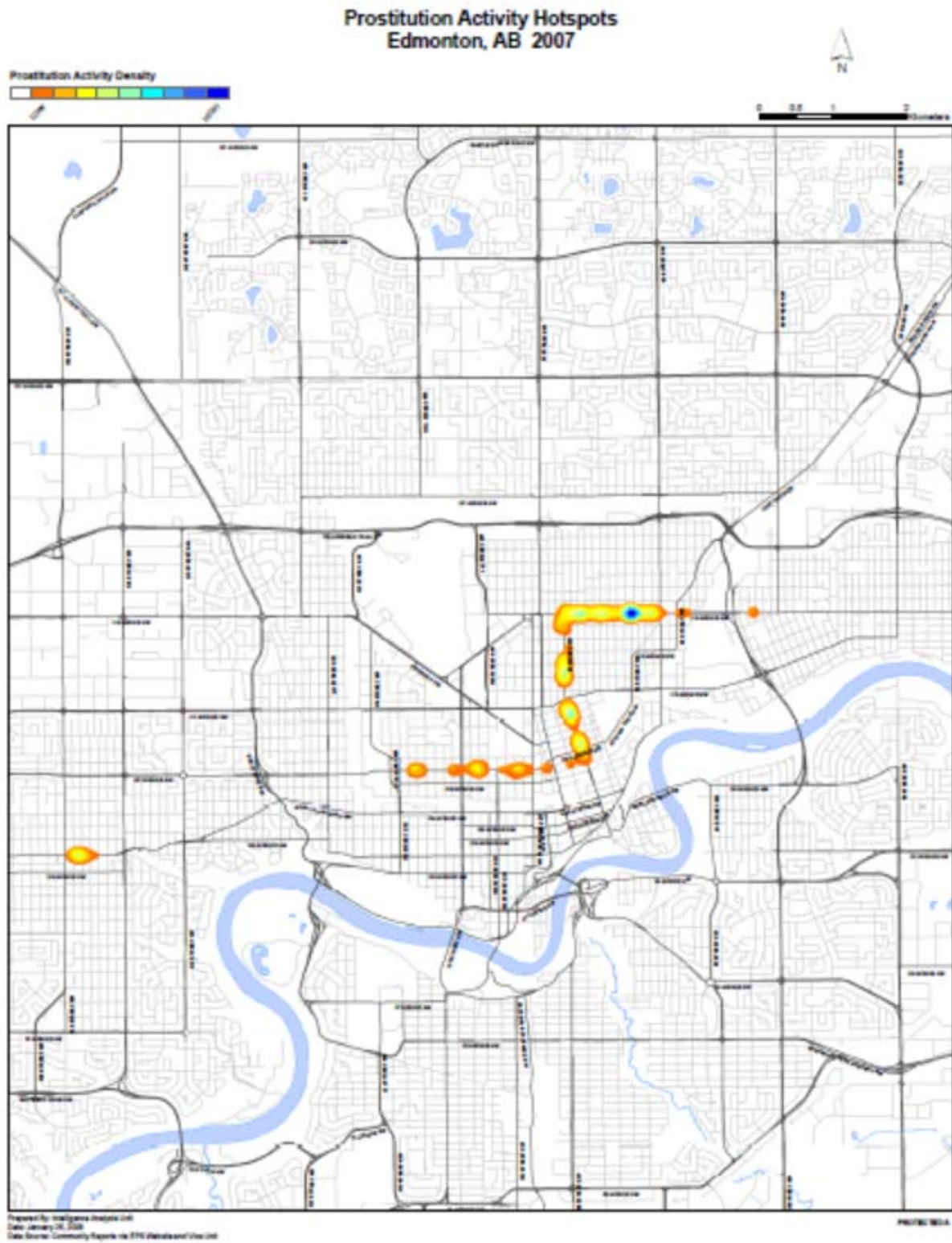
Source: Edmonton Police Service, 2007.

**Table 17: SUMMARY OF ALL MEASURED DISTANCES BETWEEN FIRST DEGREE
MURDER CRIME LOCATIONS, EDMONTON 2006-2012**

Occurrence Number	Distance between OCCUR - VICTIM Residence (km)	Distance between OCCUR - CSC Residence (km)	Distance between VICTIM Residence - CSC Residence (km)
1	0.04	0.04	0.00
2	3.62	0.04	3.63
3	0.00	3.96	3.96
4	2.48	8.21	7.17
5	2.48	8.21	7.17
6	0.96	14.26	13.39
7	0.96	11.55	10.66
8	0.96	14.18	13.22
9	7.06	16.72	11.90
10	6.79	7.70	0.90
11	6.79	7.70	0.90
12	0.00	8.96	8.96
13	0.00	8.18	8.18
14	5.43	12.64	14.86
15	7.55	0.00	7.55
16	8.72	13.07	18.76
17	0.00	0.00	0.00
18	2.38	0.82	2.75
19	5.81	14.10	16.11
20	6.14	14.10	14.36
21	4.61	8.87	9.03
22	4.61	0.00	4.61
23	0.00	0.00	0.00
Mean	3.37	7.53	7.74
Min.	0.00	0.00	0.00
Max.	8.72	16.72	18.76
Std. Dev.	2.96	5.78	5.71

Source: Edmonton Police Service

Table 18: SUMMARY OF ALL MEASURED DISTANCES BETWEEN SECOND DEGREE MURDER CRIME LOCATIONS, EDMONTON 2006-2012

Occurrence Number	Distance between OCCUR - VICTIM Residence (km)	Distance between OCCUR - CSC Residence (km)	Distance between VICTIM Residence - CSC Residence (km)
1	15.75	4.11	18.44
2	0.00	0.00	0.00
3	10.95	0.58	10.37
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	8.70	0.00	8.70
7	5.06	1.15	6.20
8	5.19	9.20	6.84
9	0.00	0.00	0.00
10	0.00	0.00	0.00
11	4.12	7.70	11.18
12	1.09	5.75	4.70
13	0.00	0.00	0.00
14	0.08	0.00	0.08
15	0.00	7.74	7.74
16	4.64	5.95	6.54
17	0.36	5.95	6.26
18	0.00	20.87	20.87
19	2.23	6.62	6.99
20	0.00	0.00	0.00
21	12.67	5.21	10.85
22	7.74	2.29	9.88
23	0.00	8.29	8.29
24	4.50	0.00	4.50
25	11.24	0.00	11.24
26	0.14	0.00	0.14
27	0.14	0.00	0.14
28	4.12	4.26	7.50
29	11.24	0.49	10.81
30	0.14	0.49	0.49
31	0.14	0.49	0.49
32	12.20	6.34	7.78
33	0.00	0.00	0.00
34	7.04	16.75	14.69
35	1.98	0.44	2.23
36	5.39	5.33	1.74
37	7.55	3.70	11.12
38	0.00	0.00	0.00
39	5.19	2.00	5.21
40	0.00	4.59	4.59
41	5.39	5.39	0.01
42	5.39	5.39	0.00
43	5.39	5.39	0.00
44	5.58	2.05	5.36
45	0.00	4.79	4.79
46	12.67	10.97	14.53
47	1.28	11.52	10.29
48	0.00	0.00	0.00
49	5.19	14.81	17.38
50	6.83	3.35	9.70
51	4.64	0.02	4.66
52	0.36	0.02	0.35
53	11.10	0.11	11.07
54	10.95	16.98	6.04
55	0.00	0.00	0.00
56	3.17	8.24	8.83
57	1.39	3.89	3.93

58	10.95	19.08	8.29
59	7.04	0.30	6.96
60	0.00	0.00	0.00
61	8.73	21.16	16.04
62	11.18	21.16	11.11
63	7.04	1.69	7.42
64	6.42	3.93	8.59
65	4.42	3.93	6.87
66	3.54	3.93	3.12
67	5.25	3.93	3.80
68	7.04	16.70	17.36
69	8.61	0.69	9.24
70	0.68	0.69	0.24
71	0.00	0.00	0.00
72	0.00	17.59	17.59
Mean	4.3	4.8	6.1
Min.	0.00	0.00	0.00
Max.	15.75	21.16	20.87
Std. Dev.	4.29	6.00	5.55

Source: Edmonton Police Service

Table 19: SUMMARY OF ALL MEASURED DISTANCES BETWEEN ATTEMPTED
MURDER CRIME LOCATIONS, EDMONTON 2006-2012

Occurrence Number	Distance between OCCUR - VICTIM Residence (km)	Distance between OCCUR - CSC Residence (km)	Distance between VICTIM Residence - CSC Residence (km)
1	15.75	4.11	18.44
2	0.00	0.00	0.00
3	10.95	0.58	10.37
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	8.70	0.00	8.70
7	5.06	1.15	6.20
8	5.19	9.20	6.84
9	0.00	0.00	0.00
10	0.00	0.00	0.00
11	4.12	7.70	11.18
12	1.09	5.75	4.70
13	0.00	0.00	0.00
14	0.08	0.00	0.08
15	0.00	7.74	7.74
16	4.64	5.95	6.54
17	0.36	5.95	6.26
18	0.00	20.87	20.87
19	2.23	6.62	6.99
20	0.00	0.00	0.00
21	12.67	5.21	10.85
22	7.74	2.29	9.88
23	0.00	8.29	8.29
24	4.50	0.00	4.50
25	11.24	0.00	11.24
26	0.14	0.00	0.14
27	0.14	0.00	0.14
28	4.12	4.26	7.50
29	11.24	0.49	10.81
30	0.14	0.49	0.49
31	0.14	0.49	0.49
32	12.20	6.34	7.78
33	0.00	0.00	0.00
34	7.04	16.75	14.69
35	1.98	0.44	2.23
36	5.39	5.33	1.74
37	7.55	3.70	11.12
38	0.00	0.00	0.00
39	5.19	2.00	5.21
40	0.00	4.59	4.59
41	5.39	5.39	0.01
42	5.39	5.39	0.00
43	5.39	5.39	0.00
44	5.58	2.05	5.36
45	0.00	4.79	4.79
46	12.67	10.97	14.53
47	1.28	11.52	10.29
48	0.00	0.00	0.00
49	5.19	14.81	17.38
50	6.83	3.35	9.70
51	4.64	0.02	4.66
52	0.36	0.02	0.35
53	11.10	0.11	11.07
54	10.95	16.98	6.04
55	0.00	0.00	0.00
56	3.17	8.24	8.83
57	1.39	3.89	3.93

58	10.95	19.08	8.29
59	7.04	0.30	6.96
60	0.00	0.00	0.00
61	8.73	21.16	16.04
62	11.18	21.16	11.11
63	7.04	1.69	7.42
64	6.42	3.93	8.59
65	4.42	3.93	6.87
66	3.54	3.93	3.12
67	5.25	3.93	3.80
68	7.04	16.70	17.36
69	8.61	0.69	9.24
Mean	5.5	3.6	6.3
Min.	0.00	0.00	0.00
Max.	18.42	16.11	18.81
Std. Dev.	6.09	4.37	6.23

Source: Edmonton Police Service

APPENDIX J: UNSOLVED CRIMES IN EDMONTON

Legend

✚ Unsolved First Degree Murder (1110) OCCURRENCE Location

✚ Unsolved Second Degree Murder (1120) OCCURRENCE Location

✚ Unsolved Attempted Murder (1210) OCCURRENCE Location

N

MAP #6

Prepared By: Deirdre MCDONALD

Date: 2013OCT05

* Point data based on undisclosed XY Offset

0   2.5   5   7.5   10   12.5

Kilometers
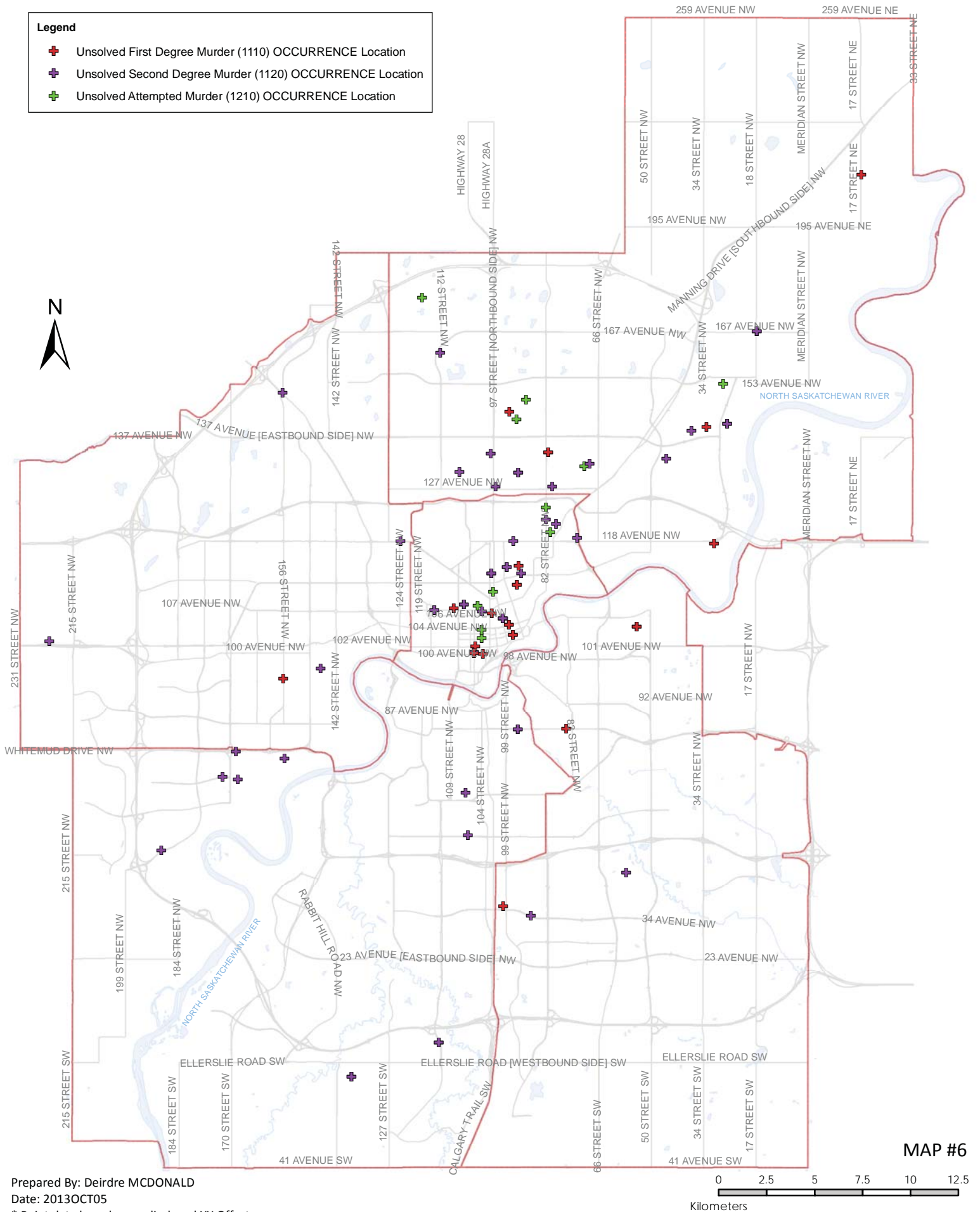
ENDNOTES

[1] This research excludes the use of self-reports by crime victims typically found in National Crime Victimization Surveys (NCVS) because one of the crimes under examination is murder, a crime for which the victim has no ability to contribute data.

[2] Canada Criminal Code, 2011 (R.S., c. C-34, s. 212).

[3] For multiple murder offences committed in Canada after December 2, 2011, a federal court, in consultation with any jury recommendation, may impose consecutive periods of parole ineligibility for each murder. This is not a mandatory requirement of the courts.

[4] For definitions of 'patrol saturation' and 'target hardening,' please refer to the section entitled 'Definitions of key terms, concepts, variables, and acronyms.'

[5] Savoie, Josée (March 2008). *Crime and Justice Research Paper Series*: Neighbourhood Characteristics and the Distribution of Crime: Edmonton, Halifax and Thunder Bay. Ottawa: Statistics Canada. ISSN 1707-5203.

[6] Ibid.

[7] National Crime Rankings: Canada's Most Dangerous Cities. *Maclean's*. Retrieved January 13, 2013 from http://www2.macleans.ca/crime-chart.

[8] Pruden, Jana (2013, January 2). Edmonton's 29 homicides a grim total for 2012. *Edmonton Journal*. Retrieved January 13, 2013 from http://www.edmontonjournal.com/news/Edmonton+homicides+grim+total+2012/7762982/story.html.

[9] These figures are not consistent with the EPS data received by the researcher. This is explained by the modification of charges after the Crown's involvement. The raw data received by this researcher is not identical to the data disseminated to the media as each occurrence has to be vetted by the appropriate authority.

[10] Edmonton Police Service. *History of the Excellence.* Retrieved August 10, 2013 from http://www.joineps.ca/AboutEPS/HistoryofExcellence.aspx

[11] Examples of international cases where the application of criminal profiling, including its reliance on geography, has been documented include, but are not limited to: the Paul Bernardo/Karla Homolka case (Canada), the Gary Ridgway, aka 'The Green River Killer,' case (United States), the Peter Sutcliffe, aka the 'Yorkshire Ripper,' case (England), the Joseph (Giuseppe) Russo case (Australia), the Sture Bergwall, aka 'Thomas Quick,' case (Sweden), the Andrei Chikatilo, aka 'The Butcher of Rostov,' case (Russia), the Larry Murphy, aka 'The Beast of Baltinglass,' case (Ireland), and the Joseph Stephenson Thompson case (New Zealand).

[12] Rossmo, 2000, p. 68.

[13] See also 'Appendix A: Theoretical Basis for Criminal Profiling.'

[14] Rossmo, 2000, p. 73.

[15] For additional information on John Snow's research see S. Crosier (2011).

[16] Centre for Spatially Integrated Social Science webpage: http://csiss.ncgia.ucsb.edu/classics/content/12/

[17] Rossmo, 2000, p. 98.

[18] The first reference to mental maps encountered in this research is the 1913 writings of Charles C. Trowbridge. Trowbridge called these cognitive processes "imaginary maps" (Canter, 2008a, p. 249.)

[19] Rossmo, 2000, p. v.

[20] Ibid, p. 113-4.

[21] Ibid, p. 115.

[22] Ibid, p. 115. Emphasis by me.

[23] Boudon, 1998, p. 820

[24] See 'Appendix B: Journey to Crime Theory.'

[25] See Appendix E: Underlying Assumptions of Crime Pattern Theory.'

[26] Ibid, p. 119.

[27] Rossmo, 2000, p. 195.

[28] Ibid, p. 71.

[29] According to Canter, Rossmo has "not published any studies demonstrating the nature of the validity of his algorithms nor how they compare with other approaches" (Godwin & Canter, 1997).

[30] Winlow's work is on the North East of England, but the experiences of this region are reflected in a Canadian context and translate well to this research study.

[31] See also de Beauvoir, 1949 [2010].

[32] Collier, 1998; Newburn & Stanko, 1994.

[33] Beirne & Meserschmidt, 1991.

[34] Brookman, 2005.

[35] Douglas, 1995, p. 319.

[36] Consequently, it is possible that there is overlap in data collection between Edmonton Police Service and adjacent jurisdictions policed by organization such as the Royal Canadian Mounted Police (RCMP) or the Calgary Police Service. This research, however, is based solely on data collected by the Edmonton Police Service.

[37] Brookman, 2005, p. 20-1.

[38] ArcGIS for Desktop 1-year Student License from AICT.

[39] Microsoft Office Excel software student license.

[40] University of Maryland. Implementing and Institutionalizing CompStat in Maryland webpage: http://www.compstat.umd.edu/index.php

[41] CompStat: From Humble Beginnings, Baseline, September 9, 2002. Retrieved January 12, 2013 from http://www.baselinemag.com/c/a/Past-News/CompStat-From-Humble-Beginnings/

[42] Godowin (2009).

[43] Due to the anonymized nature of data used for this research, Edwin H. Sutherland's 1939 differential association theory explaining how it is that criminals come to commit acts of deviant behavior based on an understanding of societal norms and values cannot be addressed in this study.

[44] According to media accounts, the above national average murder rates experienced in Edmonton in recent years may contribute to a perceived shift of the application of the term 'Deadmonton" to describe Edmonton as a boring place to live to describe Edmonton as a dangerous place to live (Libin, 2011).

[45] FBI Crime in the United States 2012 (Expanded Homicide Data Table 16: Rate: Number of Crimes per 100,000 Inhabitants by Population Group, 2012. Retrieved from http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/tables/16tabledatadecpdf

[46] Downtown Division's population density is approximated to be 4,149 individuals per square kilometre based on Edmonton's 2012 Municipal Census.

[47] No females were reported to have committed first degree murder involving an intimate male partner in the data provided by the EPS.

[48] City of Edmonton Tourism web page: http://www.edmonton.com/for-visitors/1061.aspx

[49] Consideration has been given to banning knives in Edmonton by both the Edmonton Police Service and the City of Edmonton, but this was deemed to be unfeasible and impractical (Thompson, 2011).

[50] RCMP History of Firearms Control in Canada: Up to and Including the Firearms Act. Retrieved from: http://www.rcmp-grc.gc.ca/cfp-pcaf/pol-leg/hist/con-eng.htm

[51] FBI Crime in the United States 2012 (Expanded Homicide Data Table 20: Murder by State, Types of Weapons, 2012. Retrieved from http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/tables/20tabledatadecpdf

[52] FBI Crime in the United States 2012 (Expanded Homicide Data Table 8: Murder Victims by Weapon, 2008-2012. Retrieved from http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/offenses-known-to-law-enforcement/expanded-homicide/expanded_homicide_data_table_8_murder_victims_by_weapon_2008-2012.xls

[53] *Canadian Criminal Code*, R.S.C., 1985, c. C-46.

[54] Refer to Appendix J for MAP #6 – UNSOLVED CASES. MAP #6 includes the geographic locations for unsolved OCCUR locations for murder and attempted murder cases.

[55] Hogeveen (2011).

[56] Silver (2013).

[57] http://www.cisalberta.ca/

[58] See Hogeveen and Freistadt (in press) for a discussion on the ethical and spatial questions pertaining to homelessness, hospitality, and neo-liberalism in Edmonton.

[59] Rossmo, 2000, p. 99-100.

[60] Ibid, p. 101-2.

[61] Ibid, p. 228.

[62] Ibid, p. 230.