Whoa, we're halfway there: Examining the spatial relationship between correctional halfway houses and property crime in Vancouver, BC

by

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Abstract

Despite extensive research on the efficacy of correctional halfway houses for reducing recidivism and growing interest in how offender re-entry in general affects crime, few studies investigate the relationship between halfway houses and crime specifically. None are conducted in Canada, where the number of offenders released to halfway houses has increased disproportionately to the growth of the correctional population, one-third of which resides in these facilities. In this thesis, spatial lag models are used to study the association between four measures of exposure to halfway houses and six property crime rates in Vancouver, BC. Three offences are positively associated with at least one measure of exposure. Results suggest that crimes which typically require little time, effort, and risk to offenders may increase near halfway houses, but that this is independent of how many offenders reside therein. Implications for crime prevention, community opposition to halfway houses, and future research are discussed.

Keywords: Halfway houses; Community corrections; Offender re-entry; Environmental criminology; Spatial regression; Property crime

For mum and dad. Thank you for the immeasurable support you have given me over the years and for always pushing me to be the best version of myself.

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List of Acronyms

AOM	All offences method
BEC	Break and enter – commercial
BER	Break and enter – residential
CCC	Community corrections centre
CCRA	*Corrections & Conditional Release Act*
CMA	Census metropolitan area
CPAI	Correctional Program Assessment Inventory
CRF	Community residential facility
CSC	Correctional Service of Canada
CT	Census tract
DA	Dissemination area
DTES	Downtown Eastside
GIS	Geographic information system
GMM	Generalized method of moments
GOC	Geometry of crime theory
ICE	Index of concentration at the extremes
ISD	Sum of inverse squared distances
KMO	Kaiser Meyer Olkin measure of sampling adequacy
LICO-AT	Low-income cut-off after tax
LIM-AT	Low-income measure after tax
LM	Lagrange multiplier
LTSO	Long term supervision order
MCAR	Missing completely at random
MIS	Mischief
MLE	Maximum likelihood estimation
MSO	Most serious offence method
ORNL	Oak Ridge National Laboratory
OTH	Other theft
PCA	Principal components analysis
MAUP	Modifiable areal unit problem
NIMBY	“Not in my backyard”
RAT	Routine activity theory

RHHA	Regional halfway house association
SMA	Spatial moving average
STSLS	Spatial two stage least squares regression
TFA	Theft from auto
TOA	Theft of auto
UCR	Uniform crime reporting survey
VPD	Vancouver police department
WISD	Weighted sum of inverse squared distances

Chapter 1.

Introduction

Correctional halfway houses are a form of transitional housing that has been a mainstay in Canadian corrections for more than 70 years (Bell & Trevethan, 2004; Maier, 2020a), providing supervision, counselling, treatment, and case management for both provincially and federally sentenced offenders on various forms of conditional release, including day parole, statutory release, and long-term supervision orders (Correctional Service of Canada [CSC], 2018a). With the growing body of literature supporting the effectiveness of these facilities paired with effective correctional programming and management of offenders' risks and needs (e.g., Bonta & Andrews, 2007; Burrell & Rhine, 2013; Garland & Wodhal, 2017; Lowenkamp & Latessa, 2005; Roberts et al., 2005; Wong et al., 2019), it is unlikely that halfway houses will be phased out of the existing paradigm of sentencing and supervision. Indeed, the imposition of residency conditions requiring conditionally released offenders to reside in such facilities has increased more than 300% from the years 1999-2014, while the number of releases granted has increased by roughly 20% (Gobeil & Cousineau, 2015). CSC's most recent departmental report revealed that roughly one-third of the nearly ten-thousand offenders under supervision on any given day was residing in a halfway house (Blair, 2020). This has put tremendous pressure on halfway houses in Canada, leading to the opening of new facilities and increases in the number of available beds at existing ones (Blair, 2020; Gobeil & Cosineau, 2015).

However, the use of transitional housing for offenders has historically been accompanied by community opposition driven by fear of the potential public safety (e.g., risk of victimization) and socioeconomic implications (e.g., increased social disorganization) of having a hub for returning offenders in citizens' "backyards" (Dear, 1992; Garland & Wodahl, 2017; Ouellette et al., 2017). This stream of the "not in my backyard" movement is fueled by popular media, which is replete with news stories and anecdotes of correctional halfway house residents reoffending or absconding (e.g., Bergot, 2013; Chianello, 2017) and continues in the face of the aforementioned evidence of program efficacy (Garland & Wodahl, 2017).

1.1. Halfway houses and community corrections in Canada

Correctional halfway houses in Canada are formally known as "community-based residential facilities," but the label "halfway house" is used in this thesis because of its more universal recognition in the literature. Two kinds of community-based residential facilities exist in Canada: community residential facilities (CRFs) and community correctional centres (CCCs; Bell & Trevethan, 2004; CSC, 2018a). The latter are operated by the CSC and provide housing and 24-hour supervision for offenders on unescorted temporary absences, work release, and day parole. As no CCCs operate within the study area for this thesis (i.e., the city of Vancouver), the focus hereafter is solely on CRFs.[1]

CRFs are owned and operated by non-governmental organizations under contract with the CSC and provide housing options for offenders on conditional release. They are designed to offer a gradient of supervision and care for offenders as they transition from institutional life back to the community (CSC, 2018a; 2018b). In addition to housing and supervision, CRFs may provide various forms of programming, such as counselling, substance abuse treatment, and vocational programs, and otherwise improve prosocial attitudes and behaviours while reducing antisocial proclivities. Their goal is to facilitate the adjustment of returning offenders to the community, and in doing so, prevent or reduce recidivism (Bell & Trevethan, 2004; CSC, 2018a; Maier, 2020a). Halfway house staff such as caseworkers and counsellors partner with offenders' parole officers to develop a reintegration plan that ensures a progression toward independence (or the capacity for it) in the community, such as by gaining employment and securing housing for life after the halfway house (Maier, 2020b). CRFs thus fit the generic definition of halfway houses often cited in the literature, as facilities providing temporary housing in the community with 24-hour supervision, and which provide services designed to assist with the transition from a carceral setting to the community (Blaney, 2014; Caputo, 2004; Latessa & Allen, 1982; Seiter & Kadella, 2003). There is much diversity in the operations, physical designs, and program availability of halfway houses, but researchers tend to agree on these common characteristics.

[1] For this reason, the term "CRF" is also used interchangeably with "halfway house."

It should also be noted, however, that the halfway house label is often also used as an umbrella term that describes facilities falling outside the scope of this thesis. These facilities include day reporting centers and treatment centers without a residential component. Day reporting centers serve the same functions as CRFs but do not house offenders, thereby offering a lower level of control and supervision (Ostermann, 2009; Champion et al., 2011). A popular program in various jurisdictions in the United States is "halfway back," which is often served by dedicated facilities in addition to the more standard models of halfway house described above (Hamilton & Campbell, 2014; Ostermann, 2009; Routh & Hamilton, 2015). Halfway back facilities provide an intermediate level of supervision for revocation as an alternative to institutional custody. CRFs in Canada can be used in both manners, but those in the city of Vancouver are not dedicated solely for these purposes. Consequently, each facility may have very diverse client profiles, ranging from those who successfully qualified for day parole after demonstrating to the Parole Board of Canada that they pose little risk to the community and that a non-carceral setting is more beneficial to their reintegration, to more prolific offenders who remain residents in halfway houses until the expiry of their sentence because they are deemed too high-risk for a less-restrictive form of supervision.

1.2. The current study

This thesis investigates the following research question: are property crime rates in Vancouver dissemination areas (DAs) associated with their proximity/exposure to correctional halfway houses? In doing so, it takes a less traditional approach to explore the empirical foundation of the fear of crime attached to citizen-driven resistance to halfway houses. Much of the research addressing the fear of crime from offenders re-entering society has concentrated on recidivism rates as opposed to the spatial distribution of crime in a community (e.g., Clark, 2016; Drawve, Caplan, & Ostermann, 2019; Houser et al., 2018; Miller et al., 2016a; 2016b). A rich literature has developed around the direct and indirect effects of ecological factors and neighbourhood context on recidivism in general and offenders residing at halfway houses more specifically. However, to my knowledge, few have taken the extra step of translating the risk of recidivism to the impact on crime in the community. Much of the research using an environmental perspective and spatial methods in community corrections explores their utility for offender management, maintaining this individual-level focus on the offender

(e.g., Jefferson, 2018; Karuppannan, 2005; Mellow et al., 2008; Miller, 2004). I argue that although recidivism research is important to the conversation, using crime as the dependent variable allows us to contextualize the risk of crime associated with halfway houses in the community more generally, which is arguably more salient and applicable for law enforcement and individuals who frequent neighbourhoods containing halfway houses. These analyses are carried out on the city of Vancouver, Canada using the city's open data catalogue, the 2016 Canadian Census, and information on halfway houses listed on the Regional Halfway House Association's (RHHA) website.

Chapter 2.

Theoretical Framework: Environmental Criminology

Environmental criminology is the study of crime opportunities and events. Whereas a chief concern of criminology more broadly has been on individuals and their propensity to commit crime, environmental criminology recognizes that offenders are only one part of the picture (Andresen, 2019; Schaefer et al., 2015). Environmental criminology situates crime's constituent elements (e.g., the offender) in time and space to better understand and predict crime as a function of the spatiotemporal distribution of these elements, as well as characteristics of the environment that affect the risk of crime. The discipline recognizes that individuals' motivation and willingness to offend do not operate in a vacuum but interact with their surroundings. Not only must there be opportunity, but the offender must be able to recognize the opportunity and possess the time and ability to pursue it. Effective crime prevention requires an understanding of this and the appreciation that not all opportunities for crime are structured in the same way (Andresen, 2019; Brantingham & Brantingham, 1981).

This lens has been adapted to the study of corrections to establish the field of *environmental corrections* (Cullen et al., 2002). Environmental corrections scholars diverge from the mainstream study of corrections by emphasizing how recidivism can be reduced by (1) restricting offenders' access to opportunities and (2) training self-control and avoidance behaviours rather than only doing the latter (i.e., simply addressing their criminogenic needs and motivations), especially considering how much existing treatment and supervision practices come up short due to barriers to proper and consistent implementation of supervision and treatment programming (Cullen et al., 2002; Schaefer et al., 2015).[2] Indeed, it has been increasingly noted in the literature that evaluations of halfway houses have focused overwhelmingly on individual-level characteristics of offenders at the expense of not paying enough attention to the neighbourhood context (Houser et al., 2018; McNeeley, 2018a). This implicitly leaves out

[2] See Schaefer et al. (2015, pp. 7-18) for more detail. Extensive research on effective correctional practice has informed many existing policies and practices in supervision, treatment, and control. However, administrative/institutional barriers to proper and consistent implementation compromise the manifested utility of these policies and practices.

the environment with which recently released offenders are interacting. Furthermore, as is discussed in more detail below (see subchapter 3.1), proponents of the “not in my backyard” (NIMBY) movement are not concerned only with the risk levels of offenders, but with their abilities to cope with temptations and risk factors in their new neighbourhoods. Both are integral to the perceived danger posed by returning offenders. The pith of this thesis is adjacent to environmental corrections in that while it uses an environmental criminology perspective to study an apparatus for correctional supervision and control, it examines rates of crime rather than recidivism. As the ensuing discussion and application of theory demonstrates, there are reasons to believe that public safety implications of halfway houses are not tied exclusively to recidivism, but changes in the community that affect how opportunities for crime are structured. It should not be forgotten that returning offenders represent only a small subset of individuals who may go on to commit crime. I therefore argue that environmental corrections should expand its focus to consider how crime in general is affected by halfway houses and other sources of returning offenders. Restricting supervised offenders’ access to opportunities still leaves those opportunities vulnerable to others.

To discuss the general criminogenic potential of halfway houses and the areas surrounding them, I apply two environmental criminology theories/approaches: routine activity theory (Cohen & Felson, 1979) and the geometry of crime (Brantingham & Brantingham, 1981; 1993b). These theories are also used as analytical tools to help interpret the existing empirical literature on halfway houses and establish the impetus for a geographic approach to understanding their relationship with crime in their host communities. The other two constituent theories of the environmental criminology perspective – rational choice theory (Clarke & Cornish, 1985), and crime pattern theory (Brantingham & Brantingham, 1993a) – are not explicitly considered. An application of rational choice theory, which centers on the decision-making process involved in the commission of a crime as well as decisions to initiate, sustain, and discontinue a criminal career (Clarke & Cornish, 1985), is redundant because its key concepts and propositions are reflected in those of the other theories (Andresen, 2019). Greater elaboration of this theory would be appropriate if an individual-level focus on offenders were adopted, but as the emphasis is on geography and broader offending patterns, the assumption of rationality in routine activity theory and geometry of crime is sufficient for this thesis.

Crime pattern theory[3] is a metatheory that integrates all three other theories into a cohesive framework for explaining patterns of crime and victimization (Andresen, 2019). While it is important to environmental criminology, its unique concepts and propositions are not as relevant as routine activity theory and the geometry of crime alone to the ensuing discussion and the way the relationships between halfway houses and property crime rates are modeled. Thus, what follows is a brief overview of the central concepts and propositions of routine activity theory and the geometry of crime applied to halfway houses and their criminogenic potential.

2.1. Routine activity theory

Routine activity theory stresses three minimal requisite elements for any interpersonal offence: a motivated offender, suitable target, and absence of capable guardianship. Each convergence of these elements represents a possibility for crime and occurs as a function of these elements' routine activities. The spatial and temporal distribution of crime can therefore be understood by examining how they spend their time as well as specific qualities about them that make opportunities more or less likely to be recognized and seized by offenders if a convergence of these elements does occur (Cohen & Felson, 1979; Felson, 2001).

Offenders are in ready supply in halfway houses. Many CRF residents are evaluated as high risk, which also meets the important qualifier in RAT that offenders are "motivated" to offend (Cohen & Felson, 1979). However, a high-risk "diagnosis" does not guarantee a criminal prognosis. This depends on a constellation of variables including the control of dynamic risk factors, adequate social support, and abundance of crime opportunities (Bonta & Andrews, 2007; Schaefer et al., 2015). Furthermore, there is always the possibility that offenders genuinely want to desist from their criminal careers and make a real effort to do so (Clarke & Cornish, 1985; Sampson & Laub, 2003). This does not preclude the possibility of impulsive crimes (e.g., being provoked to fight) and relatively innocuous events that may lead to revocation of conditional release (e.g.,

[3] Crime pattern theory is frequently conflated with the geometry of crime (Andresen, 2019). The literature on which this paper draws often refers to crime pattern theory without explicating the other elements of this meta-theory. This is not a mistake *per se* because the geometry of crime is subsumed under crime pattern theory. However, since these works do not reflect the differences between the two, I have changed the language used to "geometry of crime" for accuracy and to maintain theoretical fidelity.

drinking alcohol), but it does mean that for many offenders, the decision-making process in the presence of opportunities favours the foregoing of those opportunities. Indeed, Felson (1986) notes that the conversion of each opportunity into a crime necessarily involves a choice by the motivated offender. Thus, although the establishment of halfway houses creates hubs or "anchor points" (Rossmo, 1999) for offenders whose routine activities are integrated into the host neighbourhood, the motivation to commit crime is far from guaranteed and is certainly not present for all who reside in these facilities.

Moreover, the opportunities available in the first place, especially for newly released offenders in halfway houses and those deemed to pose a significant public safety risk, may be scarce. CRF residents are placed under significant restrictions limiting the amount of time they may be out in the community, which consequently limits the distance they may travel from the facility to other neighbourhoods (Maier, 2020a; 2020b; 2020c). In Canada, offenders on conditional release must demonstrate good behaviour and progress to their parole officers who may then use their discretion to extend their curfew and/or mandatory time between completion of in-person check-ins at their facility in small (typically one- to two-hour) increments. Failure to abide by these conditions is immediately reported and responses may range from reprimand and more restrictive conditions to warrants for arrest if the offender cannot be contacted remotely (Maier, 2020a; 2020b; 2020c). This system of curfews and check-ins limits the geographic reach of offenders' routine activities and the degree to which they can be integrated into the surrounding neighbourhoods. By extension, this temporal constraint also limits the number of accessible criminal opportunities (Ratcliffe, 2006).

A consideration of the types of offenders residing at halfway houses is also relevant to this discussion. In Canada, halfway houses typically serve those who are on temporary absence from an institution, day parole, have reached their statutory release[4] date and must abide by a residency condition, or have been subject to a long-term

[4] For offenders federally sentenced after 1992, ss. 127(1) and (3) of the *Corrections and Conditional Release Act* (*CCRA*) has entitled all those serving a carceral sentence to be released from custody after serving two-thirds of their sentence to serve the remainder of their sentence in the community. However, the release is subject to exceptions outlined in s. 129 of the *CCRA*, and those who have been released are subject to reincarceration if they breach the conditions of their release prescribed under ss. 134 and 161 of the statute or commit a new offence.

supervision order[5] (LTSO) with a residency condition (CSC, 2018b). Those on temporary absences can encompass a spectrum of criminogenic risks and needs (Grant & Johnson, 1998). A common reason for temporary absence is personal development, designed to improve the odds of a parole application by showing positive steps to rehabilitation and reintegration. This could mean individuals on unescorted absence are, on paper, at a higher risk of reoffending than others who are already on parole. Even so, they may still overall be at lower risk to reoffend if their temporary absence is escorted (as opposed to unescorted; Grant & Johnson, 1998). Furthermore, even if there is a pre-existing intention to escape from supervision in the community, these offenders may have fewer opportunities to do so and prefer to successfully complete their temporary absence to avail themselves to more opportunities to abscond in the future as parolees.

The population of offenders on day parole is very eclectic and may range from someone who has served one-sixth of their sentence, developed a thorough reintegration plan, has the backing of parole officers, and satisfied the Parole Board of Canada that their release is in the interest of the community; to a person who has been designated a high-risk offender, is well-past their parole eligibility date, barely meets the requirements for release, and has not convinced the Parole Board of Canada and their parole officer that a less restrictive form of release would not endanger public safety (Bell & Trevethan, 2004; CSC, 2018b). For the former, there is a strong chance that they would not contribute to the criminogenic potential of halfway houses, whereas the latter presents a far greater risk to local victimization. Those on statutory release who must abide by a condition to reside at a halfway house arguably present more of a risk to the community than those on statutory release without this condition, as it indicates a need for additional supervision. It should be noted that many on day parole are discharged from halfway houses once they reach statutory release. Lastly, offenders with LTSOs by definition present a high risk to the community, since under ss. 753.1(1) and (2) of the *Criminal Code* (1985), the court must be convinced there is a *substantial risk* that the individual will reoffend before imposing the order. Thus, unless a halfway house specifies criteria excluding applicants who are not on day parole, these facilities

[5] Offenders with LTSOs are those who remain under the supervision of the CSC for up to ten years *after* the conclusion of their sentence (*Criminal Code*, s. 753.1). Like those on statutory release or parole, they must abide by certain conditions, such as residency at a halfway house.

generally house a relatively high-risk population of offenders, even if as noted above, their motivation to offend is somewhat reduced.

I should note at this point, however, that conflict and critical criminologists have identified unfair sentencing practices and the systematic denial of conditional release to certain types of offenders (e.g., Owusu-Bempah & Wortley, 2014). The generic profiles of halfway house residents listed above should therefore be taken with a grain of salt. The type of conditional release individuals are granted should not be considered perfect reflections of the risk they pose to the community. If marginalized populations (e.g., Indigenous, Black, and other racial/ethnic minorities) tend to be denied less restrictive forms of release more often than non-marginalized populations (e.g., Caucasian) with the same levels of risks and needs, the risk to the community posed by halfway houses may be lower than expected.

The suitability or desirability of a target can be appraised in terms of its visibility, inertia, value, and accessibility (Cohen & Felson, 1979). *Visibility* refers to whether potential offenders can see or otherwise know about a target's existence; *inertia* is the mass of an object, or ability of a person to defend themselves in the case of violent offences; *value* is the monetary or other worth of a target; and *accessibility* is the ease with which a target may be reached (Andresen, 2019; Cohen & Felson, 1979). As halfway houses tend to be in urban areas often with or near commercial land uses (Bell & Trevethan, 2004; Costanza et al., 2013), their residents are immediately thrown into a concentrated pool of suitable targets. To impulsive sex offenders, robbers, and thieves, people on the street near halfway houses or other areas offenders frequent are visible, accessible, valuable, and depending on their ability and stature, may have low inertia. A wide range of valuables from jewelry to electronics may be visible through the glass windows and displays of storefronts that tend to characterize downtown areas. Potential victims can amend their routine activities to avoid greater potential for victimization if these activities bring them into close and/or frequent contact with halfway houses. This could reduce the concentration of suitable targets around halfway houses slightly, requiring halfway house residents to venture farther for more opportunities. It also makes the outlook for break and enter bleaker because buildings cannot be moved as easily as people. However, the possibility for the diversion of potential victims away from halfway houses does not appear likely, as locals are often unaware of the presence of halfway houses or their exact sites (Maier, 2020b). Even if avoidance were common, there would

probably still be high concentrations of suitable targets (e.g., people who do not care, business owners and neighbours who cannot move, stationary targets). Offenders, like many other members of the community, also frequent major activity nodes such as shopping centers, which are densely populated with suitable targets as well, including persons who may have deliberately avoided halfway houses.

Capable guardianship is a characteristic espoused by individuals such as police officers or security guards, as well as inanimate features of the environment such as CCTV or architectural design that makes a place more defensible (Cohen & Felson, 1979; Felson, 1986). Guardianship describes perceived barriers to a suitable target that discourage motivated offenders from exploiting a criminal opportunity after recognizing the potential for failure and apprehension, in addition to real protection which impedes the success of attempted crimes by manifesting that potential. For example, the mere presence of a police officer makes it less likely that offenders would attempt crime to avoid legal jeopardy, but the officer may also stop a crime in progress (Felson, 1986; Reynald, 2009). Since routine activity theory's inception (Cohen & Felson, 1979), the concept of guardianship has been elaborated to distinguish among: *capable guardians*, who protects potential targets; *handlers*, who supervise and exercise informal social control over motivated offenders; and *place managers*, who oversee the security of particular settings (Eck, 1994; Felson, 1995). Building on these qualitative distinctions, Reynald (2009) introduced a typology to measure the intensity of guardianship. According to Reynald (2009), *invisible* guardianship describes settings without guardianship; *available* guardians are those who are available to intervene, but not necessarily capable or willing; *capable* guardians are both available and capable of supervision; and *intervening* guardians are both available, capable, and willing to intervene to disrupt a crime in progress. The intensity of each type of guardianship in and around halfway houses is discussed in turn.

First, many of the targets outside a halfway house discussed above are arguably well-guarded. Because halfway houses tend to be located in or near urban commercial districts flooded with temptations for commercial break and enter (Bell & Trevethan, 2004; Costanza et al., 2013), adherence to overnight curfews means that the time frames offering the most opportunity (i.e., during the night when businesses are closed) are out of reach for halfway house residents (Jenion, 2003). Theft from these settings must thus take the form of shoplifting during hours where security personnel are present.

Even in the event that halfway house residents are granted an overnight pass or extended curfew, the use of private security and other forms of crime prevention in the commercial, high crime areas that tend to host halfway houses limits the possibility of successfully committing a crime. During the day, passersby further provide at least a perception of guardianship for targets of theft for personal belongings in addition to violent crime and may also intervene if offenders choose to seize an opportunity. However, in addition to the well-known bystander effect (where a sense of responsibility and likelihood of intervention becomes more diffuse with a growing crowd of bystanders), Reynald (2010) notes that some who witness suspicious or antisocial behaviour simply do not possess a sense of responsibility to act or involve themselves in others' business. Among those who do feel a sense of responsibility, Reynald (2010) also found that various factors affect the willingness to intervene, including the perceived seriousness of the crime (i.e., the greater the danger to the intervenor, the less likely they are to intervene), availability of tools or pets for protection, and the physical competence of the intervenor. Thus, suitable targets may have to rely more on police officers and other better-equipped place managers for protection from more serious victimization. Overall, the ubiquity of bystanders suggests a high and extensive concentration of available guardianship, but lower levels of capable guardianship, and even lower levels of intervening guardianship.

Second, onsite security and support staff in halfway houses function as place managers who maintain a watchful eye over residents and report suspicious activity and transgressions of the law and house rules (Maier, 2020b). They may also have the discretion to intervene directly depending on the role set out for them in each facility. Supervision of the vicinity of a halfway house is further exercised by law enforcement agencies, which may change the routine activities of local officers (i.e., alter a "beat") to increase police presence in the area as a response to the siting of a halfway house (Cullen et al., 2002; Jefferson, 2018). Special units, such as Vancouver Police Department's (VPD) High Risk Offender Unit, may also liaise with parole officers and other community corrections personnel to provide more direct supervision of recently released offenders (VPD, n.d.b). This is again augmented by the greater police presence in the neighbourhoods in which halfway houses tend to be sited. These two considerations suggest that the gaps in guardianship provided by passersby may receive greater coverage by law enforcement around halfway houses. The heightened

availability of police could also accelerate the average response time for police when incidents occur within the halfway house that are beyond the capabilities of staff to handle, increasing the volume of intervening guardianship. In this discussion of place managers, halfway house staff including case workers, parole officers, counsellors, and support/security attendants, offer available and at times capable or intervening guardianship, depending on their respective mandates and level of training (Reynald, 2009). The CCTV coverage in these facilities also means there may be few to no areas within a halfway house with invisible guardianship (Reynald, 2009). The intensity of guardianship offered by halfway house staff can also extend to the facility's vicinity due to the comings and goings of staff (e.g., to and from work, getting fresh air), incidentally casting a net of surveillance beyond the walls of a facility (McCord & Ratcliffe, 2007).

Third, Felson (1986; 1987) posits that in many cases, an intimate handler with a social bond to an offender may exercise informal control over that offender in a capacity that is distinct from the role played by capable guardians and place managers. Parole officers, case workers, counsellors, and other corrections personnel who successfully develop a rapport with their clients, as well as friends and family in the community who are personally invested in the successful reintegration of an offender may take on this role. Offenders are unlikely (or at least *less* likely) to offend in the presence of their intimate handlers, whom they must elude before finding criminal opportunities they are comfortable exploiting (Felson, 1986; 1987; 1995). However, the opportunities for high-risk offenders to evade their handlers in the first place are limited by the system of incremental changes in curfews and check-ins described above. Until they demonstrate low risk to the community (i.e., low offender motivation), they are required to be in the facility for a longer cumulative duration each day, where they are in the presence of capable guardians, place managers, and (possibly) intimate handlers. In this sense, even if handlers are not "intervening" or even "capable," as defined by Reynald (2009), their mere availability may be much better at discouraging antisocial behaviour compared to the mere availability of place managers and guardians. If halfway house residents have not developed social bonds with a handler, their movements are still highly restricted and in the presence of capable guardians and place managers. Thus, while siting a halfway house certainly puts newly released offenders in or near an abundance of suitable targets, considerations from RAT do not guarantee that they will personally commit more crimes, nor that the local volume of crime overall will increase.

It is also salient to consider the potential for overlap in the guardianship roles of the actors described above, especially halfway house staff. While they may fit best the definition of place managers, they may also actively monitor vulnerable targets within a halfway house, thereby assuming the role of a guardian. For example, where a risk of violent victimization against another resident is reported, staff may be expected to pay specific attention to that resident. This can occur, for instance, when one offender is hostile toward another group of offenders (e.g., child sex offenders), affiliates of rival gangs come into contact, or simply arise out of a more mundane conflict (e.g., a dispute over laundry, general disrespect).

It should lastly be noted that guardianship is influenced by social and demographic characteristics (Reynald, 2011). For instance, guardianship tends to be elevated by social cohesion. Denser and more intimate social networks within a neighbourhood can significantly increase both the likelihood of reporting suspicious and antisocial behaviour, as well as the frequency with which community members monitor their community in the first place (Freudenburg, 1986; Reynald, 2010; 2011; Sampson et al., 1997). Conversely, guardianship can be lowered by transient neighbourhood population (Sampson & Groves, 1989; Reynald, 2011; Xie & McDowall, 2008). This is a salient property of guardianship when considering that halfway houses tend to be sited in urban disadvantaged and socially disorganized neighbourhoods. A more extensive discussion follows below (subchapter 2.3).

This theoretical discussion of motivated offenders, suitable targets, capable guardians, and the routine activities of these three actors suggests that the risk for crime may be lower than expected from a halfway house. The number of motivated offenders and potential targets in and around halfway houses is often high, but the reduced suitability of targets in urban areas combined with the myriad sources and intensity of guardianship should significantly reduce the perceived feasibility of opportunities and increase the likelihood of intervention and reporting when offences are attempted.

2.2. The geometry of crime

The geometry of crime (GOC) describes the way routine activity theory manifests about the built environment (Andresen, 2019). While routine activity theory explains more *why* we might expect crime to occur (or not) around halfway houses, GOC better

explains *how*. Routine activities are necessarily carried out in specific locations called activity spaces, made up of nodes, pathways, and edges. Nodes and pathways, respectively, are discrete places where significant portions of a person's time are spent and the routes taken between those places (Andresen, 2019; Brantingham & Brantingham, 1993b). Edges represent boundaries that may be physical, such as natural barriers or major streets dividing neighbourhoods or cities; or perceptual, such as a change in land use or physical incivilities, signalling entry into a new area. A significant criminogenic property of edges is that many people have legitimate access to these spaces, making it difficult to distinguish between those who are there for legitimate reasons and motivated offenders who are not (Andresen, 2019; Brantingham & Brantingham, 1993b). This makes potential victims less able to effectively exercise caution or defend themselves against offenders, while levels of capable guardianship are reduced for the same reason. Major activity nodes (e.g., shopping centers and plazas) and pathways (e.g., arterial roadways) represent activity spaces commonly shared by large volumes of people *and* are typically edges (Brantingham & Brantingham, 1993). The convergences of potentially motivated offenders and suitable targets at these locations means that crime tends to be concentrated here if guardianship is low or perceived to be low. This can be seen easily in a visual inspection of existing crime patterns, with crime concentrated in and around major activity nodes and pathways. These activity spaces may be crime generators, which generate crime due to the number of people and opportunities present; and/or crime attractors, or places with a reputation for criminal opportunities that attracts motivated offenders (Brantingham & Brantingham, 1981; 1993b; Kinney et al., 2008).

Halfway houses may, in theory, be crime generators by virtue of having multiple offenders housed in close quarters who are given the freedom to move about the facility as they please. Furthermore, offenders may attend programs offered by other halfway houses or simply travel to and from other facilities to socialize with their residents (regardless of whether they have a condition to not associate), adding to the number of potentially motivated offenders at those sites. These considerations do not just apply to offenders residing at halfway houses, but also to offenders residing at their own home addresses who travel to and from halfway houses for the purposes stated above. In other words, the number of offenders residing at each facility may be an underestimate of the true number of offenders contributing to their criminogenic potential. Outside the

facility and away from the watchful eyes of staff, there may be greater potential for crime to be generated. Additionally, with halfway houses often sited along edges in and around the bustling urban cores of cities (Bell & Trevethan, 2004; Costanza et al., 2013; Johnson, 2006; Simes, 2018), where there is significant population turnover from people commuting in and out during the day, it may be challenging to identify returning offenders in the community unless the community has been notified of their presence. Even then, it can be hard to recognize someone from a brief glance at an image in a news report when surrounded by many individuals and attention is divided. At the same time, the guardianship present both inside and outside the facility in the form of staff and increased police presence means that the potential for CRFs to be crime generators is limited to some extent.

Halfway houses may also attract crime. Rather than the offenders themselves independently making decisions to reoffend based on opportunities, non-resident offenders may congregate around halfway houses to exploit the opportunities that returning offenders present (Hyatt & Han, 2018; Jennings, 2010). For example, local drug dealers may be drawn by returning offenders recovering from addiction. The placement of a halfway house also implies an influx of residents to an area, all with more property to be potentially stolen or vandalized. Feelings of anger and desire for retributive justice by vigilantism may attract victims and/or their sympathizers to the area (Cubellis et al., 2019; Orth et al., 2006). Crime attractor potential can be further conditioned by the types of offenders residing in halfway houses. Sex offenders as a group are subject to more persecution and acts of retribution than other offender populations (Cubellis et al., 2019; Rade et al., 2016). Gang members and affiliates may be aware of the release of rival gang members (former or otherwise) and may search the area for opportunities for retaliatory violence. Indeed, the victim-offender overlap is particularly strong within gangs and neighbourhoods with a prominent “street” culture (Berg et al., 2012; Pyrooz et al., 2014). In one case, a Vancouver halfway house was staked out by suspicious persons who eventually assaulted staff for information on the whereabouts of a client, whom they then shot and killed roughly one block away (Quan, 2009). However, it may overall be uncommon for a federal offender population to be targeted by others. The examples listed here only indicate plausibility. Again, the degree of guardianship in the area should decrease the likelihood for drug dealers to come to the area, especially if halfway houses are so small that the number of willing drug users

and resulting profit does not outweigh the elevated risk of being caught. Theoretically, it is therefore unlikely that halfway houses will produce a significant amount of crime by attracting other offenders.

Even if halfway houses are not crime generators or attractors themselves though, the routine activities of their residents are still embedded into the community, where they may frequent major activity nodes that do function as crime generators and attractors. Residents may venture into the community to purchase clothes and groceries, eat, get haircuts, and otherwise go about life in the same manner as law-abiding citizens. They are likely to frequent the same major activity nodes as these law-abiding citizens where they can stumble across a slew of criminal opportunities. Alternatively, they may be attracted there by those opportunities instead of legitimate activities. With that said, the number of residents from halfway houses relative to their host city's population is typically small. The fact is that although their routine activities become intermingled with those of many suitable targets, crime is likely to have already been concentrated in those major activity nodes and pathways long before the siting of halfway houses, owing to the criminogenic nature of these activity spaces (Andresen, 2010; Brantingham & Brantingham, 1995). Important to note is the crime funnel, which refers to the reality that many crimes and their perpetrators go undetected, and of those detected, a very small number may ultimately be charged, convicted, and subsequently incarcerated (Brockman & McEwen, 1990; Moulton, 2013). It follows that offenders residing at halfway houses represent only a fraction of offenders already in the community. Despite CRFs being major conduits for returning offenders, the risk of victimization around these facilities may not change appreciably when examining the risk posed by the total number of offenders, dampening observed crime generator/attractor effects.

Two more fundamental concepts in GOC are "awareness spaces" and "crime templates." GOC is more than just a spatial consideration of routine activity theory. As mentioned above, convergences of motivated offenders and suitable targets in the absence of capable guardianship merely constitute opportunities for crime (Felson, 2001). The likelihood of an offender to pursue these opportunities depends on their ability to recognize them and interpret cues from the environment which signal the feasibility of those opportunities. This ability in turn depends on whether the offender is in their awareness space: areas about which they have a working knowledge/ understanding or "sense of place" (Andresen, 2019; Brantingham & Brantingham, 1981;

1993a). When operating in one's awareness space, environmental cues are much easier to identify and interpret through their personal crime template, or checklist of conditions that must ideally be present or absent for a criminal opportunity to be viable. A well-developed sense of place also tends to make a person more comfortable and willing to commit crime (Brantingham & Brantingham, 1981; 1993a). These aspects of GOC suggest that offenders unfamiliar to an area will be far less likely to commit crime. However, since many offenders do return to the same neighbourhoods they lived in before being incarcerated (Kirk, 2009; 2012; 2015), the awareness spaces of many halfway house residents are likely to be quite expansive and their crime templates reasonably well-refined – especially if they have been amended in light of the circumstances surrounding their apprehension and subsequent conviction (Brantingham & Brantingham, 1981; 1993b; Clarke & Cornish, 1985). Overall, this component of GOC suggests an elevated risk of crime in and around the activity spaces of CRF residents.

One final concept integral to the geometry of crime is the *environmental backcloth*. The backcloth is the everchanging physical/structural, social/cultural, psychological, economic, and legal context in which human behaviour is rooted. These changes may occur at different times and rates throughout space with implications for the spatial and temporal patterning of crime (Andresen, 2019; Brantingham & Brantingham, 1981; 1993a; 1993b). For example, commercial burglary tends to be more common in the evening when business owners, employees, security guards, and other guardians and place managers are least likely to be present, whereas residential burglary is more frequently committed during the daytime, when homeowners have left for work or school (Jenion, 2003). At the same time, the overall rate for either type of burglary may be stable, steadily increase, or decrease over long periods of time, depending on fluctuations in demand for certain goods or the efficacy of burgling tools/techniques and security technologies.

As alluded to above, there are several ways in which the backcloth may be affected by the siting of a halfway house and integration of offenders' routine activities into the local community. Some potential victims may change their own routines to avoid the area or take other precautionary measures if this is not possible or convenient, reducing the volume and feasibility of opportunities (though this is unlikely; Maier, 2020b). Round-the-clock guardianship may increase in the area due to the presence of 24-hour halfway house staff and the added presence of law enforcement. This may be

counteracted by additional offenders drawn to the area for legitimate (e.g., programming administered by the halfway house) or illegitimate reasons (e.g., selling drugs to persons with addiction). Over time, as halfway house residents successfully complete their stint, they may acquire housing nearby where they are under less stringent supervision. The halfway house itself may increase or decrease the number of available beds, add or drop programs that attract other offenders, and alter its inclusion criteria to deny residence to certain types of potentially high-risk offenders (Bell & Trevethan, 2004). The structural backcloth though also plays a substantial role in the mobility of offenders and the opportunities available (Brantingham & Brantingham, 1993a). Adjustments in political agenda, such as greater emphasis of a tough-on-crime platform, may fuel public opposition to halfway houses and raise the risk of offender persecution/victimization. Because many offenders tend to lack transportation, a halfway house sited in a place with a well-developed and active public transportation network may extend the facility's sphere of influence (Brantingham & Brantingham, 1981), compared to facilities in more rural jurisdictions. This also means that this sphere of influence grows and shrinks based on the hours of operation for the public transportation system or for certain routes if nighttime services are offered. These are just a few examples of how changes in the backcloth may affect the way the risk of crime is structured around halfway houses. The impact of the social backcloth of offender re-entry is discussed in the next section.

Lastly, RAT and GOC not only provide insight into whether halfway houses may heighten the risk of crime in surrounding neighbourhoods and how crime patterns might manifest around halfway houses, but also explain how existing crime patterns may change. In other words, it may not be the case that halfway houses, if they do have an impact on crime, simply affect crime patterns in their respective neighbourhoods. Existing crime may be displaced to or from these areas for at least three reasons. First, increased policing in the vicinity of CRFs may lead to deterrence of criminal activity. While some sites may not have much crime to be displaced in the first place, increased patrols around halfway houses in more disadvantaged neighbourhoods may have a significant effect on local crime (Andresen & Malleson, 2014; Cornish & Clarke, 1987). Offenders who would be committing crime in these locations may therefore look to offend elsewhere. Second, the changing routine activities and activity spaces of potential victims in response to the siting of a halfway house means that the potential for future crime in that area follows those potential victims to the new sites of their routine

activities. Third, if halfway houses do function as crime attractors, the motivated offenders that are now attracted by the opportunities presented by halfway houses will have been removed from other activity spaces where they could have been committing crime. A caveat is that while this is theoretically possible, it assumes that those attracted to the space around a halfway house were attracted to other places to commit crime before; if they were not committing crimes elsewhere to begin with, this does not work. An important implication of these three considerations is that if potential victims are steering clear of halfway houses and guardianship increases in the area (i.e., changes that reduce opportunities for crime), while motivated offenders are entering the area in the form of CRF residents and those attracted by the prospect of more opportunities (i.e., changes that increase opportunities for crime), the pattern of aggregate crime may not appear to be so different, despite considerable change in the backcloth.

2.2.1. Social ecology of crime and the environmental backcloth

More nuanced insight into the social and physical conditions of neighbourhoods beyond the discussion of RAT and GOC above is available through research on the social ecology of crime. Though this body of theory and research can be subsumed under GOC's concept of the environmental backcloth (Brantingham & Brantingham, 1981), the study of these subjects developed in criminology prior to and largely independently of later work on environmental criminology and is therefore treated separately in this review. Research on physical conditions of neighbourhoods as well as sociological predictors and covariates of crime and deviance have been a mainstay of criminology since the turn of the 20th century (Andresen, 2019; Taylor, 2001). The resultant body of empirical evidence showing the salience of these relationships makes it banal to say that sociodemographic factors are associated with crime. The primary theoretical framework (from the broader research on the social ecology of crime) chosen to generate the bulk of the sociodemographic control variables for this thesis is social disorganization theory (Shaw & McKay, 1942), supplemented by broken windows theory (Wilson & Kelling, 1982). The purpose of this section is to summarize these and synthesize other relevant literature on the urban geography of crime with a focus on halfway houses and offenders returning to the community.

Social disorganization theory (SDT) and broken windows theory (BWT) have been chosen to inform the selection of control variables in this thesis for three reasons.

First, although there are many theories offering sociological explanations of crime and deviance, these two are arguably the most influential of those to incorporate a spatial dimension (Andresen, 2019). They do not speak explicitly to the essential physical elements of the environment that structure crime opportunities, which is the foundation of environmental criminology, but provide an understanding of crime patterns as a function of the sociodemographic characteristics and disorder of a neighbourhood (or part of a neighbourhood) that other theories lack. While Brantingham and Brantingham (1981; 1993a; 1993b; 1995) have written extensively about the environmental backcloth in the context of crime pattern theory and the geometry of crime, SDT and BWT provide an excellent theoretical apparatus with which to understand parts of this backcloth.[6] Second, the fact that halfway houses tend to be sited in disadvantaged neighbourhoods – neighbourhoods that are higher in crime or more conducive to it (Costanza et al., 2013; Drawve et al., 2019; Kirk, 2009; 2012; Simes, 2018) – necessitates the consideration of these variables. Otherwise, crime associated with the qualities of these communities may be erroneously attributed to halfway houses. Finally, as is discussed in more depth in the next chapter's literature review, a substantial body of empirical evidence has emerged showing how a neighbourhood's social ecology can significantly impact recidivism of returning offenders (e.g., Drawve et al., 2019; Hipp & Yates, 2009; Hipp et al., 2010; Houser et al., 2016; Kirk, 2012; 2015; Kubrin & Stewart, 2006; Stahler et al., 2013; Tillyer & Vose, 2011). This is important to an analysis of crime rates because crime is fed directly by recidivism. These reasons make SDT and BWT a strong core of any sociological exploration of crime from an environmental criminology perspective, onto which other relevant literature can build.

Both BWT and SDT postulate that disorder contributes to a neighbourhood milieu more conducive to crime. Wilson and Kelling (1982) drew from the works of social and environmental psychologists (e.g., Zimbardo, 1969) in formulating BWT, which has since been given two interpretations (Gau et al., 2014). Both begin with the proposition that physical (e.g., litter, general uncleanliness, unrepaired damage to property) and social (e.g., unsupervised peer groups, persons without homes or suffering from drug addiction) incivilities in a neighbourhood signal to its residents and those outside it that

[6] Although these theories lost favour around the turn of the 21st century, they have been reinvigorated by recent work (Braga & Clarke, 2014; Ren et al., 2019; Weisburd, 2012; Weisburd et al., 2014; 2015; Welsh et al., 2015).

the community does not have effective means of social control. The first interpretation is that, as a result of this process, residents of that neighbourhood are undeterred from committing crime and others are lured to the area under the impression they can offend with impunity. The second is that this process instills within residents a fear of crime that induces them to withdraw from the community either by being less involved or by moving away altogether, thereby reducing informal social control and cohesion (Gau et al., 2014; Weisburd et al., 2015; Wilson & Kelling, 1982). The logic of both interpretations also extends to crimes committed which are not met with a criminal justice response or are met with an underwhelming response. Though both interpretations have recently received strong empirical support (Gau et al., 2014 performed the only simultaneous analysis of both direct and indirect pathways; Ren et al., 2019), most evaluations of the broken windows hypothesis are unsupportive (Weisburd et al., 2015) while others are mixed (Perkins et al., 1993).

Regardless, this has not stopped BWT from inspiring many crime prevention interventions from community-led cleanup/rejuvenation projects to policing initiatives, all designed in some way or another to reduce physical and social disorder to reduce fear of crime and enhance informal social control (e.g., Branas et al., 2018; Harcourt & Ludwig, 2006; Weisburd et al., 2015; Welsh et al., 2015). Evaluations of these interventions are mixed as well, but many are hopeful about the future broken-windows-informed crime prevention as long as it is carried out constructively in partnership with community members, businesses, and organizations rather than aggressive no-tolerance policies (Ren et al., 2019; Weisburd et al., 2015; Welsh et al., 2015). In any case, the existence of support for the broken windows hypothesis calls for the inclusion of disorder variables in this thesis.

SDT in its original form sought to explain meso-level spatial crime patterns in the city of Chicago as the result of a much more complex process than BWT. Patterns manifested within concentric rings around the central business district, with the highest concentration of crime in the zone in transition – the ring immediately outside the central business district (Burgess, 1925). Shaw and McKay (1942) found that this could be explained by a mechanism starting with three intersecting social forces: economic deprivation, residential instability, and ethnic heterogeneity. The zone in transition contained affordable housing for those with low income. However, the quality of housing itself and the overall quality of life in the zone in transition was poor, owing to other

factors such as the intense pollution emanating from the highly industrialized city center. These conditions created a virtually universal motivation for residents to leave the area as soon as they had the economic means to. The goals of residents were to make their tenures in these neighbourhoods as short as possible. Regardless of whether these stays were temporary or not, this mentality acted as a barrier to community-building and the formation of collective efficacy. Informal social control was therefore perpetually low. The affordability of the housing and high population turnover were conditions that led to a very diverse mixture of ethnic groups. Those seeking to emigrate from other countries in pursuit of better lives (i.e., the “American dream”) were able to find cheap vacancies in the zone in transition. Not only did the existing conditions precipitate a shared aspiration among immigrants to leave these neighbourhoods, but the language barriers and cultural disparities inhibited communication with neighbours, which further contributed to the lack of collective efficacy and shared values. The milieu that results from this process is social disorganization: a state where a neighbourhood or part of a neighbourhood is unable and/or unwilling to invest the time and resources to unite against crime and its underlying determinants and exercise informal social control (Shaw & McKay, 1942; Taylor, 2001).

Since Shaw and McKay’s (1942) seminal work, scholars have built on and around social disorganization theory to construct a broader school of thought known as the social ecology of crime, or Chicago school. The resulting literature includes empirical testing of social disorganization theory as well as further theoretical developments. Whereas Shaw and McKay (1942) only posited indirect relationships, tests of SDT found that economic deprivation / concentrated disadvantage, residential instability, and ethnic heterogeneity were directly *and* indirectly associated with different crime types (Bursik & Grasmick, 1993; Sampson & Groves, 1989; Sampson et al., 1997), though with different patterns of significance. For example, after controlling for collective efficacy, Sampson et al. (1997) found the concentration of immigrants was no longer a significant positive predictor of perceived violence, while the effect sizes for concentrated disadvantage and residential stability were still significant but greatly attenuated. Similarly, when collective efficacy was added to a model of violent victimization, residential stability was no longer a significant predictor, while the coefficients for concentrated disadvantage and immigrant concentration decreased. The explained variance for both outcomes increased substantially after the inclusion of the collective efficacy variable (Sampson et

al., 1997). Bursik and Grasmick (1993) similarly found significant direct and indirect effects of economic deprivation in Chicago for the years of 1960 and 1980, though the indirect effects through reduced regulatory capacity of neighbourhoods were much stronger, consistent with Shaw and McKay's (1942) model.

Despite consistency with others, Bursik and Grasmick (1993) hypothesized that the direct relationship would have been even further attenuated if they had been able to control for more dimensions of social control, and that the inability (due to deficiencies in data) to control for these dimensions could explain abnormal results in other tests of Shaw and McKay's (1942) original model of SDT. Specifically, Bursik and Grasmick (1993) theorized that three levels of social order in neighbourhoods could be key to filling in these blanks. The private level of control refers to informal social control exercised and support given by informal primary groups. In contrast, parochial controls are grounded in nonintimate relationships with community members such as neighbours and those from local institutions (e.g., schools, involuntary organizations). Public control speaks to the ability of a community to secure public goods and services, such as government funding for welfare, policing, and other resources (Bursik & Grasmick, 1993). Private and parochial control may be deteriorated by social disorganization but can be compensated by increases in public control. They hypothesized that if they had been able to control for these sources of social order, this would have further attenuated the significant direct relationship between economic deprivation and delinquency.

On top of their (and others') research teasing apart the functional form of SDT's model of crime, Sampson and Groves (1989) also found urbanization and family disruption to be additional antecedents of social disorganization that contribute to a loss of community cohesion and informal social control in complement to the original three posited by Shaw and McKay (1942). Urbanization describes places with a higher and denser population[7] where the desire to become involved in local community engagement is more diffuse. Such areas may also experience an erosion of local kinship and friendship networks. Both situations make it more difficult to generate the sense of community or social investment needed for effective informal social control (Felson, 1987; Sampson & Groves, 1989; Websdale, 1995). Family disruption was hypothesized

[7] Though this is the common definition of urbanization, Sampson and Groves (1989) operationalized it with a dummy variable, indicating whether an area was in the city center.

to be directly related to a reduced capacity for supervision and therefore informal social control: two-parent households are more able to watch over their children and keep them occupied with prosocial activities, whereas children in lone-parent households may not have these luxuries and turn to peer groups for greater companionship. While not all peer groups are delinquent, delinquency is predominantly a group activity, such that crime rates are often directly related to the prevalence of “street-corner teenage peer groups” (Andresen & Felson, 2012; Sampson & Groves, 1989, p. 781). Like the other three structural antecedents of social disorganization, these two factors were both directly and/or indirectly associated with self-reported victimization and offending behaviour, depending on the type. For example, family disruption and urbanization had significant direct and indirect effects on total victimization, whereas Shaw and McKay’s (1942) original three antecedents were only indirectly associated with this outcome.

There has also been an important shift in the empirical relationship between two essential constructs within social disorganization theory. The first is immigration and crime, which affects the role of ethnic heterogeneity in social disorganization theory. Places with a high volume of immigration often see new immigrants settle near previous immigrants such as family or friends with the same or similar cultures. A corollary of immigrating to a new and foreign environment is that many of the social ties that do exist (whether they are forged before or after immigration) are held even more preciously than those forged in the country of emigration, as these ties are valuable for learning local norms, connecting to the wider community, and providing access to employment opportunities (Katz et al., 2011; Wright & Benson, 2010). This may be more pronounced among immigrant groups with more collectivist cultures (Triandis, 2018). The result is that neighbourhoods with a higher rate of immigration tend to have denser acquaintanceship networks and a stronger, more extensive system of informal social control than urban areas (Andresen, 2006; Katz et al., 2011; Wright & Benson, 2010). Insofar as ethnic heterogeneity reflects a high rate of immigration, it should theoretically also be associated with lower levels of crime and delinquency. Second, literature on the impact of gentrification on crime affects the theorized direction of the relationship between residential instability and crime. Boggess and Hipp (2010) found that although residential instability in general was positively associated with violent crime, the instability of homeowners was not significantly related. They suggested this was because homeowners compared to renters are generally more invested in the

community and willing to participate in local affairs than renters. An increase in homeowners relative to renters should therefore result in higher collective efficacy or at least more motivation and willingness to foster collective efficacy. In a follow-up study, Boggess and Hipp (2016) observed that the increase in aggravated assaults in areas with increasing home values (which would ultimately displace some existing residents) was markedly reduced in areas surrounded by neighbourhoods that were likewise improving.

Though initially aimed at explaining delinquency and crime in general, the social ecology of crime gained traction in corrections research, addressing the questions of whether and how these theories and hypotheses translate to the story of the returning offender: what is the dynamic between sanctioned offenders and a community's levels of physical and social disorder? Conversely, how does the sociodemographic milieu affect recidivism? Rose and Clear (1998) suggested the possibility of incarceration in some neighbourhoods producing a positive feedback loop continuously reinforcing social disorganization and other conditions that exacerbate the frequency and seriousness of local crime. Specifically, socially disorganized neighbourhoods which have a naturally reduced ability to exercise local informal social control (i.e., weakened private and parochial controls) are more reliant on public or formal controls such as the criminal justice system. While crimes are considered noxious to society, their perpetrators still often occupy important roles in informal social networks and/or contribute important resources to the community (e.g., income, supervision), such that their removal from the community does both a service and disservice. That is, incarceration is intended to provide the community with benefits (e.g., incapacitation of active offenders, general and specific deterrence), but these may be countered by unforeseen iatrogenic consequences. In the words of Rose and Clear (1998):

> Socially organized areas have sufficient assets and resources to overcome the loss of an offender's asset in order to remove the offender's liability from the neighborhood. In socially disorganized areas, however, assets are already sufficiently depleted that the neighborhood feels the loss of the asset just as it rejoices in the loss of the liability. (p. 454)

Through this "loss", incarceration serves to exacerbate social disorganization and further reduce the neighbourhood's ability to self-organize and exercise local informal social control, which in turn may lead to an even greater reliance on the criminal justice system.

A second concurrent pathway in the feedback loop involves other direct and indirect effects of re-entry on crime in the community besides increasing social disorganization. Returning offenders may bring with them aspects of the criminal subculture into which they were socialized in prison, adding to the moral and cultural heterogeneity that contributes to social disorganization (Rose & Clear, 1998). Though an underlying point to incarceration is the removal of antisocial influences from a community, the fact that these offenders frequently return to those same communities (Kirk, 2009; 2012) after being immersed in a deviant prison subculture means that they may take those antisocial/countercultural values back with them. They may therefore contribute further to crime by committing it themselves if reform has not taken place, influence others to commit crime by (re)introducing deviant values, and/or further weaken informal social control with their criminal behaviour (or the crimes of others whom they influence), thereby requiring further formal state intervention (Hipp & Yates, 2009). At the psychological level, the return of offenders can communicate to impressionable community members that prison, though not ideal, is survivable. The rest of the community is desensitized to the threat of incarceration and the criminal justice system in general, which can serve as another proverbial broken window. The strength of deterrence is therefore weakened (Clear, 2007; Rose & Clear, 1998; Wilson & Kelling, 1982). There is also the reality that custodial sentences function as badges of honour to some individuals (Petersilia, 2003). Any increases in crime precipitate additional criminal justice activity continuing the cycle.

Some (e.g., Hipp & Yates, 2009; Rose & Clear, 1998) argue that inasmuch as removing offenders from society amounts to depletion of social and economic resources, returning offenders can be a constructive resource for community building, thereby contributing to the reduction of crime (Hipp & Yates, 2009; Rose & Clear, 1998). For example, parents' antisocial behaviours are likely a negative influence on children in their households, but it is commonly noted that it is unrealistic for offenders to spend the majority of their time offending (Andresen, 2019). When they are not committing crime, these offenders can be valuable sources of human and social capital. As stated above, when they are incarcerated, the informal social networks that generate local social control are disrupted and the incarcerated individuals cease to be able to perform their positive roles in the community. Insofar as released offenders tend to return to their home communities, they can once again contribute meaningfully and prosocially,

provided the experience of incarceration has not reduced their capacity to do so. This is, however, an important contingency. The key to breaking this cycle may be in tapping into the potential of returning offenders as prosocial influences in the community fulfilling roles that improve social cohesion to combat the criminogenic effects of social disorganization; but competing forces of the positive feedback loop described above make any prediction of the net impacts on crime from returning offenders innately uncertain. Though this is not the focus of the thesis, nor is it tested directly, it is relevant to consider given the geographic distribution of Vancouver's correctional halfway houses in and around disadvantaged neighbourhoods.

2.3. Theoretical summary

This application of RAT and GOC – supplemented by the social ecology of crime literature – to halfway houses illustrates how the introduction of these facilities to a neighbourhood can trigger a complex and dynamic system of interacting factors with significant implications for how local crime opportunities are structured (Figure 2.1). More specifically, offenders re-entering the community through halfway houses have the potential to increase crime in surrounding neighbourhoods by recidivating. At the same time, there are competing forces that may either offset or compound this additive effect on crime. On the one hand, halfway houses may attract other offenders for various reasons, legitimate (e.g., associating with peers, attending programming or complying with other conditions of release) or otherwise (e.g., introducing residents to local illicit drug market, retaliatory violence and other forms of persecution). Increases in crime and the presence of offenders may erode social cohesion, communal trust, and informal social control, creating a milieu that is ultimately more conducive and inviting to future crime (Rose & Clear, 1998).

On the other hand, increases in the number of place managers and intimate handlers (Felson, 1995) in the area reduces the potential for crime in the vicinity of transitional housing facilities. This reduction may be more pronounced if potential victims make efforts to avoid the area and/or undertake precautionary safety measures, reducing their target suitability (Cohen & Felson, 1979). Those operating local businesses are likely to similarly improve the security of their establishments. Even if they do not know of the presence of a halfway house, they may be cognizant of the elevated risk of victimization in the areas where halfway houses are likely to be sited.

More abstractly, returning offenders may be reunited with loved ones or wish to lay down roots (Hipp & Yates, 2009). Either way, this may prompt them to contribute to the local economy and help to build their community, thereby improving the social conditions of the neighbourhood. These two sets of competing forces can markedly change the way opportunities for crime (and their feasibility) are structured in a neighbourhood with a halfway house. Recidivism is only one of these such forces.

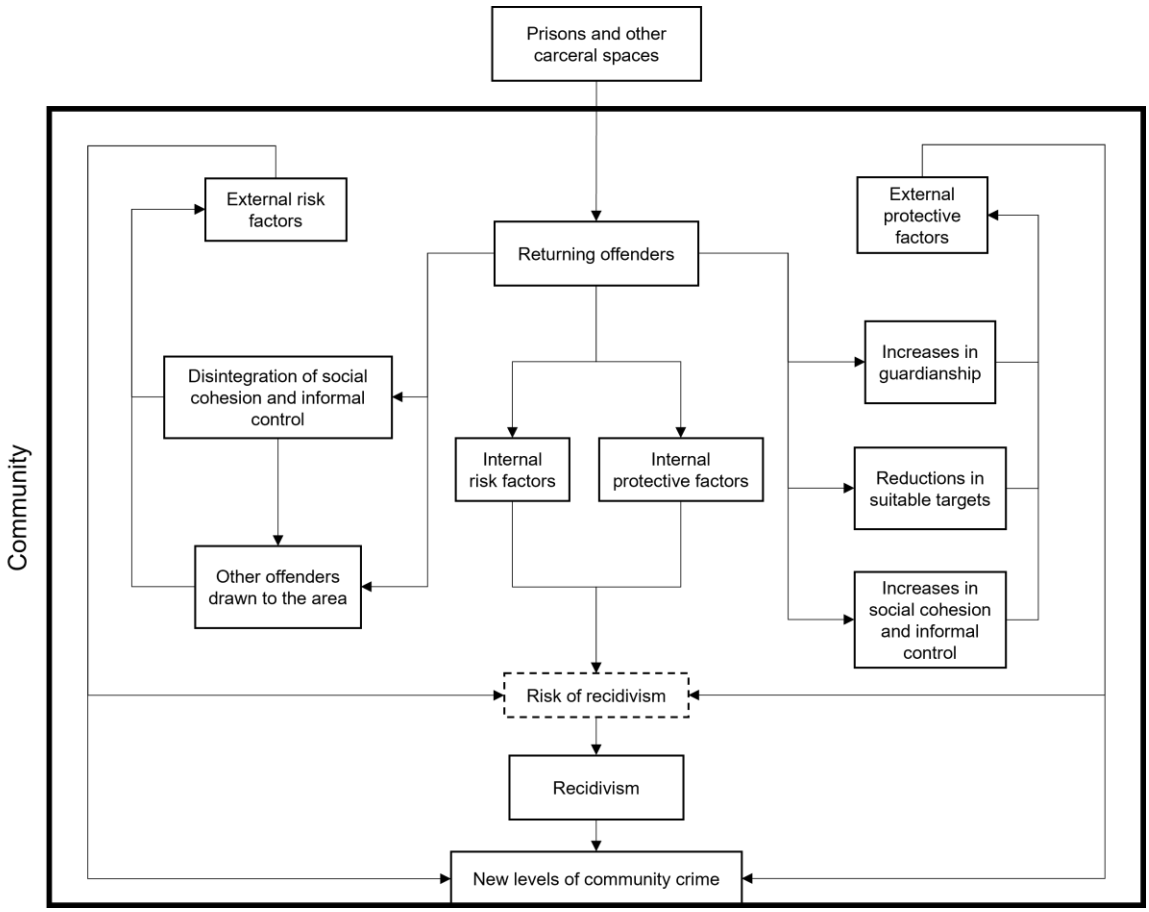

Figure 2.1. Holistic model of offender re-entry and crime in communities

Overall, while RAT and GOC do provide some theoretical support for crime increasing in the neighbourhood, the above considerations taken together make it arguably more likely that crime rates around halfway houses would be unchanged or reduced. Regardless of the propensity for residents to commit crime or how many offenders are attracted to the vicinity of halfway houses, all offenders must ultimately contend with a constellation of guardianship (Felson, 1995; Reynald, 2009) surrounding these facilities. To frame this in terms of the cross-sectional data analyzed in this thesis, although there is reason to suspect crime to be higher around halfway houses, it may be

more likely that there is either no association or a negative one. However, the fact that a significant portion of residents in any given halfway house may have a well-developed sense of place and accompanying crime templates (Brantingham & Brantingham, 1981) for the surrounding neighbourhoods if they are returning to their hometowns means that the potential for crime may increase slightly in areas farther away from the halfway house, where residents are less likely to be affected by the guardianship associated with their facility. In other words, there may be a very safe buffer zone around a halfway house, whose effects are diminished as one moves farther away (Brantingham & Brantingham, 1981). Still, this buffer zone is where clients' activities are likely to be most concentrated, and as the distance increases from the facility, so does the dispersion of offenders.

Chapter 3.

Literature Review: Halfway Houses, Re-Entry, and the Community

This chapter begins by providing context on community opposition to halfway houses with an emphasis on the fear of crime and other consequences that these facilities may have on a neighbourhood. The next two sections, respectively, review literature on halfway houses' efficacy as vessels of correctional programming and their relationship to crime. This establishes a connection between stakeholders' (e.g., general public, policymakers, criminal justice personnel) interests in public safety and evidence-based practice on the one hand, and empirical observations on how halfway houses factor into the overall landscape of crime and disorder in the community on the other. Due to the dearth of explicitly relevant literature in this area, the content in this chapter is heavily supplemented by a review of literature on urban ecology and offender re-entry more broadly. This literature review also relies heavily on research conducted in the United States due to the lack of extensive research on halfway houses in Canada (White, 2003). The term "urban ecology" in this context refers to both the sociodemographic characteristics of neighbourhoods and the built environment. Though not unique to halfway houses, this complementary research offers more nuanced insight into the potential for increases and decreases in crime and the risk of victimization associated with the locations of halfway houses in the community.

3.1. Not in my backyard (NIMBY)

Literature on what drives community opposition to halfway houses and returning offenders more generally provides a framework for recognizing and prioritizing for research the perceived impacts of the incarceration and re-entry cycle on crime. Subsequent studies can then either dismantle unfounded fears and put minds at ease or, where fears are founded, identify substantive target areas for policy and practice. Garland and Wodahl (2017) identified three themes that have emerged in the literature on public opinion of returning offenders and couch NIMBY in terms of social welfare concerns, retribution, and self-interest. Social welfare refers broadly to the well-being of society but concentrates mainly on public safety. That is, one of the primary concerns of

NIMBY proponents opposing the siting of a halfway house is the concern that offenders will recidivate; that the presence of a CRF innately increases the risk of victimization for residents of the host community (Garland & Wodahl, 2017). The media is littered with tragic anecdotes of people being victimized by recently released offenders (e.g., Chianello, 2017), so evidence of this possibility is readily available (Hirschfield & Piquero, 2010). Furthermore, the literature does not unequivocally report the effectiveness of halfway houses in reducing recidivism, especially when best practices are not followed (Lowenkamp & Latessa, 2005; Lowenkamp et al., 2006). This is elaborated below. Even if communities could be reassured of the implementation of best practice standards, some may be concerned that even a statistically significant reduction in recidivism still implies that a portion of offenders ultimately recidivates unless the reported figure is a 0% risk of reoffending. Frequent anecdotal evidence of reoffending in the media, even if it is not representative of the low-risk of recidivism, still reminds citizens that anything is possible (Garland et al., 2017; Hirschfield & Piquero, 2010).

The theme of retribution found in the NIMBY literature stems from the view that community-based facilities allow offenders far more freedom than they deserve, and that they should be subject to harsher and more restrictive sanctions (Garland & Wodahl, 2017). Research has found that various factors have significant influences on the public's attitudes toward offenders. For example, people traditionally hold harsher views of certain types of offenders, most of all sex offenders (Anderson et al., 2015; Hirschfield & Piquero, 2010; Rade et al., 2016; Socia et al., 2019; Wernick, 2006). Those residing in an urban city environment tend to be more impartial than rural residents (Anderson et al., 2015; Hirschfield & Piquero, 2010). There is also increasing evidence that higher levels of education and greater interpersonal contact with offenders – especially if they are family members – is negatively associated with hostile views against them, whereas more conservative political affiliations are positively associated with such views (Garland et al., 2017; Hirschfield & Piquero, 2010; Rade et al., 2016). In general though, it seems public opinion is becoming less negative. Research suggests that public opinion is not as retributive as is often thought, especially depending on the sociopolitical milieu of an area (Krause, 1991; Rade et al., 2016; Roberts et al., 2005; Socia et al., 2019). A slight majority of Hirschfield and Piquero's (2010) sample in their study on attitudes toward ex-offenders expressed a willingness to associate with recently released offenders. Socia et al. (2019) found that although attitudes toward sex offenders have historically been

overwhelmingly negative, their respondents were generally indifferent about policies for improving sex offenders' living conditions in the community, even if they were to move into the respondents' "backyards." Nevertheless, many take a retributive stance, even despite accepting that transitional housing may have value (Garland & Wodahl, 2017; Kras et al., 2016; Latessa & Allen, 1982; Ouellette et al., 2017).

Self-interest concerns are related to social welfare concerns, but are more personal (Garland & Wodahl, 2017). Those expressing fewer or less intense social welfare concerns may change their minds when the question ceases to be about halfway houses in the abstract and becomes more about siting one in their area (Garland & Wodahl, 2017; Garland et al., 2017). First, similar to the concern for public safety is the perceived threat to personal security. The fear that community members or those they care about may be victimized by residents of a CRF may become more intense and override their initial support for transitional housing (Dear, 1992; Garland & Wodahl, 2017). Another major concern associated with social welfare is living quality and neighbourhood disruption (Clear et al., 2001; Garland et al., 2017). Some may be worried that even if returning offenders do not recidivate, the habitation of a large number of offenders in a halfway house may indirectly contribute to crime by eroding social cohesion and collective efficacy, thereby precipitating the decline of a neighbourhood into a socially disorganized state more conducive to crime (Clark, 2016; Clear et al., 2001; Garland et al., 2017; McNeeley, 2018b). This is consistent with the theoretical discussion of the geometry and social ecology of crime above. Finally, many have suggested that the presence of a halfway house would devalue their properties (Garland & Wodahl, 2017). On top of hurting residents financially, this could help to manifest the concern over a more criminogenic neighbourhood through the mechanisms outlined in SDT. Moreover, if peoples' routine activities are displaced to areas away from a known major activity node for offenders out of fear for personal safety, the livelihood of business owners and commercial value of local properties may suffer (Garland & Wodahl, 2017). This impact may be more acute for businesses immediately surrounding halfway houses – their residents, especially those unfamiliar with the neighbourhood, are most likely to frequent places close by because of restrictions on mobility combined with the general tendency for individuals to concentrate their activities around the home node (Brantingham & Brantingham, 1981). Colwell et al. (2000) found mixed results on the change in property values for different neighbourhoods with group homes, but overall,

the presence of these facilities did predict a reduction in the value of properties within 200 feet or with a line of sight to a facility. This may be more an American phenomenon, however, as the RHHA (n.d.) reports no significant changes in the average cost of housing in their brief summary of Canadian research.

An understanding of the fears driving the NIMBY movement against transitional housing for recently released offenders is important for at least two reasons. First, it is widely accepted that stigmatization and social ostracization by the community to which an offender returns exacerbates the myriad of existing stresses that come with re-entry. Community support is integral for the success of community-based programs and for aiding the successful reintegration of newly released offenders (Duwe, 2012; Houser et al., 2018; Ouellette et al., 2017; Listwan et al., 2013). Second, public opinion can have a considerable impact on policy and practice. The body politic have been immensely successful at lobbying policymakers to enact change through petitions, protests, and even legal proceedings to validate and buttress NIMBY-based agendas, including those against halfway houses (Garland et al., 2017). One only needs to look at the United States' legislative expanse of sex offender notification laws, residency requirements, and other restrictions to understand the influence that community members can have on changes in law and criminal justice (Evans & Cubellis, 2015; Hipp et al., 2010; Wernick, 2006). Conversely, policymakers may act in anticipation of what they perceive public opinion to be, which may produce similar results (Krause, 1991). Thus, it is crucial for offenders – and the rest of society by extension – that community members, policymakers, and other stakeholders are properly informed of the impact of correctional programming and modes of supervision.

3.2. Popularity and efficacy of halfway house programs

After delineating the public's fears of halfway houses, an important question is whether those fears are substantiated by evidence; that is, whether the NIMBY response to halfway houses reflects a real threat or moral panic. In this section, efficacy of a halfway house is defined primarily in terms of recidivism because it directly adds to crime in the community and because of its connection to the social welfare and self-interest concerns described above: halfway house programs are considered successful if residents recidivate at a lower rate or after a longer period of time than average or relative to a control/comparison group (e.g., Ostermann, 2009; White et al., 2011; Wong

et al., 2019). Studies typically analyze multiple measures of recidivism, most commonly rearrest, reincarceration, and revocation for a technical reason (Wong et al., 2019). The first two measures speak directly to reoffending, while the latter speaks more to an elevated risk of offending stemming from transgressing rules/conditions in place to minimize this risk (e.g., consumption of alcohol/drugs, associating with known offenders). All three speak to recidivism as contributions to crime in the neighbourhood, but it is important to note that recidivism defined as technical violations is a purely latent measure of this.

Evidence substantiating the social welfare and self-interest concerns regarding public safety is mixed but generally optimistic about the effectiveness of transitional housing in improving offending outcomes of newly released offenders. At least three reasons can be seen for this. First, there are numerous studies finding both short- and long-term improvements for those who have successfully completed transitional housing programs (e.g., Costanza et al., 2015; Hamilton & Campbell, 2014; Latessa & Allen, 1982; Routh & Hamilton, 2015; Seiter & Kadela, 2003). In 2015, the CSC reported slightly higher than expected percentages – 72.73% overall, with 53.55% for CCCs and 76.97% for CRFs – of offenders successfully completing their supervision periods in halfway houses without revocations, “sensational incidents,” charges, or convictions (Blaney, 2015). These figures exceeded expectations in the subsequent reporting year as well, though the specific numbers are not reported (Goodale, 2016).

Participants in Costanza et al.’s (2015) study in the United States were approximately twice as likely to successfully complete parole and half as likely to recidivate after one year compared to those released directly into the community. Hamilton and Campbell’s (2014) evaluation of New Jersey’s halfway house system showed that those who were clients at halfway houses were significantly less likely to be reincarcerated for a new offence after one year or to return to prison for any reason (e.g., new offence or revocation for technical violation) after three years. Ostermann’s (2009) and White et al.’s (2011) studies of Halfway Back programs in New Jersey likewise found that offenders supervised in halfway houses after revocation significantly reduced the odds of both rearrest and reincarceration after eighteen months. Lastly, Routh and Hamilton’s (2015) comparison of offenders in halfway house work release programs and non-participants released to the community showed that the former spent significantly more days in the community on average before revocation for a technical

violation and returning to prison for any reason. Propensities for both outcomes were reduced for program participants by 41.5% and 29.9% respectively.

These more recent studies are consistent with a longer history of evaluations of halfway house programs prior to the turn of the century finding favourable outcomes for participants including lower rates and severity of recidivism in the United States (Donnelly & Forschner, 1984; Seiter & Kadela, 2003; Sullivan et al., 1974). Earlier research was far more pessimistic about the efficacy and future of halfway houses, deemed by many as failures and a drain on resources (Sullivan et al., 1974); but since the 1980s, favourable outcomes of halfway house program evaluations have become increasingly robust (Latessa & Allen, 1982; Seiter & Kadela, 2003). This is owed to improvements in programming and growing consideration of the risks and needs of individual offenders (e.g., Bonta & Motiuk, 1985; 1987; 1990; Seiter & Kadela, 2003), as well as improvements in the research design of these evaluations, including distinctions between different measures of recidivism. For example, Wong et al. (2019) in their meta-analysis of halfway houses' effects on recidivism found that the reductions in recidivism are more pronounced when recidivism is defined in terms of incarceration. Their findings are evidence that halfway houses do reduce the rates of arrest and conviction but are most effective at reducing the risk of more serious forms of offending (insofar as incarceration indicates more serious offending than rearrest or return to prison).

Furthermore, halfway houses may be more beneficial to certain types of offenders. Older offenders and those serving longer sentences may benefit more from transitional housing facilities because they tend to need more assistance in readjusting to the community. Those with offending histories linked to substance abuse may benefit from the treatment options available at a halfway house. Offenders with greater vocational needs also gain an advantage from the training and assistance finding employment provided at many halfway houses (Costanza et al., 2015; Routh & Hamilton, 2015). Makarios et al.'s (2010) study interestingly showed that participation in vocational and educational programs was not associated with significant reductions in the likelihood of recidivism, but that actual measures of employment and education did reduce this likelihood. However, because these programs are intended to improve the employment outcomes and education of offenders, this finding speaks more to weak program integrity in the halfway houses under study than to the inefficacy of halfway houses (Makarios et al., 2010; Lowenkamp & Latessa, 2006). Similarly, Lowenkamp and

Latessa (2002; 2005) found that treatment effects were substantial for moderate- and high-risk offenders, whereas low-risk offenders in halfway houses differed only slightly from low-risk offenders who did not participate in halfway house programs. The reported efficacy of halfway houses is therefore deflated by the recidivism of low-risk offenders and others for whom these facilities are not appropriate. If these facilities are used properly as a tailored intervention for specific populations (or new types of halfway house programs created for those populations whom researchers have found to be ill-suited for traditional halfway houses) and follow the tenets of effective program intervention and program integrity (Bonta & Motiuk, 1987; 1990), this type of housing/supervision could very well be more effective than studies (especially earlier studies) initially found.

Second, while research on efficacy of halfway houses themselves is mixed, there is much more consistent agreement on the positive effects of stable and adequate housing more generally. Not only does it give newly released offenders peace of mind knowing that they have a place to live for the foreseeable future, but it also provides them with a safe place to decompress and deal with other stressors which may elevate the risk of reoffending (Garland & Wodahl, 2017; Latessa & Allen, 1982; O'Brien, 2001; Listwan et al., 2013). Halfway houses serve this purpose but have the additional benefit of having in-house social supports and correctional programs that further reduce the risk of recidivism. Even if staying at such a facility has no impact on recidivism after controlling for other variables, the services offered such as education and vocational training, treatment programs, and assistance finding employment do have a significant negative relationship with recidivism (Blaney, 2014; Garland & Wodahl, 2017; Goodale, 2016; Latessa & Allen, 1982; Makarios et al., 2010). This scenario would suggest that as long as these services and programs are accessible to newly released offenders, transitional housing may not be necessary, but this is a crucial contingency. Halfway houses can guarantee this accessibility if administrated properly, whereas other returning offenders may struggle more. Moreover, it is very difficult for those with criminal histories, especially violent and sexual offenders, to find stable housing outside a halfway house in the first place (Makarios et al., 2010). Sex offenders in Kras et al.'s (2016) study of pathways in and out of transitional housing expressed that they had many viable options for stable housing with members of their social support systems (e.g., family), but were unable to use them because of sex offender residency

restrictions. Other more generic release conditions, such as the prohibition from associating with known offenders, is another barrier if members of their support systems who are willing to take them in also have criminal histories (Makarios et al., 2010; Petersilia, 2005). Hipp et al. (2010) similarly found in their study of California parolees released between 2005-2006 that sex offenders face more challenges in residency compared to even long term and serious/violent offenders. They tended to be released to more disadvantaged neighbourhoods overall and subsequently move into progressively worse conditions. This was even more pronounced for minority parolees.

Third, it is crucial to acknowledge that simply having transitional housing can be harmful if its administration and operation do not adhere to best-practice standards (Sullivan et al., 1974) or adjust for criminogenic triggers in the community (Cullen et al., 2002; Schaefer et al., 2018). As noted above, Lowenkamp and Latessa (2005) found that inconsistency in offending outcomes for halfway house clients in Ohio was attributable to a mismatch between their risk-levels and the programs' intended target population. That is, the residential treatment programs under study were intended for higher-risk offenders for whom there was ultimately a significant reduction in recidivism rates. On the other hand, the rates of recidivism for low- and low/moderate-risk offenders participating in the same programs were higher than those of the same risk-level who did not participate in those programs (Lowenkamp & Latessa, 2005). Lowenkamp et al. (2006) in their evaluation of the effectiveness of 38 Ohio halfway house programs found that program integrity was significantly correlated with recidivism. Furthermore, although transitional housing facilities tend to be established in criminogenic neighbourhoods, evidence is mixed as to whether this affects program integrity and leads to higher rates of recidivism (Clark, 2016; Drawve et al., 2019; McNeeley, 2018a; 2018b). In fact, McNeeley (2018b) found that neighbourhood disadvantage may play a greater role in increasing the risk of recidivism for those in private housing, rather than halfway houses. Although being in a disadvantaged neighbourhood may increase the risk of recidivism, the halfway house may shield residents from those influences (Garland & Wodahl, 2017; McNeeley, 2018b). Evidence of the opposite is discussed below in detail.

3.2.1. Factors affecting the efficacy of halfway houses

Despite the general approval of halfway houses as conduits for re-entry, there are a myriad of factors that may compromise these facilities' ability to reduce recidivism.

As alluded to above, these factors pertain to individual-level characteristics of offenders and characteristics of the neighbourhood which may either act directly on offenders' likelihood of reoffending or do so indirectly by weakening therapeutic integrity (Lowenkamp et al., 2006; Wright & Cesar, 2012; Wright et al., 2012; 2013). First, in some studies, staying in a halfway house had little (Lowenkamp et al., 2006) to no impact at all (Makarios et al., 2010; Latessa & Travis, 1991) on recidivism after controlling for other individual-level characteristics of offenders. For example, Latessa and Travis (1991) did not find any differences in program completion, positive social adjustment, nor recidivism when comparing offenders in halfway houses to those on probation. Makarios et al. (2010) in their study of offenders supervised by Ohio's Adult Parole Authority found that static risk scale scores and the number of changes in residence were positively associated with the odds of recidivism, whereas sexual offending history, age, being female, educational attainment, employment, and various forms of treatment (substance abuse, sex offender treatment, and "other") were associated with a lower likelihood of recidivism. Meanwhile, participation in a halfway house had a negative but non-significant relationship with recidivism. Lowenkamp and Latessa (2002; 2005) similarly found that males (compared to females) and sex offenders were more likely to recidivate, whereas older offenders and those with higher educational attainment were less likely to recidivate. These individual-level predictors are consistent with prior research (e.g., Donnelly & Forschner, 1984).

Lowenkamp and Latessa's (2002; 2005) observation that halfway house residents classified low- and low/moderate-risk had higher recidivism rates than the those with the same risk-level in the control group is again also noteworthy. High-risk subjects were still far more likely to reoffend than those considered low-risk, but the finding indicates detrimental iatrogenic effects of halfway house residency for the latter. Not only does this affect therapeutic integrity, as mentioned above, but is especially concerning in light of findings by Bonta and Motiuk (1987; 1990) that subjects in their study of Canadian offenders were often overclassified. This is because a high-risk classification tends to be accompanied by more restrictive conditions – such as residing at a halfway house – of statutory release and long-term supervision orders when compared to low- and medium-risk classifications. If the finding that halfway houses can negatively impact the successful reintegration of low-risk offenders (Lowenkamp & Latessa, 2002; 2005) is robust and generalizable, the appropriateness of halfway

houses for low-risk offenders on day parole can also be called into question because offenders must often demonstrate in their application for day parole that they do not pose a significant risk to public safety. This would invite a redesign of the existing format of day parole (i.e., residing at a halfway house which one must return to every night unless given permission to do otherwise) or replacement of day parole by some other form of release. For example, day parole could be reserved for medium-risk offenders with sound reintegration plans whose rehabilitation would be best served by release, whereas offenders who successfully demonstrate low-risk could apply directly for full parole at their day parole eligibility date. Lowenkamp and Latessa's (2002; 2005) finding also has broader implications for the interpretation of halfway house program evaluations, as the use of halfway houses for day parole or other routinely overinclusive use for low-risk offenders may tip the scales for a positive relationship between these facilities and crime or erroneously mask their effectiveness with a null finding.

Some literature also attributes greater significance to community and geography, with participation in a halfway house considered of secondary importance or even detrimental to offending outcomes. There is evidence that those who move into private addresses with strong social support from family members reoffend at a much lower rate compared to offenders in other types of housing (Clark, 2016; Steiner et al., 2015). Indeed, as I have stressed above, a critical observation is that halfway houses tend to be sited in disadvantaged, high-crime neighbourhoods, rich in criminogenic triggers and offending opportunities (Costanza et al., 2013; Clark, 2016; Simes, 2018). This is due in part to opposition from wealthier neighbourhoods and the tendency to view disadvantaged communities as "dumping grounds" (Costanza et al., 2013). Wright et al. (2012; 2013) suggested that a neighbourhood's social ecology could influence recidivism directly, but also indirectly by either complementing or compromising treatment integrity. This contrasts starkly with the above argument that halfway houses can help to insulate offenders from risk factors in the neighbourhood. Thus, some halfway house programs may impart weak rehabilitative effects on residents which are ultimately nullified by community risk factors for reoffending.

Wright et al. (2012), who operationalized the sociodemographic environment around halfway houses primarily in terms of social disorganization, reported that beneficial treatment effects of halfway houses appeared to be dampened for offenders returning to areas with greater disadvantage, but were improved in affluent areas.

Indicators of immigration and population turnover were also significant protective factors, in line with recent research on immigration and crime (e.g., Wright & Benson, 2010; Katz et al., 2011). To reiterate, neighbourhoods receiving more immigrants than others tend to have denser acquaintanceship networks and a stronger, more extensive system of informal social control (Wright & Benson, 2010; Katz et al., 2011). Wright et al.'s (2012) findings are also consistent with Lowenkamp and Latessa (2002), who reported that participants from rural halfway houses were rearrested far less frequently on average than those in urban and metro programs. Rural areas similarly tend to also have denser social networks than highly urbanized areas and be less saturated in opportunities and temptations to offend (Felson, 1987; Websdale, 1995). The higher social cohesion can enhance the quality of supervision through informal social control (Reynald, 2010; 2011) and help to ease the process of reintegration for offenders, as they can offer a more tightly knit social network and sense of community (absent in many urban centers; Felson, 1987; Websdale, 1995) into which offenders can socialize and integrate. In RAT terms, guardianship is bolstered and the willingness/motivation to offend is reduced.

Multivariate analyses in Wright et al.'s (2012) study subsequently revealed that these sociodemographic variables may be operating indirectly through their effects on program integrity, measured using the Correctional Program Assessment Inventory (CPAI). In a follow-up study, Wright et al. (2013) examined the influence of the same sociodemographic variables on CPAI itself. The authors further argued that CPAI, as a measure of institutional strength, predicts a proportionate level of parochial and public control exerted by halfway houses on their residents[8] (Wright et al., 2013). This is insofar as halfway houses represent both parochial and public control in the community by showing, respectively, the need for community participation and support, as well as the willingness for non-profit organizations and government agencies alike to establish and invest in halfway houses in the area. Like their prior study, immigration was significantly associated with increased program efficacy, whereas concentrated disadvantage had the opposite effect. Affluence, though related to CPAI at the bivariate level, did not emerge as significant after controlling for the other two variables (Wright et al., 2013). The findings from these two studies (Wright et al., 2012; 2013) on the direct and indirect

[8] This speaks to Bursik and Grasmick's (1993) systemic model of social order, which posits three levels of social control: *private* (intimate and informal primary social groups), *parochial* (control from local community institutions), and *public* (secured from groups outside the community) control.

impacts of neighbourhood ecology on recidivism of halfway house residents highlight the need for place-based strategies that take advantage of a community's protective factors to augment halfway houses' abilities to reduce the risk of recidivism as well as counter risk factors in the environment that are noxious to successful re-entry.

In sum, most evaluations of halfway house programs – especially those conducted in the last 20 years – conclude they are effective at reducing recidivism or prolonging time spent in the community before returning to prison (Wong et al., 2019). A portion of this literature has reported they are either ineffective or that their effectiveness is contingent on individual-level or geographic characteristics, and when used in a way that does not consider the principles of effective correctional intervention, they may even increase the likelihood of recidivism and exacerbate the threat to public safety (Andrews et al., 1990; Bonta & Andrews, 2007; Lowenkamp & Latessa, 2002; 2005; Makarios et al., 2010). However, these latter studies simultaneously indicate that halfway houses should be effective *if* they are administrated properly and with an appreciation for the risk and protective factors in the community. Moreover, despite the manifestation of public safety concerns near halfway houses, not having those facilities at all may be detrimental to the community at large in the long run (Hyatt & Han, 2018), given the more consistent findings in the literature of the effects of stable housing and correctional programs – which can be administered through halfway houses – on offending outcomes. While it is preferable to avoid harmful effects altogether, keeping those effects geographically isolated is also arguably more desirable than having them spread across the entire community. The geographic isolation of this risk makes supervision of this population far more manageable for the perpetually overtaxed criminal justice systems in Canada, the United States, and elsewhere.

3.3. Ecological influences on recidivism not specific to halfway house residents

Empirical literature on the relationship between returning offenders and the neighbourhoods hosting their return fall into two general camps: (1) research on the impact of neighbourhoods on returning offenders and (2) research on the impact of returning offenders on neighbourhoods. The former is the subject of discussion for this section and is also explored above specifically in the context of halfway houses; the latter is elaborated on in the next section. Together, these two areas of research

illustrate a complex and dyadic interplay between the community hosting the return/reintegration of an offender and the offenders themselves, who must contend with a myriad of restrictions that can be reminiscent of punitive and regimented institutional life, while being responsible for their own reintegration amid environmental risk factors they have not had to cope with since the first day of their incarceration.

Regarding the role of social disorganization and incivilities in recidivism (i.e., how neighbourhoods affect returning offenders) more generally, research is also historically mixed. On the one hand, several studies on recidivism have found little relationship with social ecology. Gottfredson and Taylor (1988) found no direct relationship between neighbourhood characteristics and recidivism in a sample of offenders released in Baltimore, Maryland, despite finding minor statistically significant interaction effects between subjects' individual-level characteristics and their environments. Since then, others have found that local conditions of disadvantage were not significantly associated with recidivism for property offences (e.g., Grunwald et al., 2010; Houser et al., 2018; Mears et al., 2008; Wehrman, 2010). In fact, Houser et al. (2018) recently found that the original trifecta of structural antecedents for social disorganization posited by Shaw and McKay (1942) – concentrated disadvantage, racial heterogeneity, and residential instability (measured as percentage moved in the last year) – were not significantly associated with the odds of reincarceration after three years.[9]

However, like the once primarily negative evaluations of halfway houses (Sullivan et al., 1974), the growing attention given to this overlap of re-entry and social ecology has increasingly concluded the opposite with empirical findings slowly stabilizing in support of the notion that the neighbourhood does matter. Kubrin and Stewart (2006) found that although offender characteristics did explain a much greater proportion of the variance in recidivism, concentrated disadvantage and the concentration of affluence relative to disadvantage also played important roles. The former was associated with an increase in the odds of recidivism, whereas a one-unit increase in the concentration of affluence relative to disadvantage (as measured with Massey's [2001] index of concentration at the extremes) reduced the odds of recidivism by 62%, suggesting that resource-rich neighbourhoods could lower the risk of subsequent offending as well as

[9] Houser et al. (2018) did conceptualize and operationalize these three constructs in slightly different ways from how Shaw and McKay (1942) initially theorized but they are still informed by and capture the original social disorganization theory to a large extent.

ameliorate the deleterious effects of disadvantage. Tillyer and Vose (2011) found another traditional indicator of social disorganization, residential instability, to be significantly positively associated with recidivism.[10] Research often reveals large percentages of offenders returning to the community who would prefer to live elsewhere for a fresh start rather than return to the same neighbourhoods with the same criminogenic influences and temptations (Visher & Farrell, 2005; Kirk, 2009). Returning offenders seem to have an awareness that living in a disadvantaged area is worse for their odds of successful reintegration. Indeed, Kirk (2009; 2012) found that offenders displaced to other parishes in the aftermath of Hurricane Katrina were significantly less likely to reoffend after one and three years, respectively.

Subsequent studies have further examined the impact of parolee concentrations on recidivism. As discussed above, offenders under state supervision tend to be concentrated in a small number of communities. In another natural experiment based on the same event, Kirk (2015) examined the differences in the concentration of offenders in Louisiana before and after Hurricane Katrina. The disaster forced many to emigrate from their home parishes and naturally alleviated the clustering of parolees. After controlling for the absolute concentration of parolees itself, the prior recidivism rate, and various neighbourhood-level predictors of recidivism, Kirk (2015) found that parolees residing in neighbourhoods with denser offender populations were significantly more likely to be reincarcerated than those residing in neighbourhoods with fewer parolees. Together with the studies examining the impact of parolee concentration on crime overall and other sociological covariates of crime, this indicates both direct effects of re-entry on crime itself through recidivism of returning offenders as well as indirect effects. The combination of these results suggests that communities that are “dumping grounds” (Costanza et al., 2013) for offenders released from custody have more to worry about than those offenders themselves committing crime. Chamberlain and Wallace (2016) similarly found that in the first decade of the 21st century, neighbourhoods with higher concentrations of offenders had higher recidivism rates in three cities in Ohio after controlling for various sociodemographic risk factors. However, this effect was dampened for more stable neighbourhoods. Overall, literature on the effect of parolee

[10] Tillyer and Vose (2011) measured residential stability as opposed to instability and found a negative relationship with recidivism. I present that finding here by speaking in terms of the opposite: a negative relationship between residential *stability* and recidivism is by definition a positive relationship between residential *instability* and recidivism.

concentration on recidivism and crime overall points to the need to (1) geographically disperse the concentrations of offenders and (2) invest more in communities with high concentrations of offenders to ensure that communities where re-entry is typically concentrated have a demand for services and resources they can actually cope with and thereby reduce the adverse effects of incarceration and offender re-entry on crime in the community overall (Chamberlain & Wallace, 2016; Kirk, 2015).

Wright et al.'s (2012; 2013) findings on neighbourhood ecology's direct and indirect impacts on recidivism of halfway house residents complement the recommendations from more general research on sociological risk factors for recidivism discussed above in pointing to the need for place-based community corrections strategies. This need is all the more salient, given observations from other studies (Clear, 2007; Harding et al., 2013; Kirk, 2015; Simes, 2018; Travis, 2005; Visher & Farrell, 2005) that the return of offenders is heavily concentrated in a small number of communities overburdened by this concentration and less well-equipped to deal with the needs of offenders in the first place compared to other areas (Chamberlain & Wallace, 2016; Costanza et al., 2013; Drakulich et al., 2012; Kirk, 2015). That is, the neighbourhoods that are overburdened "dumping grounds" (Costanza et al., 2013) for offenders have a reduced capacity to facilitate successful re-entry, exacerbating the already harmful effects of local sociodemographic risk factors on recidivism and program integrity; however, this strain could be offset by accommodating more offenders in communities that are better equipped to handle them and have protective factors (e.g., denser acquaintanceship networks, better organized) that enhance the effects of correctional programming.

Nevertheless, as noted above, even if proper administration of programs and the implementation of best-practice standards could be guaranteed, significant reductions in recidivism may not matter to those preaching zero tolerance, since the possibility of victimization is always present no matter how low the risk is. Indeed, while Lowenkamp et al. (2006) found a significant correlation between halfway house program integrity and recidivism, the correlations were only weak to moderate and therefore offered weak explanations of the variation in the effects of treatment. Despite the enthusiasm for halfway houses and the findings that these facilities are associated with reduced negative outcomes such as recidivism for returning offenders, much of the research on halfway houses is outdated and often weakly designed (Wong et al., 2019). Moreover,

although Wong et al. (2019) found an overall significantly reduced risk of recidivism in halfway house participants across the nine studies analyzed, the effect size was modest. Variation in the size, program availability/quality, and clientele of halfway houses also makes it difficult to generalize these positive effects of halfway houses and present them as compelling evidence to community members.

3.4. Observed impacts of returning offenders on crime in the community

3.4.1. General research on urban ecology, re-entry, and crime

A rapidly growing body of literature has uncovered a complex relationship between returning offenders and crime predicted by the application of environmental criminology theories. Research on returning offenders and their impact on crime does support direct effects on crime, such as those described above. Hipp and Yates (2009) found that increases in the number of parolees in Sacramento census tracts were associated with increases in various crime rates, with violent parolees having a particularly pronounced impact on murder and burglary. However, these effects were moderated by ecological variables. The positive effect that an increase in parolees had on robbery was reduced in neighbourhoods with greater population turnover, while the effects on burglary and assault were reduced in neighbourhoods that had more voluntary organizations, especially those serving youth. Chamberlain (2018) too reported significant direct positive effects of parolees on violent and property crime, but also uncovered a constellation of indirect and reciprocal relationships between these variables as well as neighbourhood structure. In fact, while these studies support the previous sections' notion of returning offenders' direct contributions to crime, a much bigger theme in this rapidly developing empirical literature is that there are also further deleterious effects on neighbourhoods' capacities for self-regulation from the action-reaction cycle of incarceration and re-entry. More specifically, returning offenders have been shown to be positively associated with the structural antecedents of social disorganization, such as economic deprivation, population turnover, ethnic heterogeneity, and family disruption (Chamberlain, 2018; Drakulich et al., 2012; Hipp et al., 2010; Rose & Clear, 1998; Tillyer & Vose, 2011).

Offenders tend to have greater difficulty acquiring jobs because of their criminal histories, and when they do find work, they may be paid less over the course of their careers for the same reason (Drakulich et al., 2012). The result is further economic deprivation in the community in both the short (e.g., offenders cannot contribute much financially while incarcerated; Grogger, 1995; Rose & Clear, 1998) and possibly long term due to the impacts of criminal history on earning potential, especially for marginalized ethnic groups (Western, 2002; Western et al., 2001). Higher concentrations of returning offenders in Drakulich et al.'s (2012) study were indirectly related to collective efficacy, criminogenic situations, and violent crime through the disruption of local labour and housing markets. In fact, no direct relationship with those three outcomes were detected after controlling for structural variables and previous levels of violence. Nonetheless, research is (again) mixed regarding the net impact on the economic conditions of returning offenders' neighbourhoods. For example, Chamberlain (2018) found no significant association between the number of parolees and public assistance in Cleveland, Ohio. On average, an offender in the community has a much higher earning potential than the same offender incarcerated, which should help to offset the short-term economic challenges of incarceration (Rose & Clear, 1998), and the proportion of residents who are formerly incarcerated is typically small. It is nevertheless salient to point out the potential for this relationship.

The process of carceral sentencing and subsequent release is by its very nature a source of population turnover. This is compounded by the fact that offenders historically have much more difficulty securing stable housing compared to other populations due to legal restrictions, lack of aftercare, and stigma (Gideon, 2009; Kras et al., 2016; Simes, 2018). As discussed above, the return of offenders to the community may also make it less desirable and prompt an exodus of some of the existing population. Chamberlain (2018), for instance, reported direct positive effects of parolees on residential vacancies and property sales, as well as self-perpetuating effects (i.e., where previous increases in the number of parolees predict future increases). The study also found that parolees' direct effects on property crime indirectly increased property sales. Halfway houses arguably contribute more extensively to turnover because they often house high-risk offenders who both commit more crime on average and are supervised more intensely than other groups of offenders, resulting in a higher chance of detection for lawbreaking and breaches of special conditions. This source of population

turnover exacerbates the (typically) already elevated residential instability of neighbourhoods that tend to contain halfway houses. The resulting high rate of turnover in these neighbourhoods represents a constant change that disrupts local order and socialization processes (Tillyer & Vose, 2011). As described above, the result is a more socially disorganized neighbourhood more conducive to crime and delinquency.[11]

For halfway house residents who are parents, their imprisonment also by definition constitutes family disruption, which can further contribute to social disorganization (although this is not consistently observed in empirical research; Ouimet, 2000; Rountree & Warner, 1999; Sampson & Groves, 1989). Indeed, Hipp and Yates (2009) found that although the volume of returning offenders was associated with increases in crime rates on average, this effect was reduced for areas with a higher percentage of broken families, suggesting the favourable potential effect of reuniting families.[12] This represents one way in which the siting of a halfway house may offset the harmful effects on crime and disorder in the community. The finding from Hipp and Yates (2009) suggests that community-based correctional facilities could function well as an alternative to incarceration to reduce the effects of imprisonment on social disorganization.

Lastly, Simes (2018) did not examine ethnic heterogeneity *per se* but found that respondents in Boston who were Black and Hispanic resided in the most disadvantaged areas, uncovering intersecting forces of ethnic heterogeneity and economic deprivation. A portion of Simes' (2018) sample also demonstrated weak attachment to their neighbourhood, which further compounds this issue and is consistent with the observations from other research that returning offenders may compromise a neighbourhood's collective efficacy (e.g., Drakulich et al., 2012). Hipp et al. (2010) did not test the impact of ethnic heterogeneity on crime either but did find that concentrated disadvantage had differential effects across racial groups in mediating the effects on recidivism. Those of African American descent were the least adversely impacted despite being the most likely to recidivate overall, whereas the likelihood of recidivism was most adversely affected by concentrated disadvantage for White and Asian

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[11] See subchapter 2.4.

[12] This, however, was not directly tested. Hipp and Yates (2009) advanced other rival plausible explanations, such as the possibility of lower reporting in places with a higher percentage of lone-parent households and a dampened positive effect on crime due to already high crime rates.

offenders. Latinos in areas relatively low in concentrated disadvantage (1 standard deviation below the mean) were the second most likely out of the four racial groups to recidivate, but the least likely to recidivate in areas where concentrated disadvantage was 1.4 to 2.0 standard deviations above the mean. This last result may be something of a consolation, given Simes' (2018) findings, but both studies still shed light on the effects of incarceration/re-entry on social disorganization.

3.4.2. Halfway houses as crime generators and attractors

The previous sections' discussion of returning offenders, halfway houses, and recidivism implicitly provides evidence that halfway houses can be crime generators. To reiterate, despite these facilities' ability to reduce their residents' recidivism and other negative outcomes (Wong et al., 2019) relative to offenders with other forms of housing, the modest effect sizes still imply that reoffending behaviour is not entirely eliminated. By definition, recidivism of residents at these facilities is a direct contribution to crime in that neighbourhood. The general research on the impact of returning offenders on crime more broadly supports this idea, but also indicates indirect effects on crime by promoting or exacerbating social disorganization (Chamberlain, 2018; Drakulich et al., 2012; Rose & Clear, 1998), which compounds the crime generator effect from halfway house residents' recidivism. This is predicted by the above application of environmental criminology theories.

Empirical research on the relationship between halfway houses more specifically and crime (as opposed to recidivism) is limited, but there is some evidence that halfway houses function as crime generators and/or attractors with positive net increases in crime in their surrounding neighbourhood(s). Hyatt and Han (2018) found significant increases in violent, property, and minor offences in quarter- and eighth-mile buffers surrounding halfway houses in a large urban county in the United States after their siting, followed by significant decreases in these three broad categories of crime after they closed. The only specific crime types that did not increase within an eighth-mile of halfway houses are motor vehicle theft and disorderly conduct. Increases in the latter were not detected within a quarter-mile. The only crime types that did not decrease following the closure of halfway houses are burglary and narcotic/drug offenses. Hyatt and Han's (2018) results were so pessimistic of the impact of halfway houses that they concluded the following:

> The results of this analysis consistently indicated that, within the immediate surroundings, an active HH [halfway house] can have a negative and significant effect on public safety … While the subject facilities may have had an appreciable effect on the recidivism rates for residents, the impact on public health appears to be overwhelmingly deleterious. (p. 206)

Groff and Lockwood's (2014) study on the effects of criminogenic facilities and land uses on crime in Philadelphia street segments similarly found that halfway houses were positively associated with disorder crime in 800ft and 1200ft buffers, but not 400ft. McCord and Ratcliffe (2007) in their analysis of location quotients found a disproportionate and substantial clustering of drug arrests around halfway houses in four incremental buffers. This was highest 400-800ft away, second highest within 0-400 feet of halfway houses, and roughly equal in 800-1200ft and 1200-1600ft buffers. Drug arrests are not analyzed in this thesis, but one could infer elevated levels of property and other types of crime, considering their relationship with illicit drug markets. The results of these three studies indicate a small buffer effect and distance decay pattern consistent with the geometry of crime (Brantingham & Brantingham, 1981), albeit with slightly different patterns and, in Hyatt and Han's (2018) case, one that differs slightly depending on crime type. Lastly, McCord et al. (2007) incorporated a measure of proximity to halfway houses into a crime attractor index, which was likewise significantly associated with perceived incivilities and perceived crime, but the analyses do not permit conclusions regarding buffer zones of criminal inactivity around halfway houses themselves.

These results make it easy to jump to the conclusion that observed increases in crime represent an additive effect of halfway house residents' recidivism. However, some studies report either no significant relationship between crime and halfway houses or even a significant *negative* relationship. Groff and Lockwood (2014) found, for example, that violent crime on Philadelphia street segments was not associated with halfway houses in 400ft and 800ft buffers, but significantly decreased within 1200ft. For property crime, which is the interest of this thesis, Groff and Lockwood (2014) found a significant reduction within 800ft and 1200ft. This result could possibly also allude to a diffusion of benefit (Bowers & Johnson, 2003), wherein the elevated levels of real and anticipated guardianship as well as reductions in target volume and suitability described in the previous chapter extends beyond the immediate vicinity of halfway houses. Even the significant increase in disorder crime discussed above was small, especially when

compared to other criminogenic facilities, such as schools, subway stops, and major roads. Despite McCord and Ratcliffe (2007) finding a disproportionate clustering of crime around halfway houses, they were found to not be significant predictors of the number of drug arrests. In fact, they were shown to be significant constraints on the development of drug markets.

In line with the theoretical considerations above, Groff and Lockwood (2014) suggested that the presence of intimate handlers and place managers in the form of counselors, nurses, and administrative personnel provide informal social control for residents of halfway houses, disincentivizing criminal behaviour. They further point out that when these staff frequent local businesses and commute, they provide extra guardianship in the surrounding community, rather than at the halfway house alone. Similar reasons were given by McCord and Ratcliffe (2007) to explain the mild buffer zone (crime was still disproportionately concentrated in immediately surrounding areas, but even more so in larger buffers) they observed around halfway houses. Discouragement of drug use and sales on the same block as a facility may displace this activity and associated crime to areas farther away. This would also explain why after holding constant their social disorganization variables, halfway houses were found to constrain drug activity.

These negative and non-significant results support the possibility that at least in some jurisdictions with non-zero rates of recidivism, the net contribution to crime is negative when all else is considered. Miller et al. further found that nearby hotspots (2016a) and criminogenic places such as restaurants, liquor outlets, and transportation hubs (2016b) did not predict recidivism in New Jersey (although Drawve et al. [2019] found a higher likelihood of recidivism for offenders residing in areas with an elevated risk of crime). This provides additional evidence of a spurious positive relationship between offenders under state supervision and local crime, or at least a relationship that is overestimated due to the proximity between frequently used housing options for offenders (e.g., halfway houses, shelters) and other criminogenic places. As summarized more extensively above, others have found that halfway houses are generally effective in reducing offending outcomes (Costanza et al., 2015; Lowenkamp & Latessa 2005; Lowenkamp et al., 2006). Considered with the additional guardianship around halfway houses, siting such a facility may actually reduce neighbourhood crime, provided the neighbourhood has protective factors favourable to reintegration.

Thus, while an additive effect from recidivism is an important part of the picture, it is likely not the whole story. As discussed in the previous chapter, the placement of a halfway house may attract motivated offenders to exploit opportunities in the area, perhaps under the impression that an attractive suspect pool (i.e., the residing offenders) for investigators may distract them from the true perpetrators. Conversely, non-residents may perceive that the siting of a halfway house symbolizes “broken windows” in a community and expect a lack of vigilance or care by local law enforcement (Wilson & Kelling, 1982). These reasons are only speculative, but they do invite a serious consideration of the analytical approach discussed in this thesis.

3.4.3. Implications for NIMBY and the role of community members

Though there is strong community opposition to halfway houses, it should be clarified that this resistance does not necessarily reflect ignorance by the public to the evidence cited above, nor irrational intolerance to offenders (Brooks et al. 2006; Garland & Wodahl, 2017; Garland et al., 2017; Hirschfield & Piquero, 2010; Krause, 1991; Roberts et al., 2005). Krause (1991) suggests that researchers, policymakers, and other stakeholders ought to move beyond a “NIMBY explanation” of community opposition to the siting of halfway houses because public opinion is assumed to be more retributive than what is found in the literature. For example, Roberts et al. (2005) found in their survey of Massachusetts residents that a large majority of their sample believed that a lack of follow-up care and supervision after release led to unsuccessful entry and subsequent recidivism. More specifically, roughly three-quarters of respondents believed there was too little supervision for released offenders, more than two-thirds that there are not enough transitional housing facilities and not enough treatment options for substance use, and more than three-quarters of respondents believed that offenders do not have enough help looking for places to live. When asked whether there should be greater spending for evidence-based practices shown to reduce recidivism even if this resulted in greater taxes, 69% of respondents replied either “absolutely yes” or “probably yes” and almost two-thirds supported crime prevention and rehabilitation agendas as the top priority (Roberts et al., 2005). These attitudes are consistent with the opinions of both researchers and returning offenders themselves that supervision combined with reintegrative assistance either in the form of formal programming or less formal help from halfway house staff or other service providers would drastically improve offending

and other outcomes (e.g., education, employment; Gideon, 2009; Hanrahan et al., 2005; La Vigne & Kachnowski, 2005). This indicates general agreement among stakeholders regarding the significance of community supervision and treatment. Despite this approval of halfway houses and correctional programming generally, citizens may simply not want to have offenders in their own “backyards” (Ouellette et al., 2017).

Some communities do seem to be more welcoming and open to the reintegration of offenders in their own neighbourhoods. For example, Hirschfield and Piquero (2010) further found that a slight majority of their sample were willing to associate with recently released offenders. The same general support for aftercare as described above was found in Brooks et al.’s (2006) focus groups of residents of Cleveland neighbourhoods popular for returning offenders. In addition to reiterating the challenges of securing housing and arguing for more transitional services such as intensive case management found in other research (Ouellette et al., 2017; Roberts et al., 2005), participants claimed halfway houses are necessary for the improvement of post-release outcomes. It is important to emphasize that this support was voiced emphatically by individuals in communities where there was already a high concentration of returning offenders (Brooks et al., 2006). This suggests that the opposition to halfway houses may not be an opposition to halfway houses *per se*, but resistance to returning offenders in general. Once offenders arrive in the community to which they are released, NIMBY proponents in support of evidence-based delivery of services and halfway houses anywhere but their backyard may change their minds, as it is noted frequently in the literature that increased contact with offenders generally makes members of the public more accepting and tolerant of them (Dear, 1992; Garland & Wodahl, 2017; Hirschfield & Piquero, 2010). Indeed, participants of Brooks et al.’s (2006) focus groups admitted that their neighbourhoods had changed, with some neighbourhoods reporting increases in crime and drug activity in particular, and all reporting the deterioration of social cohesion; however, transitional housing was still believed to be part of the solution rather than something that would compound the problem.

This research on community opposition to halfway houses and NIMBY demonstrates potential for residents in popular re-entry destinations to facilitate reintegration and maintain collective efficacy to prevent increases in crime/victimization. The potential may simply not be realized, considering the studies cited above (e.g., Drakulich et al., 2012; Simes, 2018), which suggest a deterioration of collective efficacy.

This highlights the need for more studies on how offenders are received by neighbourhoods and how specific reactions to offenders affect structural antecedents of social disorganization, collective efficacy, and crime, so that communities can better resist the changes that make them more criminogenic.

3.5. From recidivism to crime and place

The somewhat mixed results on the effectiveness of halfway houses, the public's unreceptiveness to the siting of halfway houses in their neighbourhoods, and insight from environmental criminology theories prompts the question of what other angles exist to empirically explore the relationship between halfway houses and crime and disorder, and ultimately how else to inform policy, practice, and public opinion on this relationship. Garland and Wodahl (2017) provided a number of recommendations, but these focused mainly on effectively communicating to the public the physical designs of facilities, the supervisory and security protocols put in place, and the use of evidence-based practices to demonstrate the secureness of the facility and low threat to public safety and local welfare, rather than showing exactly how crime manifests (or does not manifest) in the community as a result of halfway houses. Environmental criminology and spatial data science have been applied to the study of community corrections, but this research has focused largely on recidivism (e.g., effects of neighbourhood context on recidivism; Clark, 2016; Houser et al., 2018; McNeeley, 2018a; McNeeley 2018b; Miller 2016a; Miller 2016b) and management of offenders in the community (Cullen et al., 2002; Drawve et al., 2019; Jefferson, 2018; Karuppanan, 2005; Mellow et al., 2008). While these are all tremendous contributions and do help to inform criminal justice practice and public opinion on halfway houses, they only address a small number of concerns.

Ironically, the surge of research on environmental risk factors for recidivism emerged from the criticism that scholars, policymakers, and criminal justice practitioners had overemphasized individual-level risk factors; however, recidivism itself is an individual-level outcome offering little insight into how the community at large responds to returning offenders. It is an important (perhaps the most important) piece of the puzzle, but still only a piece. If the concern over recidivism is born from the concern for public safety and the potential for returning offenders to increase the rate of victimization, then crime must be the big-picture-variable of interest. This again stresses the importance of viewing re-entry and the community holistically (Figure 2.1): one must

consider the milieu of the host community and the forces beyond recidivism that may contribute to crime and victimization in a community. Spatial methods can be applied to study the relationship between crime and halfway houses to directly inform public safety and self-interest concerns. In doing so, these analyses may also indirectly curb retributive attitudes that act as a barrier to successful reintegration and further endanger the community.

Chapter 4.

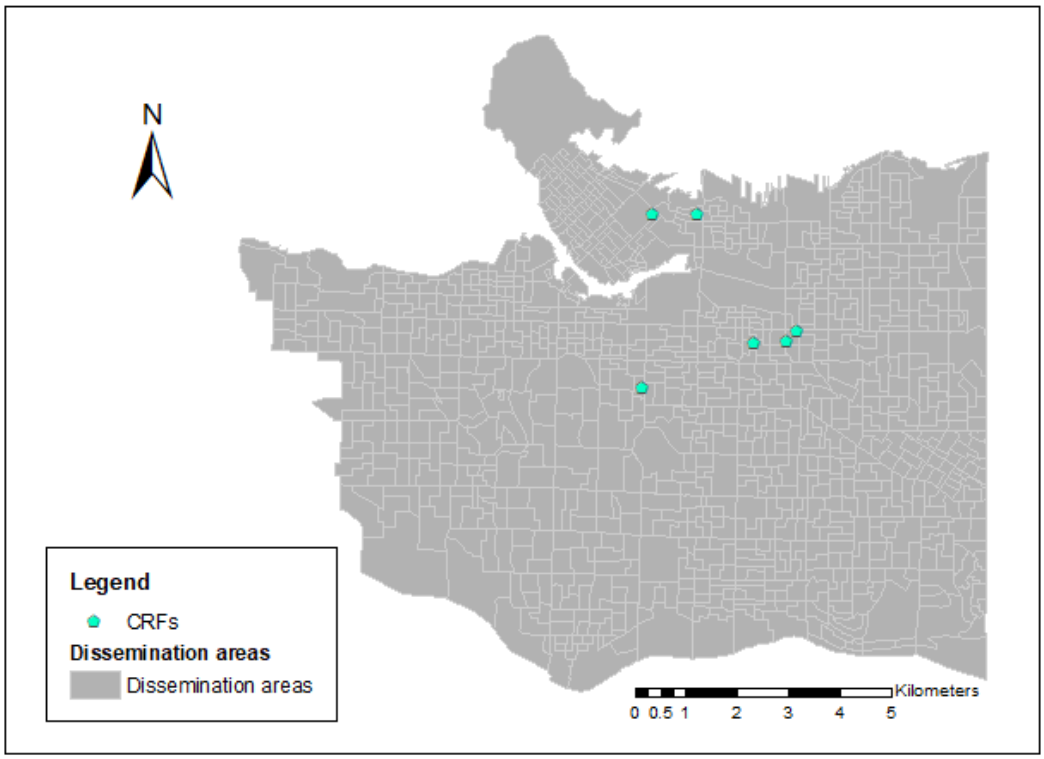
Data & Methods

4.1. Data sources

Five sources of data are used for this thesis: (1) Statistics Canada; (2) the Regional Halfway House Association's (RHHA) facility index; (3) the city of Vancouver's open data catalogue; (4) the Vancouver police department's GeoDash crime database; and (5) Oak Ridge National Laboratory's (ORNL) LandScan™ database. Shapefiles of the areal units of analysis – dissemination areas (DAs) – and sociodemographic data used for control variables are retrieved from Statistics Canada's open database of administrative units and the 2016 census, respectively. The RHHA's facility index provides information on halfway houses in Vancouver, including their addresses and resident capacity. All crime data for this thesis is retrieved from GeoDash. The city of Vancouver's open data catalogue contains information on business licenses and the locations of various criminogenic points of interest in the city, such as homeless shelters, community centres, graffiti, schools, and parks, all used as control variables. ORNL's LandScan™ database is used to estimate the size and distribution of the ambient population across Vancouver. Data from these sources are collated and prepared for analysis using Esri's ArcGIS 10.7.

4.2. The study area: Vancouver, British Columbia

The city of Vancouver, BC (Figure 4.1) is located on the western coast of Canada with a population of 631,486 at the time of the 2016 census (Statistics Canada, 2017). It is the most populous subdivision of the much larger Vancouver census metropolitan area (CMA), which contains 17 other cities and municipalities, 17 Indigenous reserves, three villages, and one regional district electoral area (Statistics Canada, 2017). The city's property, violent, and other crime rates in 2016 were 62.27, 7.84, and 9.19 per 1000 population respectively, for a total of 79.30 crimes per 1000 population (VPD, 2019). This was more than 50% higher than the national crime rate of 52.24 incidents per 1000 population at the time (Keighley, 2017).



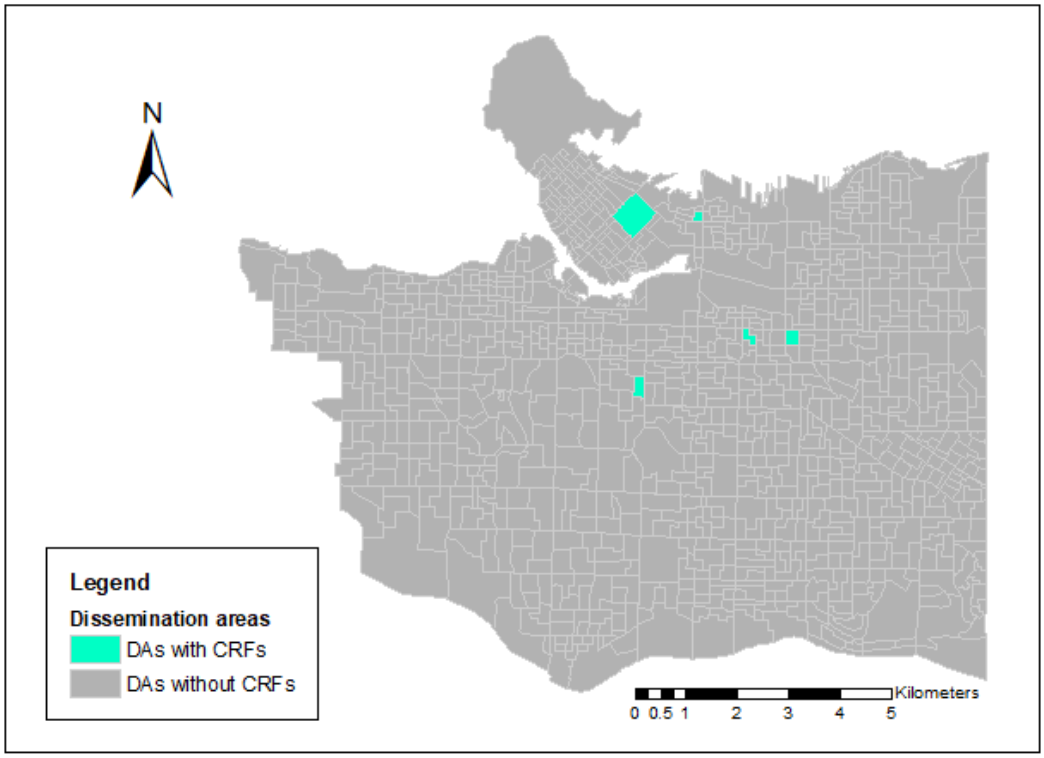


Figure 4.1 Maps of community residential facilities in Vancouver, BC's dissemination areas.

With six CRFs, Vancouver has more halfway houses than any other city in British Columbia, making up more than two-fifths of the 14 halfway houses in the Vancouver CMA and nearly one-fifth of the 35 halfway houses in the entire province (CSC, 2018a). These six facilities collectively house up to 136 offenders at any time (Table 4.1). Three of these – A, B, and D – are all-male facilities accepting offenders of all backgrounds from the federal correctional system (CSC). Facility C is also an all-male facility, but no longer accepts applicants with a history of gang affiliations or sexual offending. Halfway houses E and F supervise only Indigenous clients, with the former housing male and the latter female offenders. The disproportionately high rate of crime in light of the fact the city has the highest concentration of CRFs in the province prompts the question of why: are the high crime rates and the number of halfway houses simply an artefact of the dense population or is the number of halfway houses independently associated with the high crime rate?

Table 4.1 Descriptors of correctional halfway houses in Vancouver

Facility	Sex	Total beds	Exclusion criteria
A	Male	30	None
B	Male	48	None
C	Male	15	Sexual offence history, History of gang affiliations
D	Male	18	None
E	Male	17	Non-indigenous
F	Female	8	Non-indigenous

The DAs making up the Vancouver census subdivision were retained for analysis, leaving a sample size of n = 993. DAs are a meso-level unit of analysis akin to the United States' block group. They are the smallest unit of analysis for which aggregate census data are released. Although the study of crime and place has been trending toward micro-level units of analysis (i.e., street segments; Weisburd et al., 2009) to avoid the modifiable areal unit problem[13] (MAUP; Groff et al., 2010), the use of meso-level units of analysis is appropriate in this thesis for two reasons. First, it enables the inclusion of important aggregate census data while avoiding the ecological fallacy[14]

[13] A problem of arbitrariness where analyses conducted on areal units of analysis can yield inconsistent results, depending on the size of the units selected and how their boundaries are defined (Fotheringham & Wong, 1991; Openshaw, 1984).

[14] Inappropriately making inferences about individuals based on aggregate data (Robinson, 1950; Selvin, 1958).

(Andresen & Hodgkinson, 2018). These data directly measure constructs fundamental to the social and urban ecology of crime, thus operationalizing essential elements of the environmental backcloth. Second and relatedly, polygonal units more easily accommodate the analysis of crime rates. Populations at risk are easily calculable for a contiguous series of polygons, whereas the estimation of the number of people or other targets on a street segment can be far less precise. This again is due in part to the ecological fallacy – where allocating members of a population from an area to streets in that area is fundamentally unreliable – but is also inherent in the difficulty of trying to "accurately" assign population values to streets. That is, if one decides to commit the ecological fallacy, how should members of a population be allocated to a street based on aggregate data? This requires additional choices to be made, each requiring different potentially erroneous assumptions about how the populations at risk are distributed. A large volume of work has also been published on crime and crime rates in Vancouver at the DA-level (e.g., Andresen, 2019; Andresen & Hodgkinson, 2018), making the results of this thesis more comparable to existing literature.

4.3. Variables and measures

4.3.1. Dependent variables: Property crime rates

The dependent variables are logged crime rates for six types of property crime in 2016: mischief (MIS), residential break and enter (BER), commercial break and enter (BEC), theft from auto (TFA), theft of auto, (TOA), and other theft (OTH). Data are retrieved from the Vancouver Police Department's (VPD) publicly available GeoDASH database. Whereas official statistics reported by the VPD and many other police services are based on the most serious offence (MSO) in an incident with more than one crime to be consistent with the Statistics Canada's uniform crime reporting survey (UCR), GeoDASH reports counts based on the "all offences" method (AOM), where all offences in a recorded incident are counted separately[15] (D. Manojlovic, personal

[15] Consider the following scenario for example: one offender breaks into a home, assaults a resident, and steals a car, and another offender breaks into a different home, assaults a resident, steals *from* a car, and steals a bicycle for a quick getaway, but not before he sets the mailbox on fire as a distraction. Eight crimes occurred across six types of offences, but the MSO method only records two assaults without making a distinction between the two incidents. In addition to the two assaults, there are two counts of break and enter, and one count each of theft of auto, theft from

communication, June 4, 2020; VPD, n.d.a). This is desirable first because different types of property crime are being analyzed separately, and second because counts are aggregated and studied at the spatial level. Data containing only the most serious offence underestimates the extent of less serious crimes and does not accurately reflect the manifestation of crime across the city's opportunity surface. Looking only at the most serious incident without considering the potentially varying number of additional less serious crimes that occurred in the same incident can severely bias analyses. The locations of all reported crimes are offset to the 100-block to protect privacy. Using ArcMap 10.7, these offset locations are geocoded from X and Y coordinates before being joined to the DAs for analysis.

Property crime types are considered individually because of the differences in their spatial patterning. Although it is common to aggregate different types of crime based on some common element (e.g., all violent offences have a physical interpersonal element and all property offences are directed at property), research has shown that these commonalities may be superficial at best. Aggregating multiple crime types under an umbrella label is therefore inappropriate and methodologically unsound (Andresen & Linning, 2012). The reason for this is the unique opportunity surface for each type of crime. For example, both residential and commercial break and enter are not only offences against property, but they involve the same essential active elements. However, opportunities for these two offences are geographically disparate due to factors such as zoning.

This logic can be extended to the populations at risk used in the calculation of crime rates. If one of the chief causes of the differences in crime patterns across type is the distribution of targets and therefore opportunities unique to those crime types, then this variation in the types of targets should be reflected in different populations at-risk. Boggs (1965) conducted a study of crime rates using populations at-risk specific to each crime type analyzed. A comparison of these crime rates to rates calculated with the traditionally used residential population revealed stark differences for some crime types, but similar results for others. Despite these empirical findings, Andresen (2019) has noted that many references to Boggs' (1965) seminal work can be considered empty

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auto, theft of bicycle, and mischief. It is also critical to distinguish when considering crime at the aggregate level across different units of space that the second offender committed more crimes than the first.

tributes, and few works have genuinely embraced its implications. Considering Boggs' (1965) contributions and extant literature on the inappropriateness of aggregating across crime types (Andresen & Linning, 2012), crime rates are calculated for the six types of property offences under study here with alternative denominators to residential population.

Mischief (n = 4593) is defined as the destruction, damage, or defacement of property (VPD, n.d.a). As property can be structural or portable, rates of mischief are calculated using the sum of the number of property parcels and ambient population (estimated with the LandScan™ global population database – see below for details on estimation) in each DA as the denominator. Mischief is especially relevant to this thesis given its role in the social ecology of crime as a symbol of disorder and loss of collective efficacy. Residential break and enter (n = 2995) is arguably the one crime type under study for which the residential population represents a valid population at-risk. After testing models using both a population-based rate and one calculated with the total number of dwellings in each DA, however, the latter yielded a better fit. Furthermore, since the target in break and enters is technically a structure, a dwelling-based rate is more theoretically valid as well. For commercial break and enter (n = 2659), the population at risk is the number of properties and units therein with a Vancouver business license[16] in each DA. Excluded from this total are business licenses attached to home addresses. These include rental suites and home businesses. This is suitable, because commercial break and enters are defined as those involving a commercial property, not residential. All break and enters in private dwellings and their ancillary structures are classified as residential, regardless of whether the ultimate target of the crime is related to the business operating out of the home (K. McConnell, personal

[16] XY-coordinates for business licenses except for home businesses were retrieved from Vancouver's open data catalogue , for 29,148 total licenses. Licenses for live-aboard boats (n=189) were removed because the associated properties are considered residential rather than commercial. Finally, duplicates were deleted. Many businesses require multiple business licenses to operate, resulting in the same units/suites and addresses repeating. This problem also makes using the number of business licenses itself invalid because it overestimates the population at-risk. For example, many repair/maintenance shops, health and beauty establishments, and other service-based businesses also sell merchandise, which requires separate licenses. Medical offices often house the practices of multiple clinicians, each of whom require separate licenses. Related services performed by a single business may also require more than one business license, such as an auto dealer (1st license) who also offers repair (2nd license) and painting (3rd license) services. In all, 7,164 duplicates were removed. This process yielded a total population at-risk for commercial B&E in Vancouver of 21,795 commercial property units.

communication, July 2, 2020; VPD, n.d.a). This method does still underestimate the total population at risk for BEC because it does not include vacant commercial properties but is nevertheless much more valid than the residential population.

For the remaining offences – theft from auto (n = 12809), theft of auto (n = 1476), and other theft (n = 8337) – the population at risk is the ambient population, estimated using the LandScan™ global population database. This is appropriate for other theft because of daily population flows that occur as a function of individuals' routine activities, as well as the vulnerability of one's personal property when individuals are away from home. Other theft in this thesis is measured as the sum of counts for the other theft category reported in GeoDASH and theft of bicycle. Despite the inappropriateness of aggregating across certain crime types, bicycles are a form of personal property with characteristics of target suitability akin to other items whose theft is subsumed under the umbrella of "other theft." Models were tested separately before aggregation with little change in the significance of independent variables. I chose to continue with the composite measure based on these considerations. For theft *from* and *of* auto, a dataset is not readily available that tracks the whereabouts of motor vehicles. Ambient population is therefore used as a proxy for the population at-risk under the assumption that the number of motor vehicles is positively associated with the number of people in an area (Andresen, 2019).

The ambient population is measured using the LandScan™ global population dataset. LandScan™ estimates a 24hr average population in 30x30 arc second cells (roughly 1x1 kilometer) by redistributing census population counts based on the road density, land cover, slope, and intensity of nighttime lights in these cells[17] (Dobson et al., 2000; ORNL, n.d.). The use of nighttime lights in the estimation process comports well with its application to TOA and TFA in this case because of the use of headlights after daylight hours. That is, a road with streetlights and heavy traffic will record a higher ambient population than a road with the same number of streetlights but light traffic. Once the dataset was loaded into ArcMap 10.7, the population density was computed for each of the cells and the union overlay function used to generate a mosaic of smaller spatial units from the boundaries of DAs and overlapping LandScan™ raster cells. The

[17] In the estimation, slope is presumed to be negatively associated with the ambient population, while the other indicators are presumed to be positively associated with the ambient population.

ambient population for each of these units is then computed from their size and the population density of the original cells. The ambient population for DAs is subsequently computed by summing the population values of all the smaller spatial units falling within each DA.

Table 4.2 shows the populations at risk used to calculate each crime rate under study, as well as Spearman's correlations and S-indices from Andresen's (2009; 2016) nonparametric point pattern test, which indicates the degree of similarity to the traditionally used residential population.[18] The Spearman's correlations vary considerably but demonstrate very weak relationships between the residential population and the denominators used for licensed businesses, mischief, theft of and from auto, and other theft. The number of private dwellings, used as the denominator for residential break and enter, is strongly correlated with residential population, which is to be expected. Regardless, the correlation is far from perfect. The *S*-indices also reflect dissimilar concentrations of the alternative populations at risk when compared to the residential population. These differences justify the use of alternative crime rates in the analysis of crime and the retrospective risk of victimization in Vancouver.

Table 4.2 Crime rate denominators and their similarities to residential population

Population at risk	Crime type	Spearman's ρ	*S*-index
Private dwellings	BER	.731	.067
Licensed businesses	BEC	.330	.076
Property parcels + ambient population	MIS	.114	.046
Ambient population	TOA, TFA, OTH	.123	.049

Note: Each Spearman's correlation is between the alternative population at risk indicated in the same row and the residential population in the 2016 census. Base dataset for all point pattern tests is also 2016 residential population.

All crime rates are transformed into their natural logarithms after adding a value of unity due to severe deviations from the normality assumption in linear regression. Although the conditional means of each crime rate are normally distributed due to the

[18] Andresen's (2009; 2016) point pattern test compares the distribution of two sets of point data – a base set and a test set – across line or polygon features. The percentage of points in the base data which lie in each feature are calculated and stored for later comparison. Meanwhile, points are randomly sampled from the test data for aggregation to the same features – typically 85% of the points in the test map based on Ratcliffe (2004) – 200 times over to produce a 95% confidence interval for each feature. The stored percentages for each feature in the base map are subsequently compared to the confidence intervals created for each corresponding feature in the test map to determine whether the two differ significantly. The threshold for a conclusion that the differences are significant is an *S*-statistic that is equal to or greater than 0.8 (Andresen, 2009; 2016).

large sample size (n = 993) by operation of the central limit theorem (Lumley et al., 2002), highly skewed distributions still give rise to other problems such as heteroscedasticity and a greater number of outliers. In this case, reducing the positive skew for each of the crime rates using a logarithmic transformation remedied statistically significant heteroscedasticity for two of the six sets of models analyzed and reduced the number of outliers and the magnitude of their deviations from the mean.

4.3.2. Independent variables: Halfway houses

To respond to the research question, crime rates are regressed on four separate measures of exposure to CRFs in Vancouver. The first is the count of CRFs in each DA. However, there are only of these facilities in Vancouver, two of which are located in the same DA. Linear regression does not make distributional assumptions about predictive variables, but additional measures of exposure are computed in case there is not a sufficient number of areal units with halfway houses or variation in the number of halfway houses per area to yield reliable results using statistics.

The second measure is a dummy variable that indicates whether a DA is an immediate neighbour of a DA with a halfway house (1 = neighbour; 0 = not a neighbour), constructed based on first order queen contiguity: if at least one of the edges or vertices of a DA are in contact with at least one of the edges or vertices of another DA, these two DAs are considered neighbours. That is, a DA's neighbours are identified as all those that share a border with it, even if only a corner (Anselin, 1988b). This represents a one-unit buffer around halfway houses. One can expect that, given the potentially higher security presence around halfway houses, that DAs containing these facilities may have crime rates either lower or no different from the mean with all else held constant. Criminogenic effects of halfway houses may instead manifest in the surrounding DAs. A caveat to this measure of exposure to halfway houses is that the smallest distance between a halfway house and the edge of its DA is only roughly 30m. This is a fairly small buffer zone, but the alternative would be to operationalize this zone with a higher order of contiguity, which would likely be an overestimate. This is the issue of the modifiable areal unit problem and the fact that halfway houses are not conveniently located at the center of the areal units of analysis. I have decided to use the more conservative one-unit buffer to mark the edge of a potential buffer zone, keeping in mind this limitation, which may be mitigated to some extent by the size of those neighbouring

DAs. That is, in places where the distance from a halfway house to its DA's boundary is quite small, the areal coverage of the neighbouring DA should be robust to a buffer zone that extends beyond that boundary to some extent.

To achieve even greater variation in the independent variable for more reliable and nuanced analyses, two continuous distance-based variables representing the proximity of each DA to halfway houses are computed: the sum of inverse square distances and a weighted variant thereof. The sum of inverse square distances (ISD) from the centroid of each DA to Vancouver halfway houses yields a measure of proximity to halfway houses based on GOC's concept of distance decay (O'Leary, 2011). It is calculated with the following formula:

$$ISD_i = \sum \left(\frac{1}{{d_{ij}}^2} \right) \qquad (1)$$

In equation (1), *d* is the distance of a DA *i* to a halfway house *j* which is inversed to convert to a measure of proximity and squared to simulate distance decay. This is calculated for all halfway houses within 3.623km of the DA *i* such that the proximity to halfway houses outside this radius is assigned a value of zero. The ISD for the DA then is the sum of its proximity to each DA. Buffers such as this are commonly used in these kinds of analyses to represent a cut-off of a criminogenic place's sphere of influence. Summing the proximity to each halfway house thus reflects the cumulative impact of overlapping spheres.

Although much smaller buffers are commonly used, these are based either on conventions in existing literature - e.g., 400ft (~131m), 800ft (~262m), and 1200ft (394m; Groff & Lockwood, 2014; McCord & Ratcliffe, 2007) – the length of the average block face (Miller et al., 2016a; 2016b), or a supposition of what constitutes a reasonably walkable distance (Hyatt & Han, 2018). There is indeed a very rich journey-to-crime literature from which to draw for this purpose, some of which examines this thesis's study area (e.g., Andresen et al., 2014). However, an unconventionally large 3.623km buffer is chosen here because it represents the farthest distance between two halfway houses in Vancouver. As stated above, it is common for residents of these facilities to commute to other halfway houses either to associate with peers, attend programming, or carry out errands in fulfilment of their conditions of release (e.g., provide samples for urinalysis). For example, there is only one Indigenous men's facility in Vancouver with 17

of the 136 available beds, despite the demand for a high volume of programming specific to the unique needs of Indigenous offenders underlying their gross overrepresentation in the criminal justice system (Corrado et al., 2014). Attendance at this facility for programming and cultural support requires an extensive regular commute. Much, sometimes all, of this commuting is done on foot. The generous buffer of 3.623km therefore represents a reasonably walkable distance for this population tailored to the study area. In any case, the use of the inverse square of the distance to halfway houses means that DAs within this buffer but near its edge will only register a very small influence.

It is important to sum the measure because of the clustering of halfway houses tightly in and around the central business district, which casts overlapping spheres of influence. The chosen aggregate variable captures the overall influence of a DA's proximity to halfway houses, taking into account these overlapping spheres, such that the DAs whose centroids are closest to each halfway house have the highest ISD values, while DAs around the mean center of these facilities are also represented by relatively high values.[19] This is a salient point because in addition to residents traveling to and from their halfway houses to others, many places of interest, including popular shopping districts, temp agencies for skilled and unskilled labour, and the main parole office (Metro Vancouver West Community Corrections) lie within or close to the region of the city encircling the six halfway houses. As a result, DAs with some of the highest ISDs may contain some of the most frequently used pathways and activity nodes for offenders residing in these facilities.

The second analogous measure is the weighted ISD (WISD), which adjusts the proximity to each CRF by its number of beds for offenders, assuming that the number of beds is directly related to the number of offenders at each facility. This variable is analyzed separately for the possibility that the risk of crime is higher around facilities with a larger number of offenders. Based on this measure, a DA that is equal distances to two halfway houses is considered functionally closer to the one with more beds, or still

[19] Given the very small number of halfway houses (n = 6) relative to the sample size (n = 993), there is enough statistical power to analyze the ISDs to each halfway house individually controlling for the effects of the others. However, the clustering of all six facilities results in severe multicollinearity problems when each ISD is inputted separately into the same models.

equally far if they have the same number of available beds. WISD is calculated using the following formula (2a):

$$WISD_i = \sum \left[\left(\frac{d_{ij}}{b_j} \right)^2 \right]^{-1} \qquad (2a)$$

$$WISD_i = \sum \left[b_j \left(\frac{1}{d_{ij}} \right) \right]^2 \qquad (2b)$$

$$WISD_i = \sum \left(\frac{b_j}{d_{ij}} \right)^2 \qquad (2c)$$

In equation (2a), the distance *d* of a DA *i* to a halfway house *j* is divided by the number of beds *b* at that halfway house to yield a new weighted distance. The same equation (1) used to calculate ISD is then applied to this new weighted distance to compute WISD: it is inversed and squared to convert to a measure of proximity simulating distance decay. This is repeated for the weighted distance to all halfway houses in a 3.623km radius and summed to reflect overlapping spheres of influence. To show this, equation 2(b) expresses the same logic in a way more consistent with the format of equation (1). Equation 2(c) is the fully simplified form of both equations. This geographically shifts the distribution of higher values slightly to the North, where the two most populous facilities are located. Though the measures are still highly correlated (Spearman's ρ = .991), this is a valuable new representation of the independent variable, given that the northern region of Vancouver contains only two of the four halfway houses, but more than half (57%) of all available beds. Both ISD and WISD measures are standardized out of 100 to be directly comparable.

Thus, four iterations of the key predictive construct of interest are used to test four separate hypotheses regarding the relationship between halfway houses and crime: (1) counts are used to test the hypothesis that the number of halfway houses in a DA is associated with its property crime rates; (2) a one-DA buffer immediately surrounding each DA with halfway houses tests whether the relationship between property crime rates and halfway houses is lagged due to heightened guardianship; (3) ISD is used to test the hypothesis that the proximity of DAs to halfway houses is associated with their rates of property crime; and (4) WISD is used to test the hypothesis that the relationship

between the proximity to halfway houses and property crime rates is affected by the number of offenders residing at each facility.

4.3.3. Independent variables: Control variables

Sociodemographic factors

Sociodemographic variables representing social disorganization, other indicators of neighbourhood disadvantage, and high potential for convergences of motivated offenders and suitable targets in the absence of capable guardianship are retrieved from the 2016 Canadian census. It has become common to construct a measure of concentrated disadvantage that subsumes social disorganization variables along with other measures of disadvantage using factor or principal components analysis (e.g., Clark, 2016; Hipp et al., 2010; Kubrin & Stewart, 2006; Sampson et al., 1997). However, not all the variables taken from the census for this purpose perform well with data reduction techniques, indicating that at least in the Vancouver context, they capture distinct dimensions of disadvantage. Consequently, separate measures are constructed to represent each essential element of social disorganization theory.

Principal components analysis (PCA) with singular value decomposition is used to construct measures of economic deprivation and residential instability. The economic deprivation measure is a linear combination of five variables: the percentage of the population classified as low-income based on the LIM-AT[20] threshold, percentage of residents in subsidized housing, percentage of lone-parent families, median income after tax, and concentration of affluence relative to poverty measured as an index of

[20] Economic deprivation is measured using the low-income measure after tax (LIM-AT) instead of low-income cut-off after tax (LICO-AT). Both are widely used measures of household poverty adjusted to account for the size of each household and are therefore more objective and meaningful individual indicators of economic deprivation than rawer markers of household income. Where the LICO-AT and LIM-AT differ is in the way they conceptualize (and operationalize) economic deprivation. The LICO-AT is arguably a more objective measure of economic struggle and identifies impoverished households based on whether a disproportionate percentage of their income is spent on necessities, relative to the average family. The LIM-AT identifies impoverished households as those whose income falls below 50% of the median income for the nation. For the LIM-AT, even those who are not necessarily struggling to afford the necessities of life may be deemed impoverished if the national median income is sufficiently high (Aldridge, 2017; Statistics Canada, 2015). This captures the important concept in criminology and sociology of relative deprivation, whereby disparity with a perceived reference group invokes feelings of strain and augment the motivation to commit crime and better appreciates the nuances of economic strife in a competitive society (Hipp, 2007).

concentration at the extremes[21] (ICE). All five variables load onto a single principal component that captures both the presence of economic deprivation and absence of affluence. The residential instability measure is a linear combination of three variables: the percentage of residents who had moved in the last five years, percentage of renters, and the percentage of residents who are non-permanent residents. All variables similarly load onto a single principal component reflecting the instability of the housing market.[22] Each PCA yielded only one principal component with an eigenvalue greater than 1. For both, Bartlett's test of sphericity is significant, and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is adequate, indicating an acceptable level of internal consistency among the variables used (Dziuban & Shirkey, 1974). The variable loadings and extraction scores are reported in Table 4.3. The use of these principal components also reduces multicollinearity in the analyses and is consistent with the operationalization of structural variables in the literature (e.g., Hipp et al., 2010).

Table 4.3 PCA results for economic deprivation and residential instability

	Eigenvalue	% variance	KMO	Variable loadings	Extraction scores
Economic deprivation	3.147	62.9	.697	(1) .481 (2) .424 (3) .379 (4) -.424 (5) -.515	(1) .729 (2) .566 (3) .452 (4) .566 (5) .834
Residential instability	1.944	64.8	.603	(A) .635 (B) .796 (C) .725	(A) .886 (B) .571 (C) .526

Note: (1) % low-income, (2) % subsidized housing, (3) % lone-parent families, (4) median income, (5) ICE, (A) % moved in the last five years, (B) % renters, (C) % non-permanent residents.

Finally, instead of measuring ethnic heterogeneity, *racial* heterogeneity is operationalized with a Herfindahl index. The underlying importance of ethnic

[21] ICE is calculated by subtracting the number of residents classified LIM-AT from the number of affluent residents, defined as those in the top two income deciles in Canada, and then dividing the difference by the total population in that neighbourhood (adapted from Massey, 2001). This was first tested as a separate variable. A separate measure of economic deprivation was also constructed using PCA without ICE and tested separately. I ultimately decided that the measure of economic deprivation in its current form (with ICE) was the best measure, capturing the absence of affluence, the presence of poverty, and the general wealth of the DA.

[22] A PCA was initially conducted with the percent of residents who had moved within the last year, since this arguably reveals a more intense level of population turnover. However, the solution yielded a lower eigenvalue and the variable loaded more poorly onto the principal component than the percent moved in the last five years.

heterogeneity in presenting cultural and language barriers that hindered the development of collective efficacy is no longer as relevant, given the strong acceptance of and commitment to multicultural values in Vancouver and also the degree of assimilation of immigrant populations into local culture, relative to Shaw and McKay's (1942) original time of writing in Chicago. Where their original concerns manifest more is arguably in the form of racial homophily and racism. The banal reality is that communication, even if it is less frequent and less effective in facilitating the development of social cohesion, does occur between individuals separated by a language barrier and that avoidance of others does take place along racial lines. Research on racial homophily and racism demonstrates this robustly (McPherson et al., 2001; Mollica et al., 2003; Smith et al., 2014). The categories for the Herfindahl index are based on the *Employment Equity Act* (1995), adjusted to yield the following final categories: Indigenous, Black, Latin American, Caucasian, Filipino, Arab, West Asian, Southeast Asian, South Asian, Southeast Asian, multiple category responses, and other. To be thorough, Herfindahl indices based on both ethnic and racial heterogeneity in Vancouver DAs were computed for comparison, but the former introduced substantial multicollinearity problems, indicated by multicollinearity condition numbers well-above the commonly cited threshold of 30 (values were greater than 100 at times; Alin, 2010) and changes in the significance of other independent variables in the regression models. Interestingly, the index measuring racial heterogeneity correlated strongly with that based on ethnic heterogeneity but did not yield the same multicollinearity problems.

In addition to these three scale measures of the structural antecedents of social disorganization in SDT, seven other variables are included to represent physical indicators of disadvantage and the potential for a high rate of convergences between motivated offenders and suitable targets, pursuant to routine activity theory and the geometry of crime. Physical incivilities are represented by the percentage of households in need of major repairs in each DA and the counts of graffiti, which were retrieved as point data from Vancouver's open data catalogue and then aggregated to each DA. It should be noted though that the graffiti data were retrieved on May 07, 2019 and are therefore not contemporaneous with the other cross-sectional data from 2016. Even if they are not a perfect representation, areas high in graffiti are generally expected to continue to be high in graffiti, whereas low-graffiti areas should continue to be low in as short a time frame as three years.

The remaining five variables reflect potential for a high rate of convergences of suitable targets and motivated offenders in the absence of capable guardianship: the percentage of males aged 15-24; residential as well as ambient population density, both measured as the population per square kilometer; the percentage of dwellings not permanently occupied (i.e., complete or partial vacancies); and the average number of weeks worked in a year. Before continuing, it is important to consider the trouble with operationalizing routine activity theory that many of the readily available measures do not represent actors or entities that are exclusively either motivated offenders, suitable targets, or capable guardians. A person can indeed be all three. For example, the percentage of males aged 15-24 is included as a measure of motivated offenders, given two of the most robust observations in criminology: the age-crime curve (Farrington et al., 2013; McGee & Farrington, 2010; Moffitt, 1993) and the disproportionate volume of crime perpetrated by males relative to females (Broidy & Agnew, 1997; Piquero et al., 2005). However, males in their adolescence and young adulthood are also disproportionately victimized, so that high values on this variable also represent a high percentage of suitable targets. This reflects the victim-offender overlap (Jennings et al., 2010). In any event, both interpretations yield the same conclusion that crime should be higher in places with a high percentage of males aged 15-24.

Residential population density and ambient population density both represent a high rate of convergences of suitable targets and motivated offenders, since a greater number of people in a fixed area necessarily means a greater likelihood for each person to encounter one another. At the same time, it may also signal a greater number of onlookers and bystanders who may exercise guardianship. Including ambient population density accounts for the regular population flows across DAs as a function of the population's routine activities, which makes residential population less representative of the true number of people in each areal unit. Residential population density is retained for consistency with the literature. I initially intended to include just one measure of population density, but when included together, both variables behaved in a manner consistent with their separate inclusion and appeared to capture different yet significant dimensions of population density. This is explained further in the results.

The average number of weeks worked in 2015 is included as a negative indicator of motivated offenders. That is, a person working less weeks in the year hypothetically has more time to commit crime. Though this may also be considered a measure of

economic deprivation, it did not load well onto principal components with the other variables used in that principal components analyses, nor did it correlate highly with those variables.[23] Finally, the percentage of dwellings not permanently occupied may indicate the absence of guardians and should therefore be positively associated with crimes. For residential break and enter especially, vacant units may be considered attractive locations within which to commit other types of crime or seen as low-risk targets for thrill-seekers (e.g., youth groups); however, it may also be the case that these offences are less often noticed and reported and that occupied dwellings contain more valuable targets.

A note on missing values

Statistics Canada does not disseminate data for administrative units with small populations to protect the privacy of residents. For this reason, 13 DAs out of the full sample of 993 contained missing values for the income and mobility variables used in the two principal components analyses (economic deprivation and residential instability, respectively), while one of those 13 DAs is also missing information on the average number of weeks worked in 2015, the number of dwellings in need of major repairs, and the ethnic/racial composition of residents used to compute the Herfindahl index. The data are not missing completely at random (MCAR) in variable space (based on Little's MCAR test, $p < .05$; Little, 1988) and visual inspection of the map of Vancouver shows a slight clustering in the central business district and the Downtown Eastside community to the east. A cluster of three missing DAs is adjacent to the most populous halfway house, while another is adjacent to the second-most populous halfway house. Some of these missing DAs are also high in crime. Missing values for these three control variables are imputed based on the means of immediately surrounding neighbours, as defined by first order queen contiguity (i.e., DAs with edges or vertices touching a DA with missing

[23] This measure is conceptually very similar to the unemployment rate – both are related directly to an individual's employment status. High unemployment rates in a DA should drive down the average number of weeks worked. However, the unemployment rate, like the average number of weeks worked, is not well-represented in the same factor space as the other variables in the economic deprivation principal component, and was therefore excluded from that analysis. Average weeks worked is favoured to represent the absence of employment that may free up time to commit crime since it actually quantifies this amount of time. Unemployment rate is a poor representative of both this and economic deprivation because it is measured simply as whether an individual 15 years of age or older was employed during a reference period of one week. Not only may many adolescents have been in school and awaiting the summertime for work opportunities, but a reference period of one week is only a snapshot of one point in time over the year. It is neither a strong proxy for economic deprivation, nor the amount of time residents have to commit crime.

values). This method is chosen because it comports with Tobler's (1970) first law of geography that all things are related but closer things more so. This is confirmed by statistically significant positive spatial autocorrelation ($p<.05$) measured with Moran's *I*, which indicates spatial clustering of DAs with similar values. First order queen contiguity is chosen because Moran's *I* for variables with missing values is lower for higher order weights. A rich literature explores complex imputation methods for missing geographic data, supported by both empirical and simulated results; however, simpler methods have at times been shown to outperform their more complex counterparts (Baker et al., 2014).

Results of analyses based on the dataset with imputed values were compared to those using a dataset with the 13 DAs deleted listwise. Although the number of DAs with missing values represents 1.3% of the full sample and is well-below the threshold of 5% frequently cited for listwise deletions, comparison of these two sets of results showed substantive differences in the significance of some independent variables, *except* those for which data was imputed. This is likely due to the effects of deletion on the spatial weights structure and loss of data for the dependent variables. As Simes (2018) notes, there are times when methodological problems lead to the dismissal of places or persons who represent an important part of the phenomena under study. The characteristics of the few missing DAs described above (i.e., several of the DAs with missing values are crucially located, as they are adjacent to DAs with the two most populous halfway houses and/or represent high-crime areas) make them places of interest worthy of inclusion. To summarize, in addition to the theoretical meaningfulness of these DAs and differences in results, the following other observations favour imputation: (1) the findings with respect to the five variables with imputed data are unchanged, (2) data for the remaining more important variables including dependent variables and main predictive variables of interest are still available, and (3) randomness in missing data is a prerequisite for deletion not met here.

Crime generators and attractors

Nodes with criminogenic potential based on extant literature are included so that their confounding effects on crime can be separated from the influence of halfway houses (McNeeley, 2018a; 2018b; Miller, 2016a). Sixteen variables are used for this purpose: the counts of community centres; convenience stores and pharmacies; financial institutions; gas stations; homeless shelters; liquor stores; parkades; parks,

pubs, bars, and clubs; restaurants with liquor service; retail dealers; schools; SkyTrain stations, supermarkets and other grocers; theatres and other entertainment venues; and whether a DA is part of Vancouver's Downtown Eastside (DTES) community. Data for all variables except for whether a DA is part of the DTES were obtained from the city of Vancouver's open data catalogue.[24]

Data on alcohol outlets has been retrieved from Vancouver's open repository of business licenses in 2016 and are included for their association with crime and recidivism (Cordilia, 1985; Fergusson & Horwood, 2000; Gorman et al., 2013; Groff & Lockwood, 2014; Hanson et al., 2003), although these results are mixed in relation to halfway house populations (Houser, 2018; Miller, 2016b). These variables include (1) restaurants with liquor service, (2) liquor stores, and (3) bars, pubs, and clubs. Bars, pubs, and clubs are grouped together because they have a common social function structured primarily around intoxication. The frequency of retail stores as well as supermarkets and other grocers are included as markers of commercial land use. Commercial land uses invite large and transient volumes of people creating a high risk of crime (Brantingham & Brantingham, 1993b; Kinney et al., 2008). Parks (Boessen & Hipp, 2015; Drawve et al., 2019; Groff & McCord, 2012; Miller, 2016a), parkades (Andresen, 2007; Kinney et al., 2008; Loukaitou-Sideris et al., 2002), schools (Chen, 2008; Cook et al., 2010), convenience stores (White & Katz, 2013; White & Muldoon, 2015), gas stations (Bernasco & Block, 2011; Zahnow, 2018); homeless shelters (Clark, 2016; Faraji et al., 2018); and theatres and other entertainment venues (e.g., auditoriums and cinemas; Brantingham & Brantingham, 1995; Messner & Blau, 1987) have been shown to either be high-crime areas themselves and/or have a criminogenic influence on immediately surrounding areas and are therefore included as place-based risk factors. Pharmacies are included in the count of convenience stores because of their functional similarities.

Counts of SkyTrain (Metro Vancouver's light rail transit system) stations are included as a control variable because of the extensive use by commuters resulting in an opportunity-rich environment and relative anonymity (Brantingham et al., 1991), although

[24] As a note, although many of the criminogenic facilities included are hypothesized to be significantly associated with crime, a measure of the diversity of land use is not included, despite studies showing that mixed land use (Kinney et al., 2008) in general as well as the diversity of land (Zahnow, 2018) use is significantly associated with crime. This is a limitation of this thesis.

findings on light rail transit's association with crime have been mixed (Billings et al., 2011; Gallison, 2016; Gallison & Andresen, 2017; Loukaitou-Sideris et al., 2002). Many residents of the Metro Vancouver area travel to Vancouver's community centres to participate in recreational, social, and cultural activities; these types of facilities have also been shown to have an association with crime (Groff & McCord, 2012; McCord & Houser, 2017), although they may also exercise a degree of informal social control and function as symbols and nuclei of collective efficacy. Financial institutions including banks and credit unions are included because they attract a lot of people who may come and/or go with valuables, making them, their personal belongings, and their vehicles attractive targets. That said, some (e.g., Aalbers, 2006) have found that they may actually be associated with lower levels of crime.

Finally, a dichotomous variable was also included to represent whether a DA is part of the DTES (*0 = outside DTES; 1 = within DTES*). The DTES has a reputation across North America as an area of heavily concentrated crime, mental illness, substance abuse, homelessness, and marked socioeconomic disadvantage (Mason, 2007; Wood et al., 2003). The community is contiguous with the central business district and geographically central to the halfway houses in Vancouver (Figure 4.2). Without controlling for whether a DA is part of the DTES, any positive significant results between halfway houses and crime would likely be spurious. Existing literature is inconsistent in its delineation of the exact DTES boundaries. This neighbourhood is often informally referred to as Canada's "poorest postal code"; however, the prefix for the postal code, V6A, actually represents all of the neighbourhood of Strathcona, which is arguably far too inclusive. The Oppenheimer District is considered the core of the DTES in which homelessness, severe mental illness, drug use, and crime typically associated with the DTES label is most intensely concentrated. At the same time, much of the population in this area is transient and the Oppenheimer District's milieu frequently spills over to adjacent areas. The delineation made by the city of Vancouver for the DTES Local Area Plan represents an attractive intermediate option that can be used to code this variable (Downtown Eastside Plan, 2018). For my purposes, a DA is coded as part of the DTES if more than 50% of its area is contained in the local planning area. Use of a more inclusive operationalization would result in the inclusion of DAs that primarily contain parcels starkly outside the DTES. The small sections of DAs technically within the

bounds of the local planning area that are excluded are far outside the Oppenheimer District, so their inclusion would be tenuous anyway.

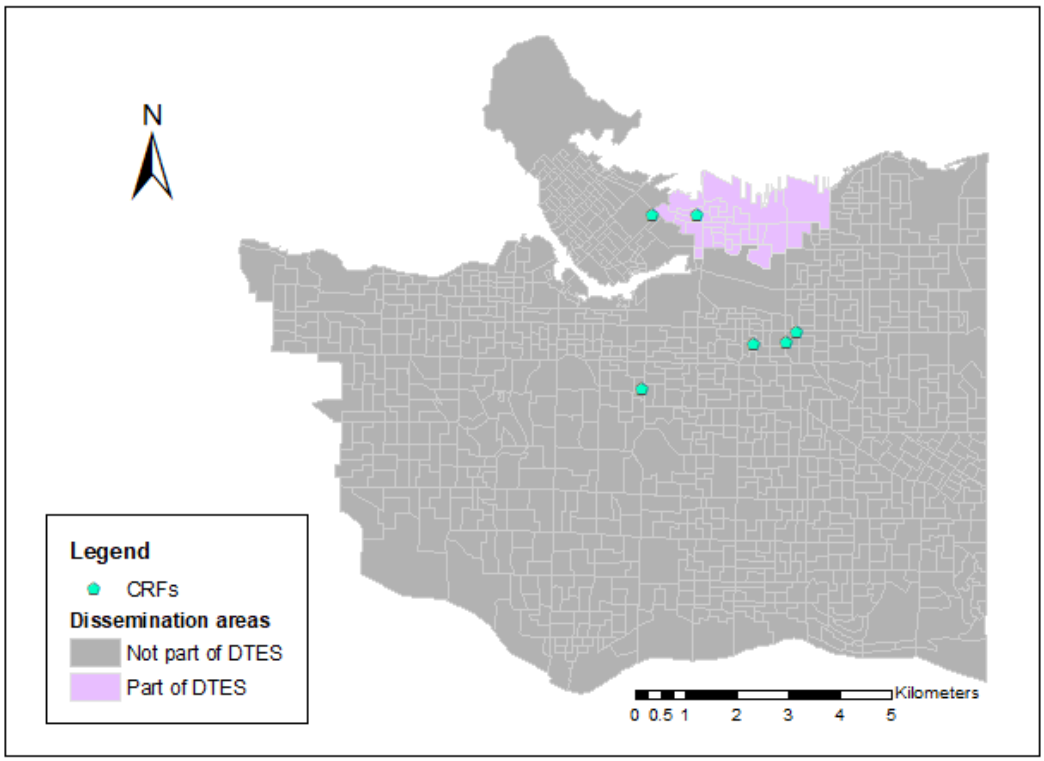

Figure 4.2 Map of dissemination areas in Vancouver, BC indicating Downtown Eastside and community residential facilities

Other relevant variables were initially included but ultimately discarded from the analyses. The counts of limited-service food establishments and restaurants without liquor service were initially entered into the models but were highly associated with the counts of retail dealers and restaurants with liquor service, introducing multicollinearity problems. After testing all models with the count of restaurants not serving liquor together with and in place of the count of restaurants serving liquor, results showed that the former had a variance inflation factor exceeding the commonly cited threshold of 5 (O'Brien, 2007). While O'Brien (2007) cautions researchers to not treat this rule of thumb too strictly, the inclusion of this variable yielded theoretically peculiar results (e.g., a reversal of signs) and caused the variance inflation factors of other variables to swell, taking away from their statistical power. Similarly, the limited-service food establishments variable raised the variance inflation factors of other variables very close

to the threshold of 5 but was never significant itself. Removing these two variables yielded more consistent and robust results. The number of money services, such as check-cashing and currency exchange, were also included, but not significant in any model and dropped altogether for parsimony. Lastly, non-market housing has been found by the literature to be established in areas that are at a high risk for crime (Lens, 2013; Woo & Joh, 2015). However, this variable is endogenous to the economic deprivation principal component, which was constructed in part from the percentage of residents in subsidized housing and also dropped from the analyses. All control variables in the analyses that follow are significantly associated with at least one of the six crime types measured or are non-significant but retained because their inclusion affects the significance of other variables. Descriptive statistics for all variables can be found in Table 4.4.

Spearman's correlations (and r-statistics for Mann-Whitney U where appropriate) for all independent variables analyzed can be found in Table 4.5. A variance inflation factor of 5 corresponds to a correlation coefficient of .80 (O'Brien, 2007). Table 4.5 shows that all bivariate correlations are well-below this threshold, with the exception of ISD and WISD (Spearman's $\rho = .991$, $p < .001$), which is expected because they represent variations of the same concept (i.e., the proximity to halfway houses). However, these two variables are never included in the same model. The highest correlation coefficient belongs to the association between retail dealers and restaurants with liquor service (Spearman's $\rho = .699$, $p < .001$). Though strong, it is still well-below the threshold of .80. Retail dealers and restaurants with liquor service are significantly ($p < .05$) correlated with the majority of independent variables included in the analyses below. This initially yielded variance inflation factors greater than the commonly cited threshold of 5 (O'Brien, 2007), but removal of other variables from the regression analyses (i.e., limited service food establishments, money services) reduced those values to an acceptable level (i.e., VIF < 5).

Table 4.4 Descriptive statistics

	n	Mean	SD	Min-Max
Sociodemographic variables				
% dwellings not regularly occupied	–	7.96	5.10	0 - 57.99
% housing in need of major repairs	–	6.88	5.08	0 - 45.76
% males aged 15-24	–	5.89	2.96	0 - 58.82
Average weeks worked in a year	–	41.8	2.71	0 - 47.90
Counts of graffiti	8,501	8.56	20.7	0 - 361
Density of population (ambient)	–	6,227	2350	660 - 13,700
Density of population (residential)	–	9,878	9425	298 - 82,800
Economic deprivation	–	.017	1.02	-2.50 - 6.76
Ethnic heterogeneity	–	.570	.140	0 - .84
Residential instability	–	.006	.998	-1.84 - 5.06
Potentially criminogenic places				
Community centres	27	.027	.163	0 - 1
Convenience stores and pharmacies	425	.428	1.10	0 - 16
DTES (1 = DTES)	32 (3.22%)	–	–	–
Financial institutions	199	.200	.785	0 - 11
Gas stations	77	.078	.289	0 - 2
Homeless shelters	21	.021	.202	0 - 5
Liquor stores	89	.090	.382	0 - 6
Parkades	319	.321	.1.48	0 - 32
Parks	304	.306	.743	0 - 8
Pubs, clubs, and bars	173	.174	.934	0 - 19
Restaurants with liquor service	1,169	1.18	3.35	0 - 57
Retail dealers	2,531	2.55	9.08	0 - 190
Schools	194	.195	.524	0 - 5
SkyTrain stations	22	.022	.160	0 - 2
Supermarkets and other grocers	508	.512	1.81	0 - 37
Theatres & other entertain. venues	95	.096	.431	0 - 6
Halfway houses				
Halfway houses (count)	6	.006	.090	0 - 2
Q1 neighbours (1 = neighbour)	42 (4.23%)	–	–	–
Inverse square distance	–	.324	3.35	0 - 100
Weighted inverse square distance	–	.200	3.21	0 - 100
Logged crime rates				
Break and enter (residential)	–	2.10	1.12	0 - 4.73
Break and enter (commercial)	–	2.49	2.63	0 - 8.01
Mischief	–	1.63	1.12	0 - 5.80
Theft of auto	–	1.04	.975	0 - 4.67
Theft from auto	–	2.76	1.11	0 - 7.47
Other theft	–	1.44	1.49	0 - 7.46

Note: The Q1 neighbours variable represents the one-unit (DA) buffer around DAs with halfway houses.

Table 4.5 Bivariate associations among independent variables (two-tailed significance)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. % dwellings not regularly occupied	–									
2. % housing in need of major repairs	-.189***	–								
3. % males aged 15-24	.317***	-.165***	–							
4. Average weeks worked in a year	-.154***	.024	-.418***	–						
5. Counts of graffiti	-.062+	.155***	-.293***	.162***	–					
6. Density of population (ambient)	-.050	.109***	-.139***	.167***	.245***	–				
7. Density of population (residential)	-.242***	.109***	-.436***	.282***	.161***	.165***	–			
8. Economic deprivation	-.057+	.061+	.191***	-.167***	.076*	.089**	.140***	–		
9. Ethnic heterogeneity	.226***	-.085**	.360***	-.088**	-.063*	.176***	-.019	.428***	–	
10. Residential instability	-.210***	.141***	-.409***	.254***	.368***	.085**	.573***	.149***	-.107***	–
11. Community centres[a]	.019	-.025	-.025	-.023	.073*	-.026	-.079*	.031	.029	.017
12. Convenience stores & pharmacies	.024	.063*	-.172***	.035	.498***	.132***	.080*	.107***	.051	.210***
13. DTES[a]	.092**	.099**	-.198***	.002	.243***	-.027	.092**	.218***	-.005	.140***
14. Financial institutions	-.004	-.005	-.087**	-.026	.294***	.051	.061+	.046	-.008	.137***
15. Gas stations	-.019	.036	.016	-.040	.143***	.010	-.150***	.095**	.033	.046
16. Homeless shelters	.080*	.025	-.157***	.061+	.203***	-.010	.089**	.054+	-.032	.139***
17. Liquor stores	-.025	-.017	-.114***	.032	.298***	-.007	.019	-.005	-.047	.169***
18. Parkades	-.018	.006	-.238***	.162***	.326***	-.012	.151***	.000	-.054+	.316***
19. Parks	-.018	.004	-.173***	.042	.072*	-.114***	-.199***	-.041	-.084**	.034
20. Pubs, clubs, and bars	.019	-.025	-.215***	.124***	.329***	-.058+	.149***	.040	-.027	.277***
21. Restaurants with liquor service	-.071*	.027	-.251***	.158***	.589***	.062+	.134***	-.009	-.097**	.346***
22. Retail dealers	-.040	.026	-.189***	.123***	.645***	.096**	.089**	.010	-.045	.319***
23. Schools	-.034	.015	.066*	-.049	.059+	.025	-.281***	.016	.022	-.121***
24. SkyTrain stations	.001	.014	-.025	.028	.102**	.008	-.043	.058+	.031	.059+
25. Supermarkets and other grocers	-.013	.042	-.119***	.038	.498***	.044	.064*	.080*	-.035	.263***
26. Theatres & other entertain. venues	-.017	-.018	-.157***	.115***	.269***	.004	.021	.008	-.056+	.199***
27. Halfway houses (count)	.007	.028	-.076*	.070*	.096**	.036	.033	.017	.005	.058+
28. Q1 neighbours[a]	-.091**	.052+	-.124***	.067*	.093**	.043	.032	-.002	-.044	.064*
29. Inverse square distance (ISD)	-.116***	.150***	-.511***	.337***	.415***	.548***	.335***	-.043	-.024	.318***
30. Weighted ISD (WISD)	-.128***	.151***	-.555***	.348***	.422***	.507***	.389***	-.047	-.065+	.378***

+p < .10; *p < .05; **p < .01; ***p < .001. All statistics reported are Spearman's ρ, except for those denoted by "a". Significance for variables denoted by "a" is from Mann-Whitney U tests; statistic reported is the *r* measure of strength of association.

Table 4.5 continued

	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. % dwellings not regularly occupied										
2. % housing in need of major repairs										
3. % males aged 15-24										
4. Average weeks worked in a year										
5. Counts of graffiti										
6. Density of population (ambient)										
7. Density of population (residential)										
8. Economic deprivation										
9. Ethnic heterogeneity										
10. Residential instability										
11. Community centres	–									
12. Convenience stores & pharmacies	.048	–								
13. DTES	.110**	.145***	–							
14. Financial institutions	.022	.360***	.006	–						
15. Gas stations	.001	.364***	-.005	.078*	–					
16. Homeless shelters	.073*	.187***	.284***	.078*	-.007	–				
17. Liquor stores	.003	.281***	.038	.285***	.175***	.143	–			
18. Parkades	.088**	.274***	.119***	.292***	.082**	.220***	.360***	–		
19. Parks	.220***	.058+	.029	.012	.086**	.063*	.036	.132***	–	
20. Pubs, clubs, and bars	.136***	.308***	.244***	.213***	.078*	.227***	.373***	.455***	.103**	–
21. Restaurants with liquor service	.111***	.500***	.107***	.342***	.105***	.159***	.364***	.448***	.102**	.470***
22. Retail dealers	.100**	.538***	.141***	.383***	.177***	.174***	.358***	.449***	.093**	.400***
23. Schools	.138***	.048	-.043	.028	.030	-.031	.010	.006	.182***	.002
24. SkyTrain stations	-.024	.161***	-.026	.138***	.017	.092**	.100**	.174***	.010	.098**
25. Supermarkets and other grocers	.047	.422***	.097**	.456***	.122***	.163***	.365***	.372***	.071*	.356***
26. Theatres & other entertain. venues	.103**	.232***	.222***	.149***	.067*	.246***	.173***	.305***	.107***	.291***
27. Halfway houses (count)	-.012	.107***	.068*	.023	.035	.211***	.037	.065*	.027	.090**
28. Q1 neighbours	-.035	.040	.018	.003	.001	.088**	.036	.013	-.020	.049
29. Inverse square distance (ISD)	.054+	.213***	.262***	.057+	-.032	.183***	.090**	.221***	.028	.212***
30. Weighted ISD (WISD)	.059+	.217***	.282***	.062+	-.037	.193***	.106***	.262***	.049	.247***

+p < .10; *p < .05; **p < .01; ***p < .001. All statistics reported are Spearman's ρ, except for those denoted by "a". Significance for variables denoted by "a" is from Mann-Whitney U tests; statistic reported is the *r* measure of strength of association.

Table 4.5 continued

	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
1. % dwellings not regularly occupied										
2. % housing in need of major repairs										
3. % males aged 15-24										
4. Average weeks worked in a year										
5. Counts of graffiti										
6. Density of population (ambient)										
7. Density of population (residential)										
8. Economic deprivation										
9. Ethnic heterogeneity										
10. Residential instability										
11. Community centres										
12. Convenience stores & pharmacies										
13. DTES										
14. Financial institutions										
15. Gas stations										
16. Homeless shelters										
17. Liquor stores										
18. Parkades										
19. Parks										
20. Pubs, clubs, and bars										
21. Restaurants with liquor service	–									
22. Retail dealers	.699***	–								
23. Schools	.024	.062+	–							
24. SkyTrain stations	.138***	.129***	.021	–						
25. Supermarkets and other grocers	.573***	.552***	.069*	.116***	–					
26. Theatres & other entertain. venues	.329***	.281***	.066*	.220***	.218***	–				
27. Halfway houses (count)	.045	.035	.053+	.093**	.033	.096**	–			
28. Q1 neighbours	.055+	.078*	-.033	-.030	.038	.022	-.015	–		
29. Inverse square distance (ISD)	.237***	.233***	-.011	.105***	.119***	.216***	.123***	.120***	–	
30. Weighted ISD (WISD)	.259***	.242***	-.025	.106***	.132***	.234***	.123***	.110***	.991***	–

+p < .10; *p < .05; **p < .01; ***p < .001. All statistics reported are Spearman's ρ, except for those denoted by "a". Significance for variables denoted by "a" is from Mann-Whitney U tests; statistic reported is the *r* measure of strength of association

4.4. Analyses

First, preliminary bivariate analyses are performed to present a picture of whether and how much the crime rates in DAs with halfway houses differ from the rates in surrounding DAs and in the city overall. For this purpose, the logged crime rates of each DA containing a halfway house (n = 5) is compared to the logged rates of their immediate neighbours (n = 42), spatial moving averages combining these two (n = 47), the mean logged rates of all other DAs in the study area (n = 988 including the neighbours; n = 946 without the neighbours), and the overall mean for the entire sample (n = 993). These comparisons are complemented by Spearman's correlations and Mann-Whitney U tests as appropriate to test the bivariate relationships between the logged property crime rates and each measure of exposure to the CRF variables described above. Altogether, this first exploratory stage of analysis can be used to say whether on average, crime is indeed higher around correctional halfway houses in Vancouver.

Next, to determine whether there is a relationship between halfway houses and property crime in Vancouver after controlling for other theoretically and empirically relevant covariates of crime, each of the six crime types is regressed on the independent variables. Four models are constructed for every crime type: a control model that contains all independent variables except for halfway houses, followed by three others, each with a unique operationalization of exposure to halfway houses: counts (plus the one-DA buffer), ISD, and WISD. Associations are considered significant at $p < .05$, with marginally significant associations ($p < .10$) also flagged.[25] Interactions between each

[25] The identification and interpretation of marginally significant results is hotly contested, though still widely practiced in social science research (Pritschet et al., 2016). In this thesis, marginally significant results are flagged for three reasons. First, some of the literature cited uses a threshold of $p < .10$ for significance (e.g., Costanza et al., 2015; Tillyer & Vose, 2011). Flagging results as marginally significant at $p < .10$ points out that they would be considered significant by parts of this literature but is also in keeping with the $p < .05$ threshold for significance used in most studies cited. Second, flagging results which approach but do not reach significance acknowledges the possibility of a type II error (i.e., failing to reject a false null). Probabilities approaching significance have stronger evidence against the null hypothesis than those which do not. Identification of marginally significant results represents a caution against failing to reject the null where probabilities are close (Pritschet et al., 2016). Third and related to the second reason, tests of two of the four key halfway house variables (count and neighbour) have low statistical power (i.e., high chance of a type II error). Identifying marginally significant relationships is intended to be sensitive to this quality of the analyses. Z-statistics and exact probabilities from the spatial regression analyses are reported in Appendix B.

measure of exposure to halfway houses and all independent variables were also tested, but the introduction of any combination of interaction terms to the models yielded severe multicollinearity problems and are therefore excluded from the multivariate analyses in this thesis.

A specific-to-general stepwise approach is taken to identify the appropriate functional form for the regression models, wherein specification tests on simple models indicate the presence of spatial dependence among the variables that can be controlled for in more complex models (Anselin, 1988a; Florax et al., 2003). Two variants of Lagrange multiplier (LM) statistics were developed to guide this forward stepwise approach (Anselin, 1988a): the LM-lag statistic tests the null hypothesis that there is no operative spatial autoregressive process in the dependent variable ($\rho = 0$), whereas the LM-error statistic tests the null hypothesis that there is no operative spatial autoregressive process in the error term ($\lambda = 0$). The one that is significant indicates the autoregressive process to be modeled to control for the spatial dependence. If both are significant, robust variants of these two LM-tests are used; again, the significant statistic indicates the correct autoregressive process. Where both the robust LM-tests are significant, the one with the lower probability value indicates the correct autoregressive process to model. This last step may not be entirely conclusive. Where this occurred, both the lag and error models were compared to higher order models to evaluate changes in significance and magnitude of coefficients.[26] If found, such differences would point to the appropriate use of those higher-order models (Lesage & Pace, 2009). To test for spatial dependence and compute lagged parameters, row-standardized spatial weights matrices were constructed in GeoDa based on varying orders of queen contiguity. The weights used in each final model are those that fully filter the confounding effects of spatial dependence and yield the best model fit. Specification testing is carried out in GeoDaSpace. In all cases, the lag model is indicated as the most appropriate.

The spatial lag model describes an autoregressive process where the value of the dependent variable in one spatial unit is associated with the values of the dependent variable in neighbouring units (i.e., the “spatially lagged” crime rate) after controlling for

[26] Comparison to the SARAR model was done using the “spatialreg” R package, while comparison to the SARMA model was done in GeoDaSpace.

the marginal effects of the exogenous (predictive) variables (Anselin, 1988b; LeSage & Pace, 2009; Ward & Gleditsch, 2008):

$$y = \beta_0 + X_i\beta_i + \rho Wy + \varepsilon \qquad (3)$$

This process, shown in equation 3, is captured with the inclusion of a spatially lagged dependent variable (i.e., crime rate) ρWy as a predictor of a DA's crime rate, alongside the exogenous variables Xiβi, intercept β_0, and a stochastic error term ε. The substantive implication of the autoregressive process explicated in a spatial lag model is that if something causes the crime rate to change in one DA, this affects crime in surrounding areas. Consequently, a change in a significant predictive variable in one DA, through its impact on crime there, has a further impact on crime in neighbouring DAs. Furthermore, because the crime rate has changed in those surrounding areas, *their* neighbours are now also affected. The outcome is a dynamic system of spillover effects across all DAs in the study area (LeSage & Pace, 2009; Ward & Gleditsch, 2008).

Spatial lag models are all estimated using generalized spatial two-stage least squares regression (STSLS), where spatially lagged independent variables are used as instruments for the endogenous lagged dependent variable (Anselin, 1988b).[27] Where the assumption of homoscedastic prediction errors is violated, White's (1980) heteroscedasticity-consistent standard errors (HC0) are used to yield reliable p-values. Impacts analyses are then conducted on all models to show the adjusted coefficients of each measure of exposure to halfway houses at equilibrium after accounting for the spillover effects from the lagged dependent variables (Bivand & Piras, 2015; LeSage & Pace, 2009).

The adjusted coefficients are broken down for each halfway house measure as direct, indirect, and total effects. A direct effect is the average change in a DA's crime rate associated with raising the value of a predictive variable by a value of 1. The indirect effect is the average change in a DA's crime rate associated with raising the value of a predictive variable by 1 in all other DAs. This is equivalent to the cumulative change

[27] The use of a generalized method of moments (GMM) estimator is chosen over maximum likelihood estimation (MLE) because of problems with heteroscedasticity in four of the six sets of models, indicated by statistically significant Breusch-Pagan tests. MLE yields inconsistent parameter estimates when the error term is heteroscedastic (Arraiz et al., 2010; Kelejian & Prucha, 2010; Piras, 2010).

across all DAs in the study area from increasing the value of the predictive variable by 1 in a *single* DA, minus the direct effect. The total effect is the sum of the direct and indirect effect, interpreted as the average change in a typical DA's crime rate associated with raising the value of an independent variable by 1 in *all* DAs. This is equal to the cumulative change in crime rate across all DAs associated with raising the value of an independent variable in a *single* DA by 1, including the DA in which the value of the independent variable is raised (LeSage & Pace, 2009). Estimation of the lag models, tests for residual spatial autocorrelation, and computation of the measures of model fit are carried out in GeoDaSpace. The impacts analyses are conducted using the spatialreg package in the R Project for Statistical Computing.[28] Simulated standard errors are estimated from distributions computed (from 200 simulations) for each impact measure based on a multivariate normal distribution, defined by the corresponding model's coefficients and covariance matrix.

[28] Although I initially intended to perform all multivariate analyses exclusively with R, GeoDaSpace was chosen to estimate lag models in the first stage of the multivariate analysis because of its preferred array of diagnostic and model fit statistics. The impacts analysis is still performed in R because GeoDaSpace does not have this functionality. This STSLS implementation of the spatial lag model is computed identically in either program (Bivand & Piras, 2015; this article doesn't use GeoDaSpace *per se* but includes a comparison of the spatialreg R package and Python's spatial analysis library, PySAL; GeoDaSpace is a click-based graphical user interface for spatial regression functions in PySAL). Because there are no material differences, using both R and GeoDaSpace for separate related analyses is permissible.

Chapter 5.

Results

5.1. At first glance: Preliminary findings

Table 5.1 shows the Spearman's correlations between the various measures of exposure to halfway houses and each logged property crime rate. Both measures of proximity (ISD and WISD) to CRFs are significantly associated with all logged property crime rates measured in this thesis, though the directions and magnitudes of these associations differ. The only negative relationship between the proximity to halfway houses and crime is for BER. That is, as the ISD (Spearman's ρ = -.131, p < .001) and WISD (Spearman's ρ = -.177, p < .001) increase, the BER logged rate decreases. This could be because of the increased security presence around halfway houses during the day when these types of offences are more likely to occur (Andresen, 2019; Jenion, 2003), or due more mundanely to the concentration of high-rise apartment buildings around halfway houses, which are much more difficult to victimize. This is the weakest relationship between CRF proximity and any crime rate. The remainder of logged property crime rates are positively associated with the proximity to halfway houses as measured by ISD and WISD.

The strongest relationship between any logged crime rate and ISD is OTH (Spearman's ρ = .387, p < .001), although the strength of the relationship is moderate at best. Mischief has the third strongest relationship (Spearman's ρ = .292; p < .001). The correlations between these two logged rates and WISD, however, is substantially stronger, with Spearman's ρ values of .345 (p < .001) and .431 (p < .001), respectively. This may signify a relationship between halfway houses and crime that tends to be stronger for pettier "low-investment" property offences (e.g., vandalism and simple theft) that take less time and effort to commit. In other words, the criminogenic potential may exist, but be bounded by increased guardianship that relegates offenders to these types of property crimes.

The relationship between ISD and BEC (Spearman's ρ = .320, p < .001) is the second strongest and can be considered moderate, while the relationship with TFA (Spearman's ρ = .288, p < .001) can be considered weak to moderate. When the

Table 5.1 Bivariate associations between logged property crime rates and halfway houses

	BER	BEC	MIS	TOA	TFA	OTH
Halfway houses (count)	-.027	.046	.048	.022	.044	.071*
Q1 neighbours[a]	-.061+	.097**	.139***	.113***	.154***	.189***
Inverse square distance	-.131***	.320***	.292***	.198***	.288***	.378***
Weighted inverse square distance	-.177***	.363***	.345***	.232***	.359***	.431***

+p < .10; *p < .05; **p < .01; ***p < .001.

a. Statistic shown is the measure of strength of association r for Mann-Whitney U. Variable is reverse coded (1 = not a neighbour; 0 = neighbour) for consistency in sign interpretation. All other rows show Spearman's correlations (rho).

proximity to halfway houses is weighted by the capacity of each facility, the strength of these relationships also appears to increase (respectively, Spearman's ρ = .363, p < .001; Spearman's ρ = .359, p < .001). The relationship between WISD and TFA can now be considered moderate and similar in magnitude to mischief and OTH, which speaks further to the possibility that proximity to halfway houses may have a stronger relationship with low-investment property offences. However, the relative strength of BEC's associations with ISD and WISD do not fit with this description, especially considering the fact that BEC is more frequently committed late in the evenings and early morning hours (Jenion, 2003), when guardianship is lowest and residents at halfway houses should be in observance of the curfews. Though the multivariate analyses below are necessary for more conclusive inferences, this significant correlation could support the hypothesis that halfway houses do contribute to local crime beyond the recidivism of supervised offenders residing therein, such as by increasing social disorganization and attracting other offenders to the area.

The weakest of the positive relationships with ISD (Spearman's ρ = .198, p < .001) and WISD (Spearman's ρ = .232, p < .001) are for TOA. This may be because of the seriousness of this type of offence and openness. Opportunities are frequently found in public and/or high-traffic areas. Offences such as BER and BEC, while also more serious and high-risk, also often offer concealment from the eyes of guardians after the initial act of break and enter.

It should be further highlighted that Spearman's correlations with all logged crime rates are higher for WISD than ISD, providing preliminary signs that the number of offenders residing at each facility contributes directly to a halfway house's criminogenic influence on the surrounding community. However, WISD also effectively shifts the relative distribution of the raw ISD measure so that higher values are concentrated in the

DTES community and the fringes of the central business district, which are expected to be high in crime for a myriad of other reasons than the two local halfway houses. The multivariate regression analyses in the next section should reveal whether this difference between ISD and WISD is a spurious artefact of other significant predictors of crime.

Focusing on the more immediate vicinities of CRFs, there does not appear to be a relationship between the number of halfway houses and logged crime rates, except for OTH, which has a very modest positive association (Spearman's $\rho = .071$, $p < .05$). That said, BEC ($r = .097$; $p < .01$), MIS ($r = .139$, $p < .001$), TOA ($r = .113$; $p < .001$), TFA ($r = .154$; $p < .001$), and OTH ($r = .189$, $p < .001$) are significantly higher in the DAs which border those with halfway houses, albeit also modestly and to slightly varying degrees. The neighbour variable is most strongly associated with OTH, which is consistent with results for other measures of exposure to halfway houses. Considering the mostly null findings for the count variable, these results support the notion of a buffer area around CRFs (Brantingham & Brantingham, 1981). Together with the positive relationships with ISD and WISD, this tentatively suggests that the risk of crime may increase with greater exposure to halfway houses but drop off inside their respective DAs. OTH is an exception, as it is significantly associated with all measures of exposure to CRFs. Lastly, in line with the findings above regarding ISD and WISD, the logged rate of BER is lower ($r = -.061$), though this relationship is weak and only marginally significant ($p < .10$).

More detailed insight into these relationships can be found in Table 5.2, which shows the logged property crime rates (Y) in each of the five DAs in Vancouver that contain halfway houses, as well as their lags (lagged Y) and spatial moving averages (SMAs) based on first order queen contiguity. Given the small sample of halfway houses, it is important to consider whether the relationships described above are predominantly driven by certain halfway houses. For BER, the logged rates of 3 of the 5 DAs with halfway houses dip below the means for DAs without them. This is reflected in the overall mean rates, lagged rates, and SMAs for all DAs with halfway houses, as well as the bivariate tests of association presented above. The exception is CRF_B[29] located in the DTES, with a logged rate ($Y = 3.15$) nearly 50% higher than non-CRF DAs (mean $Y = 2.10$); and CRF_D ($Y = 2.34$), located south of the central business district, although this

[29] When referencing this table, the acronym "CRF_i" refers to a DA with a halfway house, where the subscript i denotes the facility, corresponding to Table 4.1. For example, CRF_B in this case is the DA containing facility B, located in the central business district.

figure is only roughly 11% higher than non-CRF DAs. The lagged Y for both are quite small, however (CRF_B lagged Y = 1.99; CRF_D lagged Y = 1.56), which brings down their overall SMAs. The opposite can be said for other CRF DAs, however. CRF_C's lagged Y (3.03) is substantially higher than its own (Y = 1.45). CRF_{EF}'s lagged Y (2.02) is also higher than its own (Y = 1.39), but is still lower than the mean of all non-CRF DAs. Finally, CRF_A has a much lower logged rate (Y = 1.05) and lag (lagged Y = .951) than average. This explains why BER is lower overall in and around halfway houses (SMA = 1.77), but is only weakly associated, as evidenced by the low Spearman's correlations above.

Table 5.2 Means, lagged means, and spatial moving averages of logged property crime rates for DAs containing halfway houses

	Rate (n)	BER	BEC	MIS	TOA	TFA	OTH
CRF_A	Ln rate	1.05	4.53	4.85	2.51	6.19	6.20
	Lag (13)	.951 (.910)	4.53 (.685)	3.82 (1.31)	2.40 (1.01)	5.43 (.735)	5.00 (1.05)
	SMA (14)	.958 (.877)	4.53 (.660)	3.89 (1.29)	2.41 (.969)	5.48 (.734)	5.08 (1.06)
CRF_B	Ln rate	3.15	5.30	5.45	3.96	6.76	4.11
	Lag (7)	1.99 (.953)	5.52 (.339)	5.10 (.792)	3.14 (1.31)	6.27 (.875)	4.53 (1.01)
	SMA (8)	2.13 (.971)	5.50 (.326)	5.14 (.751)	3.24 (1.26)	6.34 (.834)	4.47 (.957)
CRF_C	Ln rate	1.45	4.52	1.70	.829	2.31	1.82
	Lag (6)	3.03 (.607)	1.76 (2.56)	.924 (.632)	.720 (.577)	2.42 (.256)	1.55 (1.26)
	SMA (7)	2.80 (.789)	2.15 (2.56)	1.03 (.645)	.736 (.535)	2.40 (.240)	1.59 (1.17)
CRF_D	Ln rate	2.34	4.36	.877	0	2.85	1.77
	Lag (7)	1.56 (1.45)	2.69 (2.38)	1.32 (.738)	1.20 (.635)	2.65 (.358)	1.59 (.845)
	SMA (8)	1.66 (1.38)	2.90 (2.29)	1.26 (.706)	1.05 (.714)	2.67 (.342)	1.61 (.793)
CRF_{EF}	Ln rate	1.39	4.43	1.98	.775	2.44	1.92
	Lag (9)	2.02 (.929)	3.67 (2.09)	1.99 (.561)	.812 (.750)	2.59 (.392)	1.78 (1.38)
	SMA (10)	1.96 (.901)	3.75 (2.00)	1.99 (.532)	.808 (.712)	2.57 (.374)	1.79 (1.31)
All CRF DAs	Mean (5)	1.88 (.768)	4.63 (.343)	2.97 (1.83)	1.61 (1.43)	4.11 (1.95)	3.16 (1.75)
	Lag (42)	1.75 (1.21)	3.81 (2.11)	2.81 (1.75)	1.74 (1.30)	4.07 (1.71)	3.17 (1.95)
	SMA (47)	1.77 (1.17)	3.90 (2.01)	2.83 (1.76)	1.73 (1.31)	4.07 (1.74)	3.17 (1.93)
Non-CRF DAs	Mean (988)	2.10 (1.12)	2.48 (2.63)	1.62 (1.11)	1.04 (.971)	2.75 (1.10)	1.43 (1.49)
	Mean-nb. (946)	2.12 (1.12)	2.42 (2.64)	1.57 (1.04)	1.01 (.941)	2.69 (1.02)	1.36 (1.41)
All DAs	Mean	2.10 (1.12)	2.49 (2.63)	1.63 (1.12)	1.04 (.974)	2.76 (1.11)	1.44 (1.49)

All figures reported are based on logged property crime rates. Lags are computed based on first order queen contiguity. Standard deviations are in parentheses. SMA = spatial moving average. "Mean-nb" refers to the DAs in the study area minus those with halfway houses and their neighbours.

Overall, BEC does appear to be substantially higher in DAs with halfway houses (mean Y = 4.63) than DAs without halfway houses (mean Y = 2.48). These logged rates are quite consistent as well, ranging from 4.36 (CRF_D) to 5.30 (CRF_B). The latter is again expected to be high because of its location in a commercial space in the DTES. Apart from CRF_A and CRF_B, the logged rates in the neighbours of DAs with halfway houses are substantially lower than the logged rates within DAs with halfway houses themselves. The lagged Ys of CRF_D (2.69), and CRF_{EF} (3.67) are still higher than DAs without halfway houses, whereas CRF_C (lagged Y = 1.76) is the only one whose neighbours logged rates are below average. That these logged rates are lower than those for CRF_A and CRF_B may reflect that the other halfway houses are in primarily residential areas, but the fact that they are still above average overall does suggest a meaningful difference.

The logged rate of mischief in CRF DAs is 2.97 (lagged Y = 4.62), which is 83.3% higher than the logged rate of 1.62 in non-CRF DAs. The logged rate in CRF_D (Y = .877, lagged Y = 1.32), however, is lower than the logged rate for non-CRF DAs. CRF_C (Y = 1.70, lagged Y = .924) and CRF_{EF} (Y = 1.98, lagged Y = 1.99) are higher, but the overall observed difference in MIS appears to be driven mostly by CRF_A (Y = 6.77, lagged Y = 5.94) and CRF_B (Y = 6.42, lagged Y = 6.45). This is not unexpected, given the tendency for destruction/defacement of property to be higher in more urban areas with greater concentrations of liquor outlets, commercial activity, pronounced night life, and expected anonymity. The lower rates around other DAs with halfway houses are likely due in part to the “quieter” residential milieu. Differences between logged mischief rates in CRF DAs and their lags is inconsistent, with there being little difference for CRF_B and CRF_{EF}, but the lag being noticeably larger for CRF_D, and lower in CRF_A and CRF_C.

For TOA, the logged rate appears to be substantially higher for CRF DAs (mean Y = 1.61, lagged Y = 1.74) compared to non CRF DAs (mean Y = 1.04, mean Y excluding CRF neighbours = 1.01). However, this difference again appears to be driven mostly by CRF_A (Y = 2.51, lagged Y = 2.40) and CRF_B (Y = 3.96, lagged Y = 3.14). CRF_D had zero thefts of vehicle in 2016, while CRF_C (Y = .829, lagged Y = .720) and CRF_{EF} (Y = .775, lagged Y = .812) are also below the average for non-CRF DAs. It is more than likely that other elements within CRF_A and CRF_B (e.g., parkades) contribute to the above average logged rates of TOA than the halfway houses themselves, although it

should not be ignored that 4 of the 5 CRF DAs (80%) have any theft of auto when 349 of the 993 DAs (35.1%) do not.

The logged rate of TFA is also higher in DAs with halfway houses on average (mean Y = 4.11) and their surrounding areas (lagged Y = 4.07) compared to all other DAs (mean Y = 2.75, mean Y excluding neighbours = 2.69). However, this overall difference appears to come again from the above-average levels of crime around CRF_A (Y = 6.19, lagged Y = 5.43) and CRF_B (Y = 6.76, lagged Y = 6.27), likely for the same reasons that TOA is much higher in these locations. Both these facilities are in major shopping districts, resulting in a high concentration of potential TFA targets, such as vehicles with forgotten valuables and the spoils of a successful shopping trip. CRF_C (Y = 2.31, lagged Y = 2.42) and CRF_{EF} (Y = 2.44, lagged Y = 2.59) both have lower logged rates of TFA compared to the mean logged TFA rates of non-CRF DAs, while CRF_D (logged rate = 2.85, lag = 2.65) is only slightly higher. The lagged rates for each CRF DA are also very similar to these DAs' own logged rates, except for CRF_A, which has a logged rate that is .76 higher than its lag. Overall though, there is no discernible buffer effect.

Finally, the mean logged rate of OTH in DAs with halfway houses (mean Y = 3.16, lagged Y = 3.17) is more than double that of DAs without (mean Y = 1.43, mean Y excluding neighbours = 1.36). All individual DAs with halfway houses have logged rates higher than the average rates of DAs without halfway houses, although the overall difference is again inflated by CRF_A (Y = 6.20, lagged Y = 4.11) and CRF_B (Y = 4.11, lagged Y = 4.53). In CRF_C (Y = 1.82, lagged Y = 1.55), CRF_D (Y = 1.77, lagged Y = 1.59), and CRF_{EF} (Y = 1.92, lagged Y = 1.78), the levels of other crime are only slightly higher than for non-CRF DAs. One more noteworthy observation is that with the exception of CRF_B, the lagged OTH values are higher than in the CRF DAs themselves, which provides evidence of a very weak buffer zone around halfway houses for this particular crime type.

Thus, with the exception of BER, the logged property crime rates in DAs with CRFs as well as their neighbouring DAs are higher than in the other DAs in the study area. Once examined individually, however, these higher logged rates on average appears to be driven by two or three of the DAs with halfway houses in an expected way, given the high saturations of environmental risk factors in and around these areas.

The fact that these individual differences for DAs with halfway houses are not consistent across crime type further speaks to the possibility that there is no general criminogenic force exerted by halfway houses on the host communities. It is perhaps more likely that these differences are the results of other forces in the neighbourhood, but the argument can also be made that these inconsistencies can be attributed to the number of offenders in each facility. Indeed, CRF_A and CRF_B contain the two most populous halfway houses. There is also some evidence of a small buffer zone, as the lagged values for each dependent variable are inconsistently higher or lower in the immediately surrounding areas. That said, the lack of statistical power flowing from the small sample size of halfway houses in Vancouver makes this finding inconclusive.

The statistically significant bivariate relationships between the logged property crime rates and the various measures of exposure to halfway houses, along with the overall differences in the values of these dependent variables when comparing non-CRF DAs to those in and around halfway houses together show a superficial empirical basis for increases in crime prevention and public safety measures for these facilities. The regression analyses that follow should tell a more conclusive story of whether a meaningful relationship exists between halfway houses and crime rates after controlling for many of these environmental risk factors. Models containing the WISD variable should also shed light on whether the higher levels of crime around CRF_A and CRF_B can indeed be attributed to the number of available beds in each facility.

5.2. Spatial regression results

5.2.1. Residential break and enter

Results of the spatial regression analyses for BER are reported in Table 5.3. The negative coefficients of all measures of exposure to halfway houses are consistent with the preliminary analyses showing that the logged rate of BER is lower on average around halfway houses, but none are significant at $p < .05$. This remains after accounting for spillover effects on the rate of BER from the spatial autoregressive process, shown in Table 5.4. The second column of Table 5.3 shows the count of halfway houses and neighbour dummy variable added to the control model. A one-

halfway-house increase in a DA is associated with a 37.9%[30] reduction (β = -.476; p > .10) in the rate of BER when all other variables are held constant: a notable decrease, but not significant, probably because of low statistical power associated with the limited variation in the number of CRFs across DAs and inconsistencies in the observed change described in the previous section. The immediate neighbours of those DAs also have a lower BER (-16.5%; β = -.181, p > .10) after controlling for other environmental risk factors. The ISD (-.862%; β = -.009; p > .10) and WISD (-.303%; β = -.003; p > .10) models similarly show a reduction on average in the level of BER as the proximity of DAs to halfway houses increases. In any case, the non-significance of these coefficients indicates that the significant negative correlation between proximity to halfway houses and BER detected at the bivariate level is spurious. The relative unimportance of halfway houses in predicting BER can also be seen in the change in pseudo spatial R^2, which increases only slightly from the control model. Whereas the pseudo spatial R^2 is .273 when all control variables are entered, the halfway house count model has a spatial pseudo R^2 of .275 (increase by .002). The ISD and WISD models both have spatial pseudo R^2 values of .274 (increase by .001).

Among the control variables, a greater proportion of the sociodemographic variables than criminogenic places emerge as significant predictors of BER. The significance of all variables is unchanged across all four models, except for the count of SkyTrain stations, which is marginally significant (p < .10) in the control and CRF count models, but not in the ISD or WISD models. Of the three social disorganization variables in the control model, economic deprivation (β = -.106; p < .01) and residential instability (β = -.156; p < .001) are significant negative predictors of BER. Specifically, one-unit increases in these two variables are associated with 10.0% and 14.4% decreases in the average DA's number of BERs per 1000 private dwellings, respectively. Though social disorganization theory predicts these values to be positively associated with crime, the results make sense in the specific context of BER. Lower levels of socioeconomic deprivation tend to be associated with more affluent neighbourhoods with much more valuable targets for burglary. Lower rates of population turnover may also characterize neighbourhoods with families invested in increasing the values of their homes and

[30] All percentages reported reflect percent changes in true rates of crime – calculated by exponentiating the coefficients, subtracting 1, and multiplying the difference by 100 – as opposed to changes in logged crime rate.

standards of living, similarly resulting in neighbourhoods with more attractive targets and therefore higher rates of BER.

Table 5.3 Spatial lag models of the relationship between residential B&E and halfway houses, controlling for other environmental risk factors

	(1) Control	(2) Count	(3) ISD	(4) WISD
	β (SE)	*β* (SE)	*β* (SE)	*β* (SE)
Constant	.825 (.569)	.758 (.568)	.794 (.571)	.818 (.570)
ρ (rho)	.711 (.094) ***	.717 (.094) ***	.711 (.094) ***	.710 (.094) ***
Sociodemographic variables				
% dwellings not regularly occupied	.017 (.006) **	.017 (.006) **	.017 (.006) **	.017 (.006) **
% housing in need of major repairs	-.001 (.006)	-.001 (.006)	-.001 (.006)	-.001 (.006)
% males aged 15-24	.012 (.012)	.013 (.012)	.013 (.012)	.013 (.012)
Average weeks worked in a year	-.012 (.012)	-.011 (.012)	-.011 (.012)	-.012 (.012)
Counts of graffiti	.001 (.003)	.001 (.003)	.001 (.003)	.001 (.003)
Density of population (ambient)[a]	3.51 (1.40) *	3.79 (1.40) **	3.57 (1.39) **	3.51 (1.38) *
Density of population (residential)[a]	-1.45 (.473) **	-1.44 (.47) **	-1.46 (.47) **	-1.45 (.47) **
Economic deprivation	.-.106 (.038)**	-.108 (.038) **	-.107 (.038) **	-.106 (.038) **
Ethnic heterogeneity	-.110 (.254)	-.102 (.254)	-.112 (.254)	-.110 (.254)
Residential instability	-.156 (.041)***	-.151 (.041)***	-.154 (.041)***	-.155 (.041)***
Potentially criminogenic places				
Community centres	-.137 (.193)	-.146 (.193)	-.137 (.193)	-.137 (.193)
Convenience stores and pharmacies	-.001 (.045)	.010 (.046)	.001 (.045)	-.000 (.045)
DTES	.716 (.224) **	.750 (.227) ***	.731 (.225) **	.721 (.226) **
Financial institutions	-.015 (.056)	-.013 (.056)	-.014 (.056)	-.015 (.056)
Gas stations	.200 (.112) +	.201 (.112) +	.203 (.112) +	.201 (.112) +
Homeless shelters	.182 (.164)	.244 (.171)	.300 (.252)	.223 (.272)
Liquor stores	.041 (.097)	.032 (.097)	.042 (.097)	.042 (.097)
Parkades	.007 (.040)	.009 (.040)	.006 (.040)	.007 (.040)
Parks	-.022 (.045)	-.021 (.045)	-.021 (.045)	-.022 (.045)
Pubs, clubs, and bars	.054 (.056)	.064 (.056)	.054 (.056)	.054 (.056)
Restaurants with liquor service	.014 (.019)	.014 (.019)	.013 (.019)	.014 (.019)
Retail dealers	-.014 (.007) *	-.014 (.007) *	-.014 (.007) *	-.014 (.007) *
Schools	.050 (.057)	.054 (.058)	.051 (.057)	.051 (.057)
SkyTrain stations	.367 (.222) +	.367 (.221) +	.361 (.222)	.365 (.222)
Supermarkets and other grocers	.025 (.022)	.022 (.022)	.024 (.022)	.025 (.022)
Theatres & other entertain. venues	-.129 (.099)	-.125 (.100)	-.128 (.099)	-.128 (.099)
Halfway houses				
Halfway houses (count)	–	-.476 (.360)	–	–
Q1 neighbours	–	-.181 (.159)	–	–
Inverse square distance	–	–	-.009 (.014)	–
Weighted inverse square distance	–	–	–	-.003 (.016)
Model-fit statistics				
Pseudo R^2	.331	.333	.331	.331
Spatial pseudo R^2	.273	.275	.274	.274

+p < .10; *p < .05; **p < .01; ***p < .001.

[a]: values are written in scientific notation by 10^{-5}. Lag is computed from 3rd order queen contiguity.

Table 5.4 Simulated impacts of halfway houses on logged rate of residential B&E at equilibrium including spillover effects from lagged Y

	Direct effects		Indirect effects		Total effects	
	β	SE	*β*	SE	*β*	SE
Halfway houses (count)	-.488	.392	-1.19	3.94	-1.68	4.10
Q1 neighbours	-.185	.159	-.452	1.41	-.637	1.48
Inverse square distance	-.009	.015	-.021	.078	-.030	.088
Weighted inverse square distance	-.003	.016	-.007	.070	-.010	.082

+p < .10; *p < .05; **p < .01; ***p < .001.
Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.3 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

Both measures of population density are significantly associated with BER, although their signs are reversed. An increase of 1000 people per square-kilometer in a DA's ambient population is associated with a 3.57% increase in the rate of BER (β = 3.51 x 10^{-5}; p < .05), while a 1000-person increase in residential population density per square-kilometer is associated with a 1.44% decrease in a DA's rate of BER (β = -1.45 x 10^{-5} p < .01). The positive coefficient for ambient density suggests that BER tends to be a commuter offence, wherein offenders travel outside their own communities to commit these crimes, but that a higher residential population density generates more guardianship. This idea is supported by the positive coefficient for the percentage of dwellings not regularly occupied (+1.76%; β = .017; p < .01), as a lower rate of occupancy indicates lower potential for guardianship from residents. However, testing this possibility with interaction effects is beyond the scope of this thesis. Another interpretation is that areas with high residential densities past a certain threshold may be more likely to have apartment buildings that are more difficult to break into.

Of the criminogenic places, the DTES, gas station, retail dealer, and SkyTrain station variables are all either significant (p < .05) or marginally significant (p < .10). In the control model, DAs that are part of the DTES have a rate of BER that is 105% higher on average with all else held constant (β = .716; p < .01). The number of retail dealers is associated with a 1.39% decrease in the rate of BER (β = -.014; p < .05). This could be because the type of housing commonly found in DAs with a large number of retail stores is often more secure and difficult to break into (e.g., apartments, especially those in high-rises). Increasing the number of gas stations in a DA by one is associated with a 22.2% increase in BER, but this finding is only marginally significant (β = .200; p < .10). The positive relationship is to be expected, as gas stations can be a conduit for outsiders to enter a neighbourhood other than their own and notice opportunities. Gas stations

represent an “edge” in the neighbourhood, where local residents expect to see unfamiliar faces and may struggle to distinguish potential offenders from those with more legitimate intentions (Brantingham & Brantingham, 1981; 1993b). Lastly, SkyTrain stations (β = .367; p <.10) are also associated with a higher rate of BER for likely the same reason, as such a large volume of commuters utilize the SkyTrain system in Vancouver. Increasing the number of SkyTrain stations in a DA by 1 is associated with a 44% increase in the rate of BER. However, as stated above, this association is not robust and is marginally significant only for the control and CRF count models.

5.2.2. Commercial break and enter

Table 5.5 shows the results of spatial regression for the logged rate of BEC. Just as with BER, none of the halfway house variables are significant at the p < .05 level. This remains after accounting for spillovers from the spatial autoregressive process in BEC, shown in Table 5.6. Contrary to the Spearman’s correlations reported in Table 5.1 and the differences in BEC reported in Table 5.2, the count of halfway houses is actually associated with a decreased BEC rate (-6.53%; β = -.068; p > .10). This is the same for the immediate neighbours, which have a BEC rate 38.2% lower on average than other DAs (p > .10) in the study area. In contrast, ISD (+.945%; β = .009; p > .10) and WISD (+1.20%; β = .012; p > .10) are positively associated with BEC. Nevertheless, the non-significance of the estimates reveal that the significant positive relationships reported in Table 5.1 between BEC and the proximity to halfway houses at the bivariate level are spurious and likely driven by the confounding effects of the control variables tested here. The unimportance of correctional halfway houses after controlling for sociodemographic factors and criminogenic places is especially evident in the changes, or lack thereof, in spatial pseudo R^2 across models. With a spatial pseudo R^2 of .328 in the control model, the spatial pseudo R^2 in the CRF count model actually decreases slightly by .002 to a value of .326. This indicates that the inclusion of the number of halfway houses and immediate neighbours of DAs containing them makes the model explain less of the variance in BEC than before, thus performing worse. Both the ISD and WISD models have a spatial pseudo R^2 of .328, identical to the control model.

The significance of all control variables is consistent across each of the four models. Residential instability is the only social disorganization variable significantly associated with BEC. Consistent with social disorganization theory, a one-unit increase

Table 5.5 Spatial lag models of the relationship between commercial B&E and halfway houses, controlling for other environmental risk factors

	(1) Control	(2) Count	(3) ISD	(4) WISD
	β (SE)	*β* (SE)	*β* (SE)	*β* (SE)
Constant	-1.01 (1.20)	-1.11 (1.21)	-.981 (1.21)	-.978 (1.21)
ρ (rho)	.673 (.101) ***	.689 (.104) ***	.676 (.102) ***	.675 (.101) ***
Sociodemographic variables				
% dwellings not regularly occupied	-.018 (.015)	-.018 (.015)	-.018 (.015)	-.018 (.015)
% housing in need of major repairs	.003 (.014)	.003 (.014)	.003 (.014)	.003 (.014)
% males aged 15-24	-.053 (.028) +	-.050 (.029) +	-.054 (.028) +	-.054 (.028) +
Average weeks worked in a year	.043 (.028)	.044 (.028)	.042 (.028)	.042 (.028)
Counts of graffiti	.007 (.006)	.007 (.006)	.008 (.006)	.008 (.006)
Density of population (ambient)[a]	.121 (3.30)	.337 (3.26)	.030 (3.25)	.094 (3.25)
Density of population (residential)[a]	2.30 (1.03) *	2.23 (1.03) *	2.30 (1.03) *	2.30 (1.03) *
Economic deprivation	.139 (.090)	.137 (.090)	-.359 (.643)	.140 (.090)
Ethnic heterogeneity	-.368 (.643)	-.313 (.647)	.141 (.090)	-.364 (.643)
Residential instability	.287 (.098) **	.289 (.098) **	.284 (.098) **	.285 (.098) **
Potentially criminogenic places				
Community centres	.-.180 (.448)	.124 (.106)	-.181 (.448)	-.181 (.448)
Convenience stores and pharmacies	.109 (.105)	.124 (.106)	.107 (.105)	.107 (.105)
DTES	.493 (.554)	.539 (.556)	.472 (.555)	.470 (.556)
Financial institutions	.188 (.130)	.196 (.130)	.187 (.130)	.186 (.130)
Gas stations	.657 (.260) *	.647 (.261) *	.655 (.261) *	.654 (.261) *
Homeless shelters	-.084 (.381)	-.077 (.397)	-.212 (.588)	-.247 (.632)
Liquor stores	.059 (.226)	.051 (.226)	.058 (.226)	.057 (.226)
Parkades	-.108 (.092)	-.113 (.093)	-.107 (.0922)	-.107 (.092)
Parks	.289 (.106) **	.288 (.106) **	.288 (.106) **	.289 (.106) **
Pubs, clubs, and bars	-.235 (.130) +	-.228 (.131) +	-.235 (.130) +	-.235 (.130) +
Restaurants with liquor service	.083 (.045) +	.084 (.045) +	.084 (.045) +	.084 (.045) +
Retail dealers	-.009 (.016)	-.009 (.016)	-.009 (.016)	-.009 (.016)
Schools	.438 (.133) **	.434 (.134) **	.437 (.133) **	.438 (.133) **
SkyTrain stations	.473 (.515)	.476 (.515)	.480 (.515)	.482 (.515)
Supermarkets and other grocers	.077 (.050)	.072 (.050)	.077 (.050)	.077 (.050)
Theatres & other entertain. venues	-.373 (.231)	-.358 (.231)	-.375 (.231)	-.375 (.231)
Halfway houses				
Halfway houses (count)	–	-.068 (.838)	–	–
Q1 neighbours	–	-.324 (.376)	–	–
Inverse square distance	–	–	.009 (.033)	–
Weighted inverse square distance	–	–	–	.012 (.037)
Model-fit statistics				
Pseudo R^2	.344	.345	.344	.344
Spatial pseudo R^2	.328	.326	.328	.328

+p < .10; *p < .05; **p < .01; ***p < .001.

[a]: values are written in scientific notation by 10^{-5}. Lag is computed from 4th order queen contiguity.

in residential instability is associated with a 28.5% increase in the rate of BEC (β = .287; p < .01). Residential population density is also significant and positively albeit subtly related ($\beta = 2.30 \times 10^{-5}$; p < .05) – a 1000-person increase per square kilometer is

Table 5.6 Simulated impacts of halfway houses on logged rate of commercial B&E at equilibrium including spillover effects from lagged Y

	Direct effects		Indirect effects		Total effects	
	β	SE	*β*	SE	*β*	SE
Halfway houses (count)	-.068	.909	-.148	3.06	-.217	3.82
Q1 neighbours	-.328	.401	-.712	2.09	-1.04	2.39
Inverse square distance	.010	.034	.020	.130	.029	.157
Weighted inverse square distance	.012	.040	.025	.129	.037	.164

+p < .10; *p < .05; **p < .01; ***p < .001.
Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.5 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

associated with a 2.33% increase in the BEC rate – while the coefficient for ambient population density is not significant. That a higher concentration of residents is related to an increase in the BEC rate suggests that it is more often locals that commit these offences, contrary to BER. Last among the sociodemographic variables, the percentage of males aged 15-24 is marginally associated with BEC (-5.20%; β = -.053, p < .10), but the relationship is negative. This is unexpected given the robust findings on the age-crime curve discussed above (Farrington et al., 2013; McGee & Farrington, 2010; Moffitt, 1993) as well as the frequent observation that males offend at a higher rate overall than females (Broidy & Agnew, 1997; Piquero et al., 2005). That said, it may be the case that if young offenders face higher levels of supervision in their home DAs, they may be commuting away from home to commit these offences (Felson, 1987). This possibility is consistent with Brantingham and Brantingham's (1981) discussion of buffer zones, which may apply more to young offenders who are at increased risk of being recognized by parents or guardians compared to adults living more independently. A neighbourhood where a high percentage of the population is less willing to offend close to home should theoretically be associated with lower levels of crime. Furthermore, many youths in this age-range are occupied with schooling and other activities that either take up their time or keep them away from their home DAs. For these reasons, their offending behaviour may be geographically anchored to the venues for these activities rather than home.

Gas stations, parks, and schools are all significantly positively associated with BEC. In the control model, an increase of one in the number of gas stations is associated with a 92.3% increase in the BEC rate (β = .657; p <.05). While businesses naturally attract outsiders who may exploit these places as opportunities for crime, nearby gas stations may compound this effect by attracting others who are more used to frequenting other commercial areas in the course of their routine activities. This is also a

potential explanation for the positive relationship between the number of parks intersecting a DA and BEC (+33.5%; β = .289; p < .01). Another reason for parks' positive influence on BEC could be the usual timing of the offence. Research on the temporal patterns of BEC in Vancouver have shown this offence to be committed primarily at night outside of business hours. Given that parks tend to be (mostly) empty during dark hours, they provide excellent hiding places for offenders waiting to seize an opportunity for this type of offence. Last among the significant results, the addition of one school to a DA corresponds to a 54.9% increase in the rate of BEC (β = .438; p < .01). This is consistent with the marginally significant negative relationship between BEC and the percentage of males aged 15-24 discussed above. Delinquent youth may spend a large portion of their time away from home and use other nodes such as school as an anchor point for offending. Unlike the home node, social controls may not extend far beyond school property. The pool of potential co-offenders is also very high in schools, which cannot be ignored since youth offending is very often a group-based phenomenon. Even if youth are not enrolled in a particular school, many schools have attractive features that make them similar in function at times to parks. Lastly, two variables have marginally significant associations with the logged BEC rate in Vancouver. A one-unit increase in the number of restaurants with liquor service is associated with an 8.80% increase in the rate of BEC (β = .083; p < .10), whereas a one-unit increase in the number of pubs, bars, and clubs is associated with a 26.5% decrease in BEC (β = .235; p < .10). The positive association with restaurants serving liquor is consistent with the literature (e.g., Cordilia, 1985; Gorman et al., 2013). The negative association with pubs, bars, and clubs may be due to the increased guardianship in the form of bouncers and other forms of security at these venues, as well as the likely higher focus of patrons' attention on each other relative to their inanimate surroundings. This may result in a higher risk of violent offending and mischief as opposed to commercial break and enter.

5.2.3. Mischief

Spatial regression results for mischief are contained in Table 5.7. Although neither the count of halfway houses in each DA (-11.4%; β = -.121; p > .10), nor the neighbours of DAs with halfway houses (+18.5%; β = .169; p > .10) are significantly associated with the risk of victimization, both measures of proximity, ISD (+2.03%; β =

Table 5.7 Spatial lag models of the relationship between mischief and halfway houses, controlling for other environmental risk factors

	(1) Control	(2) Count	(3) ISD	(4) WISD
	β (SE)	*β* (SE)	*β* (SE)	*β* (SE)
Constant	-.213 (.390)	-.163 (.386)	-.147 (.388)	-.160 (.389)
ρ (rho)	.583 (.084) ***	.568 (.083) ***	.583 (.083) ***	.584 (.083) ***
Sociodemographic variables				
% dwellings not regularly occupied	-.005 (.005)	-.005 (.005)	-.004 (.005)	-.004 (.005)
% housing in need of major repairs	.013 (.006) *	.013 (.006) *	.013 (.006) *	.013 (.006) *
% males aged 15-24	.025 (.011) *	.024 (.011) *	.024 (.011) *	.024 (.011) *
Average weeks worked in a year	.019 (.009) *	.019 (.009) *	.017 (.009) *	.017 (.009) *
Counts of graffiti	–	–	–	–
Density of population (ambient)[a]	-4.73 (1.29)***	-4.87 (1.31)***	-4.83 (1.29)***	-4.70 (1.29)***
Density of population (residential)[a]	1.58 (.53) **	1.63 (.54) **	1.59 (.53) **	1.58 (.53) **
Economic deprivation	.107 (.032) ***	.109 (.032) ***	.109 (.032) ***	.109 (.032) ***
Ethnic heterogeneity	-.161 (.223)	-.179 (.223)	-.157 (.223)	-1.61 (.223)
Residential instability	.148 (.045) **	.146 (.046) **	.146 (.045) **	.147 (.045) **
Potentially criminogenic places				
Community centres	.113 (.093)	.116 (.092)	.119 (.090)	.118 (.090)
Convenience stores and pharmacies	.120 (.032) ***	.113 (.034) ***	.116 (.032) ***	.117 (.032) ***
DTES	.748 (.223) ***	.725 (.220) **	.738 (.219) ***	.738 (.219) ***
Financial institutions	-.047 (.040)	-.052 (.040)	-.048 (.040)	-.048 (.040)
Gas stations	-.049 (.080)	-.040 (.081)	-.053 (.080)	-.053 (.080)
Homeless shelters	.089 (.097)	.109 (.105)	-.177 (.160)	-.205 (.181)
Liquor stores	-.030 (.074)	-.027 (.073)	-.025 (.075)	-.025 (.075)
Parkades	-.028 (.029)	-.023 (.027)	-.026 (.029)	-.026 (.028)
Parks	-.045 (.036)	-.045 (.036)	-.045 (.036)	-.044 (.036)
Pubs, clubs, and bars	.035 (.047)	.034 (.044)	.033 (.046)	.033 (.046)
Restaurants with liquor service	.048 (.014) ***	.047 (.014) ***	.051 (.014) ***	.051 (.014) ***
Retail dealers	-.002 (.005)	-.002 (.005)	-.002 (.005)	-.002 (.005)
Schools	.063 (.036) +	.068 (.036) +	.061 (.036) +	.062 (.036) +
SkyTrain stations	.073 (.134)	.071 (.133)	.076 (.132)	.076 (.133)
Supermarkets and other grocers	.037 (.024)	.039 (.023) +	.037 (.024)	.037 (.024)
Theatres & other entertain. venues	-.042 (.077)	-.051 (.075)	-.035 (.075)	-.034 (.075)
Halfway houses				
Halfway houses (count)	–	-.121 (.211)	–	–
Q1 neighbours	–	.169 (.160)	–	–
Inverse square distance	–	–	.020 (.075) **	–
Weighted inverse square distance	–	–	–	.022 (.009) *
Model-fit statistics				
Pseudo R^2	.520	.521	.522	.521
Spatial pseudo R^2	.517	.519	.519	.519

+p < .10; *p < .05; **p < .01; ***p < .001.

[a]: values are written in scientific notation by 10^{-5}. Lag is computed from 4th order queen contiguity.

.020; p < .01) and WISD (+2.25%; *β* = .022; p < .05) are significantly associated with higher rates of mischief. After factoring in the positive spatial autoregressive process (*ρ* = .583; p < .001), Table 5.8 shows that a one-unit increase in ISD is associated with a

Table 5.8 Simulated impacts of halfway houses on logged rate of mischief at equilibrium including spillover effects from lagged Y

	Direct effects		Indirect effects		Total effects	
	β	SE	*β*	SE	*β*	SE
Halfway houses (count)	-.121	.220	-.158	.303	-.279	.517
Q1 neighbours	.171	.161	.222	.216	.393	.369
Inverse square distance	.020 **	.007	.028 +	.018	.049 *	.023
Weighted inverse square distance	.023 *	.010	.031	.020	.054 *	.028

+p < .10; *p < .05; **p < .01; ***p < .001.
Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.7 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

2.05% increase in the rate of mischief (β = .020; p < .01), and an additional 2.82% increase across all other DAs in the study area, though this indirect effect is only marginally significant (β = .028; p < .10). Similarly, a one-unit increase in a DA's WISD is significantly associated with a 2.29% increase in the mischief rate within that DA (β = .023; p < .05), but the indirect effect of a 3.19% increase cumulatively across all other DAs in Vancouver is nonsignificant (β = .031; p > .10). That said, the total effects (Table 5.8) shown for both variables are significant at the p < .05 level. A one-unit increase in ISD is associated with a cumulative 4.99% (β = .049) increase in the mischief rate across all DAs. Interpreted differently, if the ISD increased by one unit in all DAs (e.g., by adding halfway houses), the rate of mischief would increase by 4.99% in the average DA. This total effect is higher for WISD, where a one-unit increase for all DAs (e.g., addition of halfway houses and/or beds) results in a 5.56% (β = .054) increase in the average DA's rate of mischief. This greater effect for WISD supports the postulation that the number of offenders residing at each facility play a role in defining its criminogenic influence on the surrounding community. It more specifically supports the status of these facilities as crime generators if one assumes that this result directly reflects recidivism. This assumption, though plausible, is purely speculative without data on recidivism itself. The difference in coefficients is also small, suggesting that the presence of a CRF itself may be more important than the offenders therein, either functioning as crime attractors or otherwise changing the neighbourhood milieu to be more conducive to crime.

Despite these significant results, the magnitude of both coefficients is small and changes in spatial pseudo R^2 from the control model after adding ISD and WISD shown in Table 5.7 are minimal. The spatial pseudo R^2 is .517 in the control model and .519 in both the ISD and WISD models, for a change of only .002. Thus, while the overall proximity to halfway houses, especially after adjusting for the number of beds at each

facility, are significantly associated with higher risk of victimization for mischief, the contribution is minor. Sociodemographic variables and other criminogenic places, most of which are faced with less community opposition compared to halfway houses, appear to play a much larger role. Furthermore, the identical spatial pseudo R^2 for both the ISD and WISD models suggests that accounting for the capacity of each facility does not contribute to a significantly better explanation of existing patterns of mischief, despite the higher coefficient for the latter. This is consistent with the conclusion above drawn from the small difference in coefficients and supports the supposition of halfway houses more as crime attractors than generators.

As shown in Table 5.7, the significance of control variables is consistent across models. Among the social disorganization variables, economic deprivation (+11.2%; β =.107; $p < .001$) and residential instability (+15.9%; $\beta = .148$; $p < .01$) are both significantly and positively associated with the rate of mischief. This is congruent with the expectations of social disorganization theory. The percentage of housing in need of major repairs (+1.32%; $\beta = .013$; $p < .05$) is also significantly associated with an increase in the risk of victimization for mischief and consistent with the broken windows hypothesis that increased levels of dilapidation in a neighbourhood may signal reduced care for or investment in a neighbourhood and therefore lower risk of apprehension for offenders (Wilson & Kelling, 1982). In this case, higher levels of property damage reduce social cohesion in the neighbourhood and invite the destruction or defacement of more property. The other physical measure of neighbourhood disorder, graffiti, is excluded from the models because it is a form of mischief and would be tautological to include. The percentage of houses in major need of repairs is retained, however, because there are countless other more likely reasons than mischief for a house to need such repairs (e.g., natural causes such as flooding; faulty or outdated building materials, wiring, and plumbing; and normal wear over time). Changes in coefficients after introducing ISD and WISD are very small and likely do not represent any mediating effect.

Four of the RAT variables are significantly and positively associated with mischief: the percentage of males aged 15-24 (+2.57%; $\beta = .025$; $p < .05$), average number of weeks worked in a year (+1.89%; $\beta = .019$; $p < .05$), and residential population density (+1.59% x 10^{-5}; $\beta = 1.58 \times 10^{-5}$; $p < .01$). The positive result for percentage of males aged 15-24 is expected because of the frequency with which young males engage in these types of offences, but contrary to the findings with respect to

BEC. A simple explanation for this difference could be temporal, since the times when guardianship is lowest (after business hours) for BEC (Jenion, 2003) are times when youth may have the most supervision. Youth may also perceive it unwise to do something as serious and high-risk as break into a business, but doing graffiti or setting a fire can be far less risky from an apprehension point of view. Similarly, the average hours worked is consistent with the hypothesis that less time spent at work equates to more time available for committing crime, or at least more time spent in situations where the temptation of this offence is present. The positive relationship between residential population density and mischief is also expected because higher concentrations of residents, assuming the proportion of residents who are potential offenders is somewhat consistent across DAs, should predict a higher risk of crime. Conversely, ambient population is the only sociodemographic variable included that is negatively associated with mischief (-4.62%; $\beta = -4.73 * 10^{-5}$; $p < .001$). The opposite signs of coefficients for residential population and ambient population density suggests that it is either residents who are committing these crimes more often or that housing associated with high residential density is more susceptible to mischief (e.g., mischief may be easier to commit around storefronts and alleys typical around apartment buildings or on apartment buildings themselves compared to detached houses), but that this may be moderated by natural surveillance and vigilance of a more highly concentrated ambient population. The coefficients in the ISD and WISD models are identical to the control model, except for average weeks worked, where β decreases by .002. However, this is a very small difference and likely does not represent any mediating effects from the proximity to halfway houses or spuriousness.

There are four criminogenic places that are either significant or marginally significant. In model 1, the rate of mischief is 111% higher in the DTES than all other DAs in Vancouver on average ($\beta = .748$; $p < .001$), but the coefficient is slightly lower after accounting for either ISD or WISD (both +109%; $\beta = .738$; $p < .001$). While the difference may seem trivial, it suggests that a very small portion of the DTES's substantially higher risk of victimization can be attributed to halfway houses. The positive effect of convenience stores and pharmacies on the mischief rate also reduces slightly from a 12.7% ($\beta = .120$; $p < .001$) increase per store to 12.3% ($\beta = .116$; $p < .001$) and 12.4% $\beta = .117$ ($\beta = .117$; $p < .001$) after introducing ISD and WISD respectively. Conversely, the effect of restaurants with liquor service on the logged rate, which is also

positive and highly significant ($p < .001$), increases slightly from the control model (+4.89%; $\beta = .048$) to the ISD and WISD models (both roughly +5.2%; $\beta = .051$). Lastly, each additional school is associated with a marginally significant 6.53% increase in the average DA's mischief rate ($\beta = .063$; $p < .10$), which is expected given the significant association found for the percentage of males aged 15-24 found above. Arguably the highest concentration of this population outside of their homes is in schools, where potential offenders are also immersed in a rich pool of potential co-offenders. After introduction of ISD and WISD, the effects are reduced slightly to a 6.29% ($\beta = .061$) and 6.41% ($\beta = .062$) increases, respectively. Overall, the changes in coefficients from the control model after adding ISD and WISD are quite small and do not likely represent any moderating effect.

5.2.4. Theft of auto

Table 5.9 reports the spatial regression results for TOA. The count of halfway houses (-24.6%; $\beta = -.282$), dummy variable for neighbours of DAs with halfway houses (.424%; $\beta = .004$), ISD (-.637%; $\beta = -.006$), and WISD (-.626%; $\beta = -.006$) are all not significant ($p > .10$). This remains after accounting for spillovers from the significant positive spatial autoregressive process in TOA, shown in Table 5.6. The signs of the estimates are also all negative in both tables (except for the Q1 neighbour dummy variable), which is inconsistent with the significant positive Spearman's correlations reported in Table 5.1. Thus, the relationship between halfway houses and the logged TOA rate appears to be a spurious artefact of other criminogenic facilities and sociodemographic risk factors. As with the BER and BEC spatial lag models which also yielded non-significant coefficients for all measures of exposure to halfway houses, there is minimal change in the spatial pseudo R^2, which begins at .266 for the control model and increases to .268 for the halfway house count model and .267 for both the ISD and WISD models. In other words, neither the proximity to nor count of halfway houses is associated with any increase or decrease in the logged TOA rate. The absence of a relationship could be due to the seriousness of the offence as well as the degree of effort required. As noted above, stealing a motor vehicle is a very intentional act that easily attracts unwanted attention. It is also a very specialized offence that often involves organized crime groups at one stage or another (Morselli, 2009). At the same time, offenders released from prison who have gang or organized crime affiliations typically

Table 5.9 Spatial lag models of the relationship between theft of vehicle and halfway houses, controlling for other environmental risk factors

	(1) Control	(2) Count	(3) ISD	(4) WISD
	β (SE)	*β* (SE)	*β* (SE)	*β* (SE)
Constant	-.365 (.448)	-.370 (.443)	-.387 (.445)	-.382 (.446)
ρ (rho)	.830 (.111) ***	.825 (.112) ***	.829 (.111) ***	.830 (.111) ***
Sociodemographic variables				
% dwellings not regularly occupied	-.016 (.006) **	-.016 (.006) **	-.016 (.006) **	-.016 (.006) **
% housing in need of major repairs	.007 (.005)	.007 (.005)	.007 (.005)	.007 (.005)
% males aged 15-24	.014 (.011)	.014 (.011)	.015 (.011)	.014 (.011)
Average weeks worked in a year	.021 (.011) *	.021 (.011) *	.022 (.011) *	.022 (.011) *
Counts of graffiti	-.002 (.002)	-.002 (.002)	-.003 (.002)	-.003 (.002)
Density of population (ambient)[a]	-4.06 (1.34) **	-4.00 (1.37) **	-4.02 (1.35) **	-4.06 (1.34) **
Density of population (residential)[a]	-.277 (.583)	-.272 (.584)	-.284 (.584)	-.283 (.583)
Economic deprivation	.043 (.035)	.043 (.035)	.042 (.035)	.042 (.035)
Ethnic heterogeneity	-.157 (.229)	-.159 (.229)	-.159 (.229)	-.157 (.229)
Residential instability	.080 (.045) +	.079 (.045) +	.081 (.045) +	.080 (.045) +
Potentially criminogenic places				
Community centres	-.016 (.135)	-.020 (.135)	-.016 (.135)	-.016 (.135)
Convenience stores and pharmacies	.075 (.034) *	.076 (.036) *	.076 (.035) *	.076 (.035) *
DTES	.952 (.238) ***	.947 (.233) ***	.963 (.232) ***	.962 (.135) ***
Financial institutions	.030 (.042)	.029 (.042)	.031 (.042)	.031 (.042)
Gas stations	-.020 (.080)	-.015 (.081)	-.019 (.080)	-.019 (.080)
Homeless shelters	.168 (.087) +	.206 (.098) *	.255 (.212)	.254 (.238)
Liquor stores	-.045 (.078)	-.048 (.078)	-.044 (.078)	-.044 (.078)
Parkades	-.084 (.027) **	-.081 (.027) **	-.085 (.027) **	-.085 (.027) **
Parks	-.077 (.035) *	-.077 (.035) *	-.077 (.035) *	-.077 (.035) *
Pubs, clubs, and bars	.096 (.043) *	.099 (.043) *	.096 (.043) *	.095 (.043) *
Restaurants with liquor service	.009 (.016)	.009 (.016)	.009 (.016)	.009 (.016)
Retail dealers	.001 (.005)	.001 (.004)	.001 (.005)	.001 (.005)
Schools	-.149 (.040)***	-.144 (.040)***	-.148 (.040)***	-.148 (.040)***
SkyTrain stations	.095 (.146)	.094 (.147)	.091 (.147)	.090 (.148)
Supermarkets and other grocers	.013 (.018)	.013 (.018)	.013 (.018)	.013 (.018)
Theatres & other entertain. venues	.071 (.089)	.067 (.089)	.072 (.089)	.072 (.089)
Halfway houses				
Halfway houses (count)	–	-.282 (.218)	–	–
Q1 neighbours	–	.004 (.154)	–	–
Inverse square distance	–	–	-.006 (.010)	–
Weighted inverse square distance	–	–	–	-.006 (.012)
Model-fit statistics				
Pseudo R^2	.305	.306	.305	.305
Spatial pseudo R^2	.266	.268	.267	.267

+p < .10; *p < .05; **p < .01; ***p < .001.

[a]: values are written in scientific notation by 10^{-5}. Lag is computed from 5th order queen contiguity.

receive much more attention from local law enforcement and other criminal justice agents. Even if they do not have these affiliations, CRF residents are probably wary that possession of stolen vehicles while residing at a facility monitored around the clock is counterproductive to their freedom. Not only can an offender residing at a facility receive

Table 5.10 Simulated impacts of halfway houses on logged rate of theft of auto at equilibrium including spillover effects from lagged Y

	Direct effects		Indirect effects		Total effects	
	β	SE	*β*	SE	*β*	SE
Halfway houses (count)	-.287	.231	-1.33	51.5	-1.62	51.6
Q1 neighbours	.004	.149	.020	4.67	.024	4.73
Inverse square distance	-.007	.011	-.031	3.56	-.037	12.53
Weighted inverse square distance	-.006	.125	-.030	.267	-.037	.273

+p < .10; *p < .05; **p < .01; ***p < .001.
Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.9 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

incidental attention from law enforcement agents surveilling local criminal networks, but any interaction between known offenders outside a halfway house is considered suspect. The negative signs of the estimated impacts of halfway houses on TOA also hint that the risk of this offence is lower near these facilities with all else held constant, but again, the estimates are not significant.

The significance of control variables is consistent across all models except for the number of homeless shelters, discussed below. None of the social disorganization variables is significant at $p < .05$. Residential instability is marginally significant ($\beta = .080$; $p < .10$), suggesting that a one-unit increase in population turnover is associated with an 8.29% increase in the rate of TOA. But this finding, though consistent with social disorganization theory, is tenuous. Three of the RAT variables are significantly associated with the logged rate of TOA in the study area's DAs. The positive coefficient for average number of weeks worked in a year (+2.14%; $\beta = .021$; $p < .05$) may be due to the recognition of more opportunities with more time spent out of the house. This does assume that most people do not work from home and that the proportion of time not working that is spent at home is reasonably consistent from person to person. The percentage of dwellings not regularly occupied (-1.57%; $\beta = -.016$; $p < .01$) and ambient population density (-3.98%; $\beta = -4.06 * 10^{-5}$; $p < .01$) are both negatively associated with TOA. The latter makes sense, as a greater concentration of ambient population likely increases the number of eyes on the street (Jacobs, 1961) and this measure represents in part the number of people commuting and recreating in public. A higher residential density, on the other hand, may not provide as much guardianship. This measure more so captures residents in their homes whose eyes may be focused on a myriad of other tasks and activities rather than on the streets. The negative relationship between TOA and percentage of dwellings not regularly occupied could be due a higher number of

suitable targets: assuming there is on average a certain number of cars per household, more occupied households should equate to more cars to steal.

Among the criminogenic places, the DTES appears to be very strongly associated with TOA. DAs in the DTES have rates of TOA that are 159% higher on average with all else held constant (β = .952; $p < .001$). One explanation could be the level of organized crime activity in the area. The DTES has a very active open drug market which sees much participation from local gangs and organized crime groups (Bolan, 2021; Robertson, 2006; Wood et al., 2003). It is certainly plausible for ringing operations to overlap out of convenience, given the high volume of suitable targets in the area. The number of convenience stores and pharmacies (+77.4%; β = .075; $p < .05$) and pubs, bars, and clubs (+10.0%; β = .096; $p < .05$) is also significantly associated with an increase in the TOA rate of DAs. This latter result could be because of patrons who become inebriated and leave their vehicles vulnerably parked overnight. The positive relationship with convenience stores and pharmacies could be attributable to the large number of people frequenting these destinations on a daily basis. These individuals may not as likely be targets themselves if they are only running to the store for a few minutes, but they may certainly notice potential opportunities (e.g., a parking lot with poor crime prevention elements). Homeless shelters are marginally associated with crime in the control model (+18.3%; β = .168; $p < .10$), but significant in the halfway house count model (+22.9%; β = .206; $p < .05$), and non-significant in the remaining models ($p > .10$). Though one may not expect homeless persons to be heavily involved in crimes of skilled labour such as TOA, shelters are concentrated in the DTES. In addition to there already being an organized crime presence in the area, homeless persons represent a large portion of the consumer base for the drug market. As stated above, the attraction of organized crime groups may incidentally result in a higher rate of auto theft. However, this finding is not robust and should be taken with a grain of salt.

Schools (-13.8%; β = -.149; $p < .001$), parkades, (-8.06%; β = -.084; $p < .01$), and parks (-7.45%; β = -.077; $p < .05$) are all significantly associated with decreased logged rates of TOA. The ambient population is used as the denominator to calculate the rate of TOA and should be quite high in DAs with schools, driven upward by the student body. Other than secondary schools and colleges, however, a large proportion of this ambient population is too young to have drivers licenses, whereas students in secondary schools and colleges may either not be able to afford a car or simply not commute with one (e.g.,

opting to take transit instead). The negative relationship with the number of parks and parkades is unexpected. The open sightlines of parks may naturally enhance guardianship, whereas parkades may simply on average be designed with effective crime prevention in mind. It is important to also consider that the parkades included in this study come from geocoded business licenses. Privately owned lots operating as businesses typically have greater guardianship in the form of security guards, attendants, and other crime prevention measures, which could displace crime to other public lots which do not have the same level of security and are not included in this thesis. Another likely explanation, however, may again be the ambient population. Parks naturally draw large numbers of people, whereas parkade businesses have an interest in siting their lots in areas with a high level of human activity. Thus, while an individual may be more likely to experience theft of vehicle in these areas, the risk of victimization relative to all the other people in the same area (on average) may be lowered overall. That is, the risk of victimization may be more diffuse.

5.2.5. Theft from auto

Spatial lag models for TFA are shown in Table 5.11. This is the only crime type that has significant or marginally significant relationships with all measures of exposure to halfway houses. The number of halfway houses has a marginally significant positive relationship with the logged TFA rate (+16.1%; $\beta = .150$; $p < .10$), while the immediately surrounding areas have a rate 33.4% higher ($p < .001$) on average with all else constant. Table 5.13 shows these estimates in terms of their direct, indirect, and total effects on DAs in the study area taking into account the positive spatial autoregressive process in TFA indicated by ρ ($\beta = .670$; $p < .001$). Increasing a DA's number of halfway houses by one increases its rate of TFA by 16.9%. This direct effect is still marginally significant ($\beta = .156$; $p < .10$). However, the indirect (+39.0%; $\beta = .329$) and total effects (+62.4%; $\beta = .485$) are both non-significant ($p > .10$). This suggests that an increase in a DA's number of halfway houses is not on average significantly associated with a change in the TFA rate in other DAs. At the same time, the DAs immediately neighbouring those with halfway houses have significant direct, indirect, and total impacts on the rate of TFA. The direct effect is a 35.1% ($\beta = .301$; $p < .001$) higher rate on average in these DAs compared to others, whereas the cumulative spillover effect across all DAs in the study area is an increase of 88.5% ($\beta = .634$; $p < .05$) in the TFA rate. Altogether, a DA being a

Table 5.11 Spatial lag models of the relationship between theft from vehicle and halfway houses, controlling for other environmental risk factors

	(1) Control	(2) Count	(3) ISD	(4) WISD
	β (SE)	*β* (SE)	*β* (SE)	*β* (SE)
Constant	.072 (.349)	.202 (.344)	.146 (.351)	.126 (.351)
ρ (rho)	.715 (.056) ***	.692 (.055) ***	.713 (.055) ***	.716 (.055) ***
Sociodemographic variables				
% dwellings not regularly occupied	.001 (.004)	.001 (.004)	.002 (.004)	.002 (.004)
% housing in need of major repairs	.014 (.004) ***	.014 (.004) ***	.014 (.004) ***	.014 (.004) ***
% males aged 15-24	-.014 (.009)	-.016 (.009) +	-.015 (.009) +	-.015 (.009) +
Average weeks worked in a year	.026 (.007) ***	.026 (.007) ***	.025 (.008) ***	.025 (.008) ***
Counts of graffiti	-.002 (.002)	-.001 (.002)	-.001 (.001)	-.001 (.001)
Density of population (ambient)[a]	-7.29 (1.06)***	-7.74 (1.07)***	-7.44 (1.05)***	-7.31 (1.05)***
Density of population (residential)[a]	1.39 (.366) ***	1.49 (.36) ***	1.42 (.37) ***	1.40 (.360)***
Economic deprivation	-.024 (.028)	-.022 (.028)	-.022 (.028)	-.022 (.028)
Ethnic heterogeneity	-.131 (.173)	-.170 (.174)	-.129 (.174)	-.131 (.174)
Residential instability	.092 (.038) *	.090 (.037) *	.089 (.037) *	.090 (.037) *
Potentially criminogenic places				
Community centres	.011 (.136)	.017 (.132)	.011 (.134)	.009 (.134)
Convenience stores and pharmacies	.060 (.025) *	.047 (.026) +	.055 (.024) *	.055 (.024) *
DTES	.502 (.166) **	.473 (.162) **	.473 (.165) **	.468 (.165) **
Financial institutions	.005 (.030)	-.002 (.031)	.003 (.030)	.003 (.030)
Gas stations	-.108 (.062) +	-.101 (.062)	-.113 (.062) +	-.113 (.062) +
Homeless shelters	.040 (.082)	.024 (.085)	-.225 (.139)	-.240 (.153)
Liquor stores	.002 (.057)	.009 (.057)	-.000 (.058)	-.001 (.058)
Parkades	-.036 (.020) +	-.031 (.019)	-.033 (.020)	-.034 (.020) +
Parks	-.175 (.026)***	-.174 (.026)***	-.175 (.026)***	-.175 (.026)***
Pubs, clubs, and bars	.034 (.033)	.027 (.031)	.034 (.033)	.035 (.033)
Restaurants with liquor service	.017 (.011)	.017 (.011)	.019 (.011) +	.019 (.011) +
Retail dealers	.006 (.004)	.006 (.003) +	.006 (.004)	.006 (.004)
Schools	-.095 (.036) **	-.092 (.036) *	-.098 (.037) **	-.097 (.036) **
SkyTrain stations	-.016 (.104)	-.019 (.105)	-.003 (.103)	-.002 (.103)
Supermarkets and other grocers	.005 (.008)	.009 (.008)	.006 (.009)	.005 (.009)
Theatres & other entertain. venues	.057 (.069)	.044 (.070)	.054 (.068)	.054 (.068)
Halfway houses				
Halfway houses (count)	–	.150 (.090) +	–	–
Q1 neighbours	–	.288 (.082) ***	–	–
Inverse square distance	–	–	.019 (.007) **	–
Weighted inverse square distance	–	–	–	.021 (.008) **
Model-fit statistics				
Pseudo R^2	.717	.719	.718	.718
Spatial pseudo R^2	.664	.673	.669	.668

+p < .10; *p < .05; **p < .01; ***p < .001.

[a]: values are written in scientific notation by 10^{-5}. Lag is computed from 2nd order queen contiguity.

neighbour of another DA containing a halfway house is associated with a cumulative 155% (β = .934; p < .01) increase in the rate of TFA across all 993 DAs in Vancouver.

Table 5.12 Simulated impacts of halfway houses on logged rate of theft from vehicle at equilibrium including spillover effects from lagged Y

	Direct effects		Indirect effects		Total effects	
	β	SE	*β*	SE	*β*	SE
Halfway houses (count)	.156 +	.091	.329	.238	.485	.321
Q1 neighbours	.301 ***	.085	.634 *	.257	.934 **	.319
Inverse square distance	.020 **	.007	.048 *	.023	.068 *	.029
Weighted inverse square distance	.021 **	.008	.051 +	.028	.072 *	.035

+p < .10; *p < .05; **p < .01; ***p < .001.
Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.11 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

However, this is based on limited data (i.e., a small number of DAs with halfway houses). The next column (model 3) in Table 5.11 shows that a one-unit increase in ISD is significantly associated with a 1.97% increase in TFA (β = .019; p < .01), indicating that the risk of victimization for this offence in Vancouver increases with proximity to halfway houses. The coefficient for WISD in the last column (model 4) is slightly larger (+2.07%; β = .021; p < .01), suggesting that this risk of victimization is even greater when we adjust the measure of proximity to account for the highest possible number of offenders at each facility. Table 5.12 shows that these results remain significant after accounting for the additive effect of the lagged dependent variable. In addition to an increase in a DA's ISD (+2.06%; β = .020; p < .01) or WISD (+2.17%; β = .021; p < .01) significantly predicting an increase in the TFA rate in that DA, the indirect and total effects demonstrate that there should be increases in other DAs due to spatial autocorrelation in the dependent variable. A one-unit increase in ISD for one DA is associated with a cumulative increase of 4.87% (β = .048; p < .05) across all DAs in the rate of TFA, whereas a one-unit increase in WISD for one DA is associated with a cumulative increase of 5.20% (β = .051; p < .10) across all DAs. However, the latter is only marginally significant. The total effects of WISD on this crime type are also slightly larger than that for ISD. Altogether, if all DAs increased their ISDs and WISDs by 1, the average DA's TFA rate would increase by 7.03% (β = .068; p < .05) and 7.49% (β = .072; p < .05), respectively.

Overall, it appears that increasing the ISD of all DAs by adding halfway houses to the study area and increasing the WISD either by adding halfway houses and/or increasing the capacity of halfway houses would significantly increase the TFA rate in the typical DA (p < .05). However, the difference between the ISD and WISD estimates is very small and the indirect effects of the latter are only marginally significant. Although

the direct and total effects of either variable on the logged rate of TFA are significant, the similarities in the coefficients combined with the differences in significance between ISD and WISD in the indirect effects suggests that the proximity of DAs to halfway houses is significantly associated with TFA but that the presence of these facilities themselves matters independent of the offenders themselves. In other words, there is evidence that the presence of a halfway house itself may affect the risk of crime in surrounding areas which cannot be explained alone by the fact that offenders are residing in those facilities. Nevertheless, without information on the concentrations of offenders in other DAs for comparison, this inference is purely speculative.

These positive relationships can be attributed potentially to a combination of halfway house residents committing the crimes themselves, the attraction of other offenders who exploit these opportunities, and changes in the neighbourhood milieu that result in a greater risk of this offence. If halfway house residents themselves are committing these crimes, it could be because of the ease of commission. Suitable TFA targets do not usually have their drivers (i.e., guardians) present and access to valuables may simply involve the opening of an unlocked door, smashing of a window, or specialized technique and take very little time. Contrary to mischief – whose results include a negative finding for halfway house counts and non-significant estimates for ISD and WISD – TFA involves an immediate tangible gain (acquisition of some valuable), whereas the temptation of pleasure from destruction or defacement of property may be easier to resist. Opportunities for TFA are also far more obvious and recognizable in the environment. Commission of this crime by other offenders attracted to the area is plausible for the same reason. It seems less likely though that the positive relationship with halfway houses stems from a unique milieu generated by halfway houses which creates a neighbourhood more conducive to crime in general. If this were the case, an increase in crime types in surrounding areas should also be detected after controlling for other environmental risk factors. Nevertheless, the modest changes in the explained variance suggest that while halfway houses do play a meaningful role in the pattern of TFA in Vancouver, it is relatively unimportant in the scheme of all other elements of the environmental backcloth. The spatial pseudo R^2 for the control model is .664, which increases to .673 in the halfway house count model, .669 in the ISD model, and .668 in the WISD model.

Among the social disorganization variables, only residential instability is significant ($p < .05$). Estimates of the coefficient are consistent across all models, ranging from a 9.35% increase in the TFA rate ($\beta = .089$) in the ISD model to a 9.62% increase ($\beta = .092$) in the control model. Of the physical measures of neighbourhood disorder, the percentage of housing in need of major repairs is significant (+1.38%; $\beta = .014$; $p < .001$) across all models, in line with the broken windows hypothesis. Three of the RAT variables are significantly associated with TFA: average weeks worked in a year ($p < .001$), ambient population density ($p < .001$), and residential population density ($p < .001$). More specifically, the estimate of residential population density's impact on TFA ranges from a 1.40% increase per 1000-resident increase per square kilometer in the control model ($\beta = 1.39 \times 10^{-5}$) to a 1.50% increase for the halfway house count model ($\beta = 1.49 \times 10^{-5}$); the estimate of the ambient population density's impact on TFA ranges from a 7.03% decrease per 1000-person increase per square kilometer in the control model ($\beta = -7.29 \times 10^{-5}$) to a 7.45% decrease in the halfway house count model ($\beta = -7.74 \times 10^{-5}$); and the estimated impact of average number of weeks worked in a year ranges from an increase of 2.54% per extra week worked in the ISD and WISD models ($\beta = .025$) to an increase of 2.68% in the control and halfway house count models ($\beta = .026$). The relationships that the latter two variables have with TFA are consistent with results for TOA and can be explained by the same possibilities. A greater number of hours worked in a year may translate to more time spent commuting and recognition of more opportunities, while a denser ambient population may mean more watchful eyes in public spaces where TFA tends to be more frequently committed. The positive relationship between the logged TFA rate and residential population density may indicate a denser concentration of vehicles that can be targeted. The significance of these variables is consistent across all halfway house models. Finally, the percentage of males aged 15-24, while not significant in the control model, emerges across all halfway house models as a marginally significant negative covariate of crime. The sign may be negative because after considering the presence of halfway houses, youth may prefer to recreate elsewhere. The coefficient ranges from $\beta = -.015$ (-1.50%) for ISD and WISD models and $\beta = -.016$ (-1.58%) for the halfway house count model.

Like the sociodemographic variables, the significance of criminogenic places is somewhat consistent with the TOA models. This is expected because the targets are essentially the same, except that for TOA, the vehicle is the target, whereas for TFA, the

target is inside the vehicle. Convenience stores and pharmacies are significantly ($p < .05$) associated with an increased logged rate of TFA in the control (+6.21%; $\beta = .060$), ISD, and WISD models (+5.65%; $\beta = .055$ for either). However, the variable is only marginally significant (+4.79%; $\beta = .047$; $p < .10$) in the halfway house count model. The only other consistently significant positive covariate of TFA is whether a DA is part of the DTES ($p < .01$). According to the control model, DAs that are part of the DTES have a rate of TFA that is 65.3% higher ($\beta = .502$) than others on average. This decreases to 60.5% ($\beta = .473$) in the halfway house count model and ISD model, and then to 59.7% ($\beta = .468$) in the WISD model. Retail dealers emerge as a marginally significant predictor of TFA as well, but only in the halfway house count model (+.580%; $\beta = .006$; $p < .10$). This finding is consistent with prior research finding a positive relationship between commercial land use and vehicle theft. Although pubs, bars, and clubs are not significant in any of the models for TFA, the number of restaurants with liquor service is marginally significant in the ISD and WISD (for both, +1.92%; $\beta = .019$; $p < .10$) models. In other words, considering the proximity to halfway houses reveals a potentially meaningful relationship between this form of liquor outlet and the level of TFA, potentially indicating that halfway houses are an important part of understanding the underpinnings of crime beyond directly contributing to it.

Similar to TOA, schools ($p < .01$) and parks ($p < .001$) are significant negative covariates of TFA, for likely the same reasons: the high ambient population may deflate the rates of crime despite the high volume of vehicle-related offences in parks, while most student bodies are expected to have either zero or little access to vehicles, or not use them to commute in the first place. The coefficient for parks is $\beta = -.175$ (-16.1%) in the control as well as ISD and WISD models, but slightly lower in the halfway house count model at $\beta = -.174$ (-16.0%). For schools however, the coefficient is $\beta = -.095$ (-9.09%) in the control model and falls to $\beta = -.092$ (-8.79%) in the halfway house count model but is actually higher at $\beta = -.098$ (-9.30%) and $\beta = -.097$ (-9.21%) in the ISD and WISD models, respectively. The number of parkades is marginally significant only in the control model (-3.50%; $\beta = -.036$; $p < .10$) but non-significant when controlling for halfway houses. Finally, gas stations are marginally significant ($p < .10$) in all but the halfway house count model. The coefficient is $\beta = -.108$ (-10.2%) in the control model and increases in magnitude when proximity to halfway houses is introduced in the ISD and WISD models (for both, -10.7%; $\beta = -.113$; $p < .10$). As with the finding regarding

restaurants with liquor service, this suggests a potentially meaningful role played by halfway houses in understanding the underpinnings of TFA in the study area.

5.2.6. Other theft

Results of spatial lag models for OTH are reported in Table 5.13. Neither the count of halfway houses (-10.6%; β = -.112; p > .10), ISD (+1.55%; β = .015; p > .10), nor WISD (+1.09%; β = .011; p > .10) are significant predictors of this logged rate. However, the halfway house count model shows that the immediate neighbours of DAs with halfway houses have significantly higher (+89.2%; β = .637; p < .001) rates of OTH on average with all other explanatory variables held constant. The impacts analysis presented in Table 5.14 shows the direct effect of this variable to be significant (β = .643; p < .001) after accounting for the spillover effects from the lagged dependent variable. Specifically, the DAs immediately neighbouring those with halfway houses have rates of OTH that are 90.3% higher on average compared to other DAs. The significant indirect effect (β = 1.07; p < .05) indicates that one DA being the neighbour of an area with a halfway house is associated with a cumulative 192% increase in the OTH rate across all other DAs in Vancouver.

The importance of this variable can be seen in the change in explained variance from the control model in Table 5.13 (model 1) to the halfway house count model (model 2). The spatial pseudo R^2 for the control model is .587. Simply accounting for proximity to halfway houses yields nearly identical results, with spatial pseudo R^2 values of .588 in the ISD and WISD models. However, the halfway house count model that includes this dichotomous neighbour variable has a spatial pseudo R^2 of .596, increasing by .009 from the control model. This is still a modest change at best, indicating as with all other crime types discussed above, halfway houses play a very small role, but an important role nonetheless in this case. Taken with the observation that none of the other measures of exposure to halfway houses are significant, the significance of the “Q1 neighbour” variable suggests a curvilinear, inverted U-shaped relationship, wherein the presence of a halfway house in a DA is unrelated to OTH in that DA but does in the immediately surrounding area, and this influence drops off rapidly as DAs get farther away – even more rapidly than modeled using ISD and WISD. One possible explanation is that many forms of OTH such as pickpocketing require close interpersonal proximity between the victim and offender and therefore a potentially higher risk. This risk combined with the

closeness of a halfway house may discourage offenders from committing these types of offences.

Table 5.13 Spatial lag models of the relationship between other theft and halfway houses, controlling for other environmental risk factors

	(1) Control	(2) Count	(3) ISD	(4) WISD
	β (SE)	*β* (SE)	*β* (SE)	*β* (SE)
Constant	.250 (.530)	.440 (.510)	.310 (.528)	.280 (.537)
ρ (rho)	.670 (.078) ***	.628 (.076) ***	.665 (.078) ***	.669 (.078) ***
Sociodemographic variables				
% dwellings not regularly occupied	-.008 (.007)	-.009 (.007)	-.008 (.007)	-.008 (.007)
% housing in need of major repairs	.004 (.006)	.004 (.006)	.004 (.006)	.004 (.006)
% males aged 15-24	-.020 (.017)	-.026 (.016) +	-.022 (.017)	-.021 (.017)
Average weeks worked in a year	.019 (.012)	.018 (.011)	.018 (.012)	.018 (.012)
Counts of graffiti	-.002 (.003)	-.002 (.003)	-.002 (.003)	-.002 (.003)
Density of population (ambient)[a]	-5.81 (1.43)***	-6.36 (1.43)***	-5.91 (1.44)***	-5.82 (1.43)***
Density of population (residential)[a]	.681 (.647)	.874 (.631)	.721 (.648)	.694 (.648)
Economic deprivation	.079 (.039) *	.083 (.039) *	.080 (.039) *	.080 (.039) *
Ethnic heterogeneity	-.565 (.289) +	-.668 (.287) *	-.569 (.289) *	-.566 (.289) +
Residential instability	.238 (.050) ***	.232 (.049) ***	.237 (.050) ***	.237 (.050) ***
Potentially criminogenic places				
Community centres	-.081 (.196)	-.067 (.198)	-.081 (.196)	-.082 (.196)
Convenience stores and pharmacies	.125 (.057) *	.097 (.058) +	.121 (.057) *	.123 (.057) *
DTES	-.108 (.305)	-.211 (.300)	-.128 (.302)	-.125 (.303)
Financial institutions	.174 (.080) *	.157 (.081) +	.173 (.079) *	.173 (.080) *
Gas stations	.173 (.137)	.199 (.139)	.169 (.137)	.170 (.137)
Homeless shelters	.220 (.154)	.239 (.158)	.010 (.364)	.072 (.413)
Liquor stores	.371 (.146) *	.383 (.145) **	.369 (.148)	.369 (.147) *
Parkades	-.147 (.060) *	-.133 (.055) *	-.145 (.060) *	-.146 (.060) *
Parks	-.085 (.042) *	-.084 (.041) *	-.085 (.042) *	-.085 (.042) *
Pubs, clubs, and bars	-.095 (.089)	-.105 (.078)	-.095 (.089)	-.095 (.089)
Restaurants with liquor service	.098 (.024) ***	.096 (.023) ***	.099 (.024) ***	.098 (.024) ***
Retail dealers	.003 (.011)	.004 (.010)	.003 (.011)	.003 (.011)
Schools	.016 (.054)	.030 (.054)	.014 (.054)	.015 (.054)
SkyTrain stations	.527 (.253) *	.521 (.255) *	.538 (.254) *	.535 (.255) *
Supermarkets and other grocers	.080 (.044) +	.089 (.042) *	.081 (.045) +	.080 (.045) +
Theatres & other entertain. venues	-.098 (.120)	-.134 (.116)	-.100 (.120)	-.100 (.120)
Halfway houses				
Halfway houses (count)	–	-.112 (.273)	–	–
Q1 neighbours	–	.637 (.178) ***	–	–
Inverse square distance	–	–	.015 (.017)	–
Weighted inverse square distance	–	–	–	.011 (.020)
Model-fit statistics				
Pseudo R^2	.598	.605	.598	.598
Spatial pseudo R^2	.587	.596	.588	.588

+p < .10; *p < .05; **p < .01; ***p < .001.

[a]: values are written in scientific notation by 10^{-5}. Lag is computed from 4th order queen contiguity.

Table 5.14 Simulated impacts of halfway houses on logged rate of other theft at equilibrium including spillover effects from lagged Y

	Direct effects		Indirect effects		Total effects	
	β	SE	*β*	SE	*β*	SE
Halfway houses (count)	-.113	.281	-.188	.608	-.300	.873
Q1 neighbours	.643 ***	.163	1.07 *	.476	1.71 **	.577
Inverse square distance	.016	.017	.030	.046	.046	.062
Weighted inverse square distance	.011	.021	.022	.056	.033	.075

+p < .10; *p < .05; **p < .01; ***p < .001.
Note: Produced from an "impact" analysis of the count, ISD, and WISD models shown in Table 5.13 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

It is nevertheless peculiar that this pattern is not also observed for the similar offence of TFA since much of OTH involves less conspicuous acts of swiping unattended items (i.e., as opposed to smashing a car window). A more graduated pattern of distance decay is also expected, which should be detected by the non-significant ISD and WISD variables because the neighbours of the DAs with halfway houses are among the highest in ISD and WISD. Furthermore, given that these neighbours are identified using first order queen contiguity, the distance between the start of the inverted U (at the DA with a halfway house) and its peak in the curvilinear relationship hypothesized above is quite short – arguably short enough, in theory, that the inverse relationship should still be detected, especially if a more gradual form of distance decay is assumed. Based on these considerations, a spurious relationship cannot be ruled out. Some areas high in the environmental risk factors tested as control variables may exert a criminogenic influence that extends beyond their DAs. For example, even CRF_D and CRF_{EF} which are located in primarily residential streets are just a few blocks away from highly commercial areas, whereas CRF_A is located in the central business district and CRF_B is adjacent to it. There are also potential risk factors not included in these models, such as public services buildings/offices, clubhouses, cultural centers, hospitals, and the amount of bicycle traffic. The places in this list can be found in abundance near halfway houses. Indeed, though CRF_C lies south of the body of water delineating the boundary of the central business district, it is in another highly urban area close to city hall, a hospital, and a number of other place attractors. Finally, CRF_A, CRF_B, and CRF_C are located in places with a high amount of bicycle traffic, whereas CRF_D and CRF_{EF} are considered highly cyclable areas as well, located in the middle of a network of bicycle lanes. This is relevant because the amount of bicycle theft, which comprises a large portion of OTH, is expected to be higher in areas with a lot of cycling activity.

This is the only crime type for which all three social disorganization variables are either significant or marginally significant. Consistent with SDT, economic deprivation ($p < .05$) and residential instability ($p < .001$) are significant positive predictors of OTH across all models. Estimates for the former range from an 8.19% increase ($\beta = .079$; control model) to an 8.64% increase ($\beta = .083$; halfway house count model) in the rate of OTH per one-unit increase in economic deprivation. A one-unit increase in residential instability is associated with a 26.9% increase ($\beta = .238$) in the OTH rate in the control model, but this drops to a 26.2% increase ($\beta = .232$) in the halfway house count model. That is, the relationship between residential instability and OTH is slightly lower when controlling for whether a DA is an immediate neighbour of a DA with a halfway house. In any case, both greater population turnover and economic deprivation are associated with higher levels of OTH. Contrary to the expectations of SDT, ethnic heterogeneity is negatively associated with the logged OTH rate. The relationship is marginally significant in the control model (-43.2%; $\beta = -.565$; $p < .10$) but becomes fully significant in the halfway house count model (-48.7%; $\beta = -.668$; $p < .05$). In other words, multicultural neighbourhoods are on average significantly lower in the rate of OTH by 95.8%. The only other significant sociodemographic variable is the ambient population density, which is negatively associated with crime ($p < .001$). The control model predicts a 5.64% decrease in the OTH rate per 1000-person increase per square kilometer ($\beta = -5.81 \times 10^{-5}$) in the control model is, but this increases in magnitude to a 6.16% decrease ($\beta = -6.36 \times 10^{-5}$) in the halfway house count model. This negative relationship is consistent with the findings for TFA and TOA and strengthens the overall conclusion that a greater ambient population equates to greater guardianship overall, whether real or perceived. Finally, the percentage of the population who are males aged 15-24 is non-significant in the control model but marginally significant in the halfway house count model (-2.59%; $\beta = -.026$; $p < .10$). This negative relationship is unexpected, but also in line with findings for this variable for other crime types and can be explained by a buffer zone where there exists a higher risk of youth being recognized closer to home (Brantingham & Brantingham, 1981). The changes in magnitude going from the control to halfway house count model again suggests that halfway houses may be an important fixture of the environmental backcloth when explaining a neighbourhood's level of crime.

Restaurants with liquor service ($p < .001$) and SkyTrain stations ($p < .05$) are consistently positively associated with OTH. A one-unit increase in the number of

restaurants with liquor service is associated with a 10.3% increase (β = .098) in the rate of OTH in the control model, but this drops slightly to 10.1% (β = .096) when the number of DAs with halfway houses and the neighbours of those DAs are considered. Conversely, liquor stores are also positively associated with OTH, but the magnitude of this association increases from the control model (+44.9%; β = .371; $p < .05$) to the halfway house count model (+46.7%; β = .383; $p < .01$). A one-unit increase in the number of SkyTrain stations is associated with a 69.5% increase (β = .527) in the OTH rate, but this also drops to 68.4% (β = .521) in the halfway house count model. Convenience stores and pharmacies (+13.3%; β = .125; $p < .05$) and financial institutions (+19.1%; β = .174; $p < .05$) are significant covariates of OTH in the control model but become only marginally significant ($p < .10$) when halfway houses and their neighbouring DAs are added. Similarly, the number of supermarkets and other grocers is marginally significant in the control model (+8.35%; β = .080; $p < .10$) but emerges as fully significant (+9.30%; β = .089; $p < .05$) in the halfway house count model with a higher coefficient. Finally, two variables are negatively associated ($p < .05$) with the logged OTH rate: parks and parkades. The coefficient for parks is quite stable from the control model (-8.14%; β = -.085) to the halfway house count model (-8.05%; β = -.084). The impact of parkades on the OTH rate, however, seems to decrease more in magnitude from a 13.7% reduction in rate per additional parking facility (β = -.147; control model) to a 12.5% reduction (β = -.133; halfway house count model). Overall, the changes from model 1 to 2 signify a potential interplay between halfway houses and their surroundings in conditioning the relationship with OTH.

Chapter 6.

Discussion & Conclusions

6.1. Summary of findings

Although a significant relationship between the exposure to halfway houses and all six logged property crime rates in Vancouver DAs exists at the bivariate level, the associations are shown to be spurious for residential break and enter, commercial break and enter, and theft of auto after controlling for other environmental risk factors. This is true for all four measures of exposure tested: count of CRFs, whether a DA neighbours another with a halfway house, sum of inverse square distances to halfway houses in a 3.623km radius (ISD), and the same ISD measure adjusted to account for the number of available offender beds in each facility located within 3.623km (WISD). Further analysis of the direct, indirect, and cumulative effects of halfway houses holding at equilibrium the spillover of crime into neighbouring DAs also yielded null findings.

In other words, for half the crime types analyzed, the preliminary finding that DAs in the vicinity of halfway houses have a higher risk of victimization for property offences is an artefact of the placement of halfway houses in neighbourhoods with a heavy concentration of human activity, large number of criminogenic activity nodes, and sociological risk factors of crime. The variation in the rates of these offences across DAs are accounted for entirely by (1) criminogenic places and (2) demographic indicators of social and physical incivilities and frequent convergences between motivated offenders and suitable targets in the absence of capable guardianship. In fact, many criminogenic facilities other than halfway houses providing valuable and desirable services to the community are positively associated with these three property crime types. These include convenience stores and pharmacies (TOA); gas stations (BEC); parks (BEC); pubs, bars, and clubs (TOA); and schools (BEC). DAs that are a part of the DTES also have significantly higher rates of two of these three crime types (BER, TOA). Demographic indicators positively associated with these crime types include the percentage of dwellings not regularly occupied (BER); average number of weeks worked in a year (TOA); ambient population density (BER), residential population density (BEC); and residential instability (BEC).

The other three property crime rates – mischief, theft from auto, and other theft – have significant positive relationships with at least one measure of exposure to halfway houses. For other theft, crime is significantly higher only in the DAs immediately neighbouring those with halfway houses. More specifically, the direct impact on the rate of other theft in these DAs is a notable 90.2% (β = .643) increase. The spillover effect of other theft, where the increased risk of victimization flows into surrounding DAs (and back onto the same DA) independent of the predictive variables, is a cumulative increase of 192% (β = 1.07) in the logged rate across all DAs. The indirect impact suggests that the risk of other theft increases slightly beyond the immediate neighbours (as well as in the DA containing the halfway house). However, neither ISD nor WISD – which incorporate the distance to DAs, such that areas that are not immediate neighbours of DAs with halfway houses still register their influence as well as the influence of other nearby halfway houses – were significant in the initial spatial lag models and subsequent impacts analyses. As such, the influence of halfway houses on other theft does not appear to extend far beyond the immediate neighbours.

Three measures of exposure to halfway houses are significantly associated with theft from auto: immediate neighbours, ISD, and WISD. The count variable is marginally significant ($p < .10$) in the initial model. Impacts analyses show that there is indeed a marginally significant direct effect but non-significant indirect effect. When both are considered together, the cumulative impact of the count variable on all DAs is not significant (but there is low statistical power to detect a relationship in the first place). The remaining measures of exposure have statistically significant direct, indirect, and total effects ($p < .05$). DAs neighbouring areas with halfway houses have a rate of theft from auto 35.1% (β = .301) higher than others on average. The subsequent impact of spillovers due to the autoregressive process in the spatial lag model leads to an additional cumulative increase of 88.5% (β = .634) in all other DAs. For both ISD and WISD, effect sizes are similar. A one-unit increase in proximity to halfway houses is only associated with a 2.02% (β = .020) and 2.12% (β = .021) increase in rate respectively for ISD and WISD. The indirect impacts are 4.92% (β = .048) and 5.23% (β = .051) increases in the theft from auto rate per one-unit increase in ISD and WISD respectively across all other DAs, independent of those DAs' own proximity to halfway houses. Note that while WISD's indirect impact is only marginally significant, the total effect is still significant. This translates to a particularly low impact in Vancouver, where the average

DA has an ISD value of .324 and a WISD value of .200. While these are very small effect sizes, it also predicts that the DA with the highest ISD and WISD values of 100 in Vancouver has a rate of theft from auto that is 671% to 758% higher when all else is held constant, depending on the measure used (excluding the indirect effect). This DA, however, is an outlier located in the DTES neighbourhood and home to the most populous halfway house with a capacity of 48. The DAs with the next highest ISD and WISD have values of 26.2 and 8.48, respectively.

For mischief, neither the count of halfway houses in a DA nor whether a DA is an immediate neighbour of an area with a halfway house are significantly associated. However, the impacts of both ISD and WISD on the rate of mischief are statistically significant and remain significant after including spillover effects from the autoregressive process. Specifically, both have significant direct impacts on mischief. A one-unit increase in ISD is associated with a 2.02% (β = .020) increase in the mischief rate, whereas a one-unit increase in WISD is associated with a similar 2.33% (β = .023) change. However, the indirect effects are not significant at the $p < .05$ level (although the indirect effect of ISD is marginally significant). This means that, unlike theft from auto, the higher rates of mischief in DAs closer to halfway houses are not significantly inflated by spillover effects. The combined effects, however, are significant at the $p < .05$ level.

Thus, while these three crime types are significantly associated with exposure to halfway houses, they each behave uniquely. This is indicated by the specific measures of exposure with which each crime type is associated, in addition to the pattern of direct and indirect effects of those measures. The criminogenic influence on other theft, though acute in immediately neighbouring DAs, drops off dramatically, as suggested by the non-significant ISD and WISD. At the same time, the increase in other theft in those DAs subtly yet significantly elevates the risk of other theft in surrounding DAs. The same is true for theft from auto, but the additional significance of ISD and WISD means the criminogenic influence of halfway houses is more far reaching for this offence. The effect of spillovers into neighbouring DAs is independent of their own ISD or WISD values. Accordingly, if a DA is outside the 3.6km buffer established as a sphere of influence for halfway houses, it still experiences a significant albeit subtle increase in the risk of theft from auto arising from the direct impact of proximity to halfway houses on DAs within that 3.6km buffer spilling over on a global scale (i.e., this is the indirect effect). For mischief, however, this is not the case. DAs within 3.6km of a halfway house do have

elevated rates of mischief after controlling for other environmental risk factors, but as there is no significant indirect effect from this resultant increase in mischief, DAs outside this buffer do not experience any significant change in the risk of this offence.

Despite these significant results, the effect sizes for ISD and WISD are small, having an almost negligible impact on most DAs, and all measures of exposure contribute very little to the overall explanation of mischief and theft from auto patterns in Vancouver's DAs. For other theft, adding the dummy variable denoting immediate neighbours of DAs with halfway houses only raised the spatial pseudo R^2 by .009 from .587 to .596. This change is identical for theft from auto, where addition of the variable denoting neighbours of DAs with halfway houses improved the spatial pseudo R^2 from .664 to .673. However, after adding the ISD and WISD variables separately, the spatial pseudo R^2 improved less from .664 to .669 and .668 – a change of .005 and .004 – respectively. For mischief, addition of ISD and WISD separately to the control model only improved spatial pseudo R^2 from .517 to .519 in both cases – a mere change of .002 in explained variance, which is even less than that for theft from auto. Again, despite the significance of exposure to halfway houses for three types of property crime, other environmental risk factors account for virtually all their variation. Specifically, the positive sociodemographic correlates are the percentage of dwellings in need of major repairs (MIS, TFA); percentage of males aged 15-24 (MIS); average number of weeks worked in a year (MIS, TFA); residential population density (MIS, TFA); economic deprivation (MIS, OTH); and residential instability (MIS, OTH, TFA). Criminogenic places positively associated with these two crime types are convenience stores and pharmacies (MIS, OTH, TFA); the DTES (MIS, TFA); financial institutions (OTH); liquor stores (OTH); restaurants with liquor service (MIS, OTH); and SkyTrain stations (OTH). Unfortunately, a direct comparison of the importance of the ISD and WISD variables to other criminogenic facilities is not possible because the latter are measured as counts. The count variable is also not significantly related to theft from auto nor mischief at the $p < .05$ level.

6.2. Crimes of effort and exposure to halfway houses

The pattern of results perhaps indicates a higher risk of offences that are low-effort and low-risk, which is in line with expectations from routine activity and geometry of crime theories discussed above. Although the opening of a correctional halfway house

both introduces (i.e., in the form of residents) and attracts (i.e., other offenders under supervision who associate with residents of the halfway house, attend programs at those halfway houses, and/or wish to victimize residents of the halfway house) offenders to a neighbourhood, guardianship increases while target suitability is likely to decrease. Increased guardianship comes in the form of halfway house staff, more intense patrol from police, as well as attention from parole officers and specialized police units such as HRO in the case of Vancouver (VPD, n.d.b). Family members and others who function as intimate handlers for offenders may visit, reducing the likelihood that residents may offend. Residents as well as owners and employees of local businesses or service providers may also become more alert if news of a halfway house opening receives much publicity. Business owners may put in place added security measures, such as hiring private security guards/attendants and installing CCTV and security gates, reducing suitability of targets for theft and break and enter. Residents may similarly install more secure locks on their doors park their vehicles in more secure lots and ensuring they do not leave valuables in plain view from the windows of both their homes and vehicles. Individuals who frequent the area may also plan their routine activities to avoid halfway houses, resulting in fewer overlapping activity spaces, and ultimately, fewer convergences of motivated offenders with suitable targets. This could involve changing the pathways one takes or the nodes in which one spends time. Alternatively, instead of changing the activity spaces themselves, individuals could amend the amount of time spent in each activity node to maximize avoidance of risky areas.

Crime types that typically involve greater effort and risk of detection may therefore be deterred by the increase in guardianship in the area provided by staff, who also act as place managers and intimate handlers within halfway houses themselves (Cullen et al., 2002). For example, both residential and commercial break and enter tend to involve prolonged time in potentially unfamiliar and unwelcoming territory. There may be more chances to get caught and a quick getaway may not be feasible. The act of entry itself can be quite difficult as well with a possible need to bypass various security measures and be harder to “legitimately” explain if unforeseen third parties stumble upon an offender’s illicit activities. Similarly, in vehicles, security measures such as steering column locks may be barriers that not only make it more difficult to steal a car but prolong the time it takes to execute the act (Farrell et al., 2011; Mayhew et al., 1976).

An act of mischief (e.g., defacing property, breaking a window, denting a car door) can comparatively be done inconspicuously and in very little time. Theft from auto can also be done inconspicuously if it involves accessing an unlocked vehicle. Without a driver or passenger present who can identify a thief as an illegitimate presence in the vehicle, passersby could easily mistake the individual as the owner. On the other hand, hotwiring, using an ignition punch, or some other tool/technique to start a car without a key would appear suspicious to most individuals who happen upon the situation. Even if the car is locked, a valuable item located in plain sight can be acquired within seconds by smashing the window or using a more specialized technique if the vehicle is isolated and there are few to no guardians immediately present. There is physically little in the way of accessing a locked car, whereas more advanced/effective security measures – such as tracking devices, electrical and mechanical immobilizers, central locking, and car alarms – for preventing and deterring the theft of a vehicle are increasingly present especially in newer models (Farrell et al., 2011). Other theft is a residual category for theft of personal property and does include hard-to-steal items high in inertia and low in accessibility, such as furniture and appliances. Much more common though is the theft of items in plain sight and in public, which, like theft from auto and mischief, can be low-effort, low-risk, and open to a hasty getaway: acts such as pickpocketing or shoplifting in crowded places where one can easily blend into the crowd or swiping a cellphone or other electronic device from a tabletop at a coffee shop or school campus. Moreover, for theft from auto, other theft, and mischief, escape does not necessarily involve navigating an unfamiliar structure with the risk of being trapped or apprehended after taking too much time to exit the building. It would be interesting to see whether this hypothesis holds for violent crime types. However, I should reiterate that the association between the proximity to halfway houses and rates of theft from auto and mischief, though significant, appear to be weak at best. Other environmental risk factors adequately explain the local risk of victimization without the consideration of nearby halfway houses.

It is also important to consider that it may be easier for individuals to protect themselves from certain types of property offences. This is another possible reason why offences requiring little effort and/or time are more likely to be committed near halfway houses. When an individual and their property are outside the safety of a home or other building/unit (e.g., a workplace), there is a greater sense of vulnerability. It can be a simple task to install a chain or second deadbolt on a door, but what can one do to

secure their property exposed to the outside world? An alarmed security system and deadbolt on the front door may prevent or at least reduce the incidence of residential as well as commercial break and enter but cannot stop a vandal from defacing that front door or accessible windows and walls. Similarly, automobiles have many security features and aftermarket antitheft options (Farrell et al., 2011). However, apart from removing "stealable" items from one's car, there is very little one can do to prevent theft *from* auto.[31] Thus, the difficulty in protecting one's property from mischief and theft from auto may also play a role in shaping the results above.

6.3. Evidence of buffer zones and variations in functional form

The regression analyses in this thesis model log-linear relationships between different property crime rates and exposure to halfway houses. However, the results point to the possibility of buffer zones and curvilinear or U-shaped associations not explicitly modeled. This possibility of a curvilinear relationship is reflected in the geometry of crime, which suggests a buffer zone around the home node where the residents of that node are more apprehensive to seize opportunities for crime. Brantingham and Brantingham (1981) explain this as a result of offenders wanting to avoid recognition by neighbours familiar with their identity. This logic applies to CRFs, but there is arguably an added layer of apprehension from the heightened guardianship in and around these facilities, especially for their residents. The likelihood of offending peaks outside this buffer zone and wanes with distance in the process of distance decay (Brantingham & Brantingham, 1981). The two measures of exposure to halfway houses in the count models (model 2 in each spatial regression table) can be interpreted as representing buffer zones. The first is the count variable: for DAs containing halfway houses, the area of the DA itself represents a small buffer zone, such that a negative coefficient should represent a buffer effect. Second, a buffer zone was integrated into the analyses in the form of a dummy variable in the count models that represents

[31] Certain objects can be customized with an added layer of security. For example, in Vancouver, phones, computers, and bicycles can be enrolled in a program that helps to identify when stolen. Extra types of locks can also be purchased for the latter, while it is possible to locate the former using GPS. However, this only describes a few types of valuables, which must be addressed separately in unique ways, and which may not be particularly effective at preventing theft in the first place.

whether an immediately neighbouring DA (defined by first order queen contiguity) contains a halfway house. It is in interpreting the results of the halfway house count model and proximity to halfway house models that evidence of buffer zones and variations in the functional form of the relationship between these facilities and crime are detected.

First, the results for mischief present evidence of the largest buffer zone around halfway houses among the crime types tested. The ISD and WISD models show that the logged rates of crime increase significantly as a DA gets closer to halfway houses, but the count model shows that neither DAs with halfway houses nor those immediately surrounding halfway houses have significantly higher or lower logged rates of mischief. In other words, rates of mischief do get higher as one gets closer to a halfway house, but they peak well before reaching the halfway house and then drop off, such that the rate of mischief is not significantly different from DAs that are not near halfway houses when other variables are held constant. The second largest buffer zone around halfway houses exists for other theft. This is evidenced by the result that in the count model, DAs with halfway houses are not significantly related to other theft, but bordering DAs are. This set of results has another unique quality, however, in that ISD and WISD are not significantly related to other theft. As noted above, this means that although the risk of other theft is significantly higher in DAs that border those with halfway houses, this increase drops off very abruptly. The possibility of higher levels of crime is not discretely tested in DAs of higher orders of contiguity (i.e., there are no dummy variables for second order or third order contiguity), but the fact that neither ISD nor WISD are significantly related makes this unlikely. This perhaps indicates the need for a different distance decay function, such as the inverse of the cubed distance to halfway houses instead of the square. The fact that the spatial pseudo R^2 improved so much more after the addition of the dichotomous neighbour variable compared to ISD and WISD in the other theft and theft from auto models is support for this. Finally, theft from auto is the only crime type that appears to be a log-linear function of ISD and WISD as hypothesized. Like the results for mischief, both ISD and WISD variables emerge as highly significant ($p < .001$) predictors of theft from auto. However, the count model shows only minimal evidence of a very small buffer zone as the halfway house count variable is marginally significant ($p < .10$) and the DAs immediately surrounding those with halfway houses have a significantly higher logged rate of theft from auto ($p < .001$).

The studies examining the relationship between crime and halfway houses cited in this thesis also do not examine a log-linear relationship. All instead analyze measures of crime in incremental buffers and provide some modest circumstantial evidence of curvilinear relationships. For example, Groff and Lockwood (2014) found that the number of disorder crimes on streets was unrelated ($p > .05$) to the number and proximity of halfway houses within 400ft. However, exposure to halfway houses within 800ft significantly increased the number of disorder crimes by 22% ($p < .05$), and this effect while still significant, was reduced to 11% within 1200ft ($p < .01$). On the other hand, for property crime, the negative effect of exposure to halfway houses increased consistently from 400ft (8%, $p > .05$; non-significant) to 800ft (11%, $p < .01$) to 1200ft (15%, $p < .01$). In all, the results and existing literature suggests that the functional form of the relationship between halfway houses and crime may vary by type of crime and depend on other factors such as the environmental backcloth.

This is again suggested by Brantingham and Brantingham (1981) who mention that the buffer zone may be smaller or even non-existent for serious crimes such as homicide. But in this thesis, it is difficult to compare the crime types significantly associated with exposure to halfway houses on the basis of seriousness. An act of mischief can range from minimal defacement of property (e.g., scratching one's initials onto a tabletop at a restaurant with a knife) to destruction of property worth thousands of dollars or more. Targets in theft from auto can range from a fistful of loose change to expensive electronics and other valuables. On the note of seriousness though, I should point out that while buffer zones are detected for mischief and other theft, it is possible that larger buffer zones exist around halfway houses for the non-significant and more serious crime types; those crime types may very well be related to the proximity to halfway houses, but not be detected by the kinds of analyses conducted here and because of the ways in which exposure to halfway houses is measured. For this reason, a non-parametric regression may also be appropriate for exploring the data to better understand the nature of the relationship between halfway houses and property crime.

6.4. Size does not matter

Meaningful differences are not detected between ISD – the proximity of a DA to halfway houses in a 3.6km radius, measured as the sum of inverse square distances – and WISD. Using WISD, the relative criminogenic influence of halfway houses is

adjusted to increase around facilities that can house more offenders. The coefficients for WISD are always slightly larger than those for the original ISD variable, suggesting that the weighted measure has a stronger effect on the logged property crime rates. However, the greater effect size is never enough to reveal a significant relationship for the models where ISD is not significantly associated with the logged property crime rate, nor is there enough of a difference in the mischief and theft from auto models to suggest that the influence of halfway houses on crime is proportionate to the number of offenders residing at each facility. In other words, it appears that it is halfway houses themselves rather than the offenders therein that are responsible for the impact of proximity to halfway houses on theft from auto and mischief. This has three main implications.

First, contrary to the main fears driving the opposition to halfway houses, a larger number of offenders does not necessarily equate to more crime. This likely reflects that the intensity of the guardianship response to a halfway house is commensurate with the number of offenders residing therein. This is probably a natural administrative reaction to the capacity of halfway houses. Larger facilities may employ more staff than smaller facilities simply out of operational necessity, as more workers are needed to handle the caseload. Special police units tasked with monitoring recently released offenders such as Vancouver's HRO (VPD, n.d.b) may naturally divide their time among halfway houses based on the number of subjects they are tasked to monitor. Consequently, offenders residing at these facilities are more likely to either not offend at all during their stay or seize opportunities elsewhere. However, this does not automatically mean that local crime and the recidivism of halfway house residents is geographically displaced to communities outside Vancouver. A rich body of empirical literature shows evidence of distance decay (e.g., O'Leary, 2011; Rengert et al., 1999), in line with the expectations of the geometry of crime (Brantingham & Brantingham, 1981; 1993b). Even if offenders would prefer to offend in another part of the city away from their intimate handlers and other guardians, the risk of offending is unlikely to simply be geographically inverted. The preference to offend in another part of the city may be mitigated or even cancelled out by reduced confidence and comfort in less familiar areas as well as a hampered ability to recognize opportunities in places where the offender's awareness is not as well-developed (Brantingham & Brantingham, 1981; 1993b). This is supported by the fact that none of the relationships between crime rates and proximity to halfway houses are negative in this thesis.

This explanation is consistent with the proposition from McCord et al. (2007) that correctional halfway houses are more likely to be crime attractors than generators. If the reason for theft from auto and mischief being higher around halfway houses is due to halfway house residents committing the offences, we would expect the estimates for WISD's impact on crime to be meaningfully higher than that for ISD, but this is not the case. The constraints on offending opportunities from added guardianship focused on the offender (i.e., handlers such as HRO, parole officers, halfway house staff including caseworkers and attendants) may significantly limit opportunities for recidivism. On top of this direct attention from handlers, they must also contend with general elevation of guardianship in the area from the extra vigilance of locals and any increases in police patrol. Conversely, other offenders attracted to the area may be on the fringes of the handlers' attention and must contend mainly with the more general and diffuse increases in guardianship from local guardians and place managers. As another possibility, residents of one halfway house may not offend around their facility but may stumble onto opportunities when commuting to other facilities to attend programming, satisfy other conditions of release (e.g., urinalysis), or to associate with peers. In this case as well, a halfway house does not generate crime through the recidivism of *its* residents, but perhaps attracts crime through the recidivism of other facilities' residents. A possibility not examined here is the joint impact of both crime generator *and* attractor effects.

Second – and related to the first implication – the halfway house itself may have an impact on the local milieu, rendering it slightly more criminogenic, at least for theft from vehicle and mischief. This is in line with community members' social welfare and self-interest concerns described by Garland et al. (2017) and Garland and Wodahl (2018) in addition to prior research alluding to an indirect relationship between returning offenders and crime through the exacerbation of the structural antecedents of social disorganization (Drakulich et al., 2012; Hipp et al., 2010; Hipp & Yates, 2009; Rose & Clear, 1998; Tillyer & Vose, 2011). That is, even if recidivism is infrequent or null, the habitation of offenders in the area may erode social cohesion and collective efficacy, making the area more socially disorganized and subsequently more conducive to crime (Clark, 2016; Clear, 2001; Garland et al., 2017; McNeeley, 2018b). For example, knowledge that a large group of offenders is residing in the community could make local parents and other residents reinforce the maxim of "stranger danger," thereby stifling the formation of bonds with future residents and unfamiliar neighbours. This would reduce

informal social control and contribute to a greater sense of anonymity in the area, making crime more likely to occur (Hipp & Yates, 2009; Sampson & Groves, 1989; Shaw & McKay, 1942). Devaluation of property due to the number of offenders or increases in crime (Colwell et al., 2000) could also increase population turnover (characteristic of cheaper housing), especially if existing residents decide to vacate to other neighbourhoods. This feeds further into social disorganization, as individuals looking for cheaper and short-term housing before moving onto greener pastures are less likely to invest in the community and build relationships (Boggess & Hipp, 2010; Sampson & Groves, 1989; Shaw & McKay, 1942).

In this case, rather than the halfway house itself being a crime generator through the direct criminal activity of the residents or creation of significantly more opportunities, it could render the surrounding area more criminogenic, which could in turn attract more crime. Put differently, this would indirectly give the halfway house joint attractor and generator properties, in that the surrounding neighbourhood is more conducive to crime and may subsequently attract offenders from other areas. I should note that this explanation is not mutually exclusive from the first possibility put forward that halfway houses themselves function directly as crime attractors. Nevertheless, the results indicate that this is likely only the case for low-risk offences requiring little time and effort, such as mischief and theft from auto. As is hypothesized above, any crime generator or attractor quality, regardless of the possible mechanisms outlined here, should be inhibited/mediated by extra guardianship and reduced target suitability, though this still needs to be tested directly.

Third, this finding runs counter to other studies which suggest that returning offenders can be a positive resource in the community (Rose & Clear, 1998; Hipp & Yates, 2009). If this were true in Vancouver, the results should show a negative relationship between the rates of property crime and both ISD and WISD, as halfway houses represent a source of returning offenders residing in the community. However, the relationships between these variables and each crime rate are either null or positive. Under this hypothesis, property crime should also be more strongly related to WISD than ISD, as a higher number of returning offenders means more resources introduced to the community and therefore a lower rate of crime. But as stated above, while the coefficient for WISD is of a slightly higher magnitude than that for ISD across all crime types, the

relationship runs in the opposite direction (i.e., positive). In other words, a greater number of offenders may do the opposite of strengthen a community and reduce crime.

There is a possibility though that the number of returning offenders does have a negative effect on crime but is offset by the criminogenic effects of the halfway house. This would be consistent with the null findings and is more in line with Rose and Clear's (1998) postulation that while returning offenders can ameliorate the effects of social disorganization, if incarceration was not reformative, they can also reintroduce antisocial values into the community and inspire future criminals. Their return may also show others in the community that while noxious, prison is survivable, thereby dampening the deterrent effect of incarceration (Petersilia, 2003; Rose & Clear, 1998). These influences may exist alongside the explanations advanced above that halfway houses may be crime attractors or indirectly have joint generator and attractor properties. That is, while CRF residents may not be committing much crime themselves, they can still inspire others to, and this would contribute to the rendering of the environment around such facilities as more prone to crime.

Unfortunately, the analytic strategy in this thesis is not ideally set up to test this hypothesis, primarily because I have not included variables measuring the strength of community resources aside from economic deprivation (i.e., a negative predictor). Examples of these variables are measures of parochial and private control (Bursik & Grasmick, 1993). Although some measures of private control are available in the census and have been integrated into the analyses (e.g., two-parent households), measures of parochial control are not as available. Collecting detailed data on these forms of control requires other methods such as surveys. Once created, these variables along with the environmental risk factors for crime could be used as mediators in modeling the relationship between halfway houses and crime. Lastly, despite the range of bed numbers from 8-48, the Spearman's correlations between ISD and WISD are extremely high, owing to the spatial autocorrelation of halfway houses. The same comparison of results for areas with halfway houses spread farther apart could be more telling.

6.5. Contextualizing the findings within studies of halfway houses and crime

6.5.1. Do the results "agree" with the literature?

This thesis's mixed findings fittingly complement the extant literature's mixed results on the relationship between halfway houses and crime. Half of the six crime types tested are significantly associated with at least one measure of exposure to halfway houses. Overall, the areas immediately surrounding DAs with halfway houses have a considerably higher risk of theft from auto and other theft. The increased rate of theft from auto seems to decline steadily with distance, whereas other theft drops off more abruptly. Results for the ISD and WISD variables suggest small increases in the risk of mischief and theft from auto with proximity to halfway houses – increases that are almost negligible for most of Vancouver but become substantial for DAs close to multiple halfway houses. Still, half of the other half of the crime types tested are not significantly associated with exposure to halfway houses, and that these measures of exposure account for less than 1% of the variability in the logged rates of any of the offences that are significantly associated. I therefore submit that on the whole, exposure to halfway houses is not strongly associated with property crime in the city of Vancouver. The crime types that are associated with exposure to halfway houses are lesser offences, which further mitigates the seriousness of the risk to personal victimization.

With that in mind, this thesis joins studies by Groff and Lockwood (2014) and McCord and Ratcliffe (2007) in finding that proximity to halfway houses is generally not associated or not strongly associated with higher levels of crime after controlling for other risk factors. For example, Groff and Lockwood (2014) likewise found that after controlling for other criminogenic facilities and the same (though measured differently) three indicators of social disorganization as this thesis, the inverse distance weights for halfway houses[32] within 400ft of Philadelphia street segments were not associated with the frequencies of property crime. In fact, halfway houses within 800ft and 1200ft buffers were significantly associated with decreases in property crime. Moreover, Groff and

[32] Inverse distance weights (IDW) are a composite measure combining the number of and distance from halfway houses within a given distance. Each halfway house contributes a value of 1 minus the square root of the distance (in miles) from the centroid of a street segment to that halfway house. The values for each halfway house in the buffer are summed to compute the final IDW.

Lockwood (2014) found decreases in violent crime related to halfway houses within 1200ft buffers (but non-significant relationships within 400ft and 800ft), while increases in Type II disorder offences such as public drunkenness and disorderly conduct were associated with halfway houses in 800ft and 1200 ft buffers (though not 400ft). This is compatible with the results of this thesis in that it appears to reflect increases in lesser offences characterized by little required time, effort, and risk of apprehension. McCord and Ratcliffe (2007) found that drug arrests were disproportionately concentrated around halfway houses, four to six times higher than the concentration of drug arrests for their entire study area. However, after controlling for other criminogenic facilities, sociodemographic variables, and the size of each areal unit, halfway houses were revealed to be not only non-significantly (though negatively) related to the number of drug arrests, but also significantly related to placement in areas with no drug arrests at all (McCord & Ratcliffe, 2007). Insofar as drug markets tend to geographically coincide with property offences, the results of this thesis are consistent with the findings of McCord and Ratcliffe (2007).

To the extent that three of the six crime types are not significantly related to proximity to halfway houses and the other three are not strongly related, the results of this thesis overall conflict with other studies' findings that halfway houses are positively associated with crime (e.g., Hyatt & Han, 2018; McCord et al., 2007). McCord et al. (2007) did not examine the effects of halfway houses separately, incorporating halfway houses into a crime attractor index found to be significantly ($p < .05$) associated with perceived crime and incivilities. The findings above, however, call into question the blanket supposition that halfway houses are crime attractors. These facilities may only attract certain types of crime, presumably because real and perceived guardianship around halfway houses and decreases in target volume and suitability constrain offenders' abilities to seize more lucrative opportunities for crime, such as break and enter and theft of auto. The results of this thesis are also in stark contrast to Hyatt and Han (2018), who reported halfway houses as significant ($p < .05$) predictors of 11 out of 12 crime types (various violent felonies, property felonies, and misdemeanors) within quarter-mile buffers. Among these 11 offences were burglary and motor vehicle theft, both of which are reported as non-significant ($p > .10$) covariates of proximity to halfway houses in this thesis. Disorderly conduct, a misdemeanor, is the sole offence not significantly associated with halfway houses in their study. The only agreement between

these two sets of results is that vandalism (i.e., a subtype of mischief) and theft in Hyatt and Han's (2018) study are significantly associated with halfway houses. Notwithstanding this similarity, the fact that all types of crime except for disorderly conduct significantly increase after the siting of halfway houses and decrease after their closing additionally contrasts with the observation in this thesis that only low-effort and low-risk offences are related to proximity to halfway houses.

This begs the following question: why do this thesis and the studies by Groff and Lockwood (2014) and McCord and Ratcliffe (2007) diverge from Hyatt and Han (2018)? For example, is there anything different in the risk profiles of halfway house residents or the administration and operation of halfway houses, law enforcement agencies, or other stakeholders for halfway houses in this study area compared to those in Vancouver or Philadelphia? If halfway house residents have a higher risk of reoffending on average and/or the facilities tend to be located in areas with a lower intensity of guardianship and other constraints on offending, a higher rate of recidivism could follow and inflate the frequency of crime. In other words, halfway houses could function more acutely as crime generators in Hyatt and Han's (2018) study. Above average risk levels could be a product of releasing more prisoners to alleviate prison overcrowding and high demand for institutional resources (Pitts et al., 2014; Vaughn, 1993). Deficiencies in guardianship could arise if the halfway houses and local police agencies are short-staffed or otherwise under-resourced, as may be the case in rural and remote areas (Duxbury & Higgins, 2012; Hollis & Wilson, 2015; Ricciardelli, 2018). In these cases, the sources of guardianship relied on in Vancouver and other jurisdictions may be unable to rise in proportion to the number of residents or offenders attracted to the area after the siting of a halfway house. It could also be that halfway houses function more acutely as crime attractors if the types of offenders residing at halfway houses in the area tend to fit a particular profile. For example, offenders with substance abuse disorders may be targeted by drug dealers as potential clientele; members or gangs and organized crime groups may be targets of retaliatory violence my members of rival groups (Berg et al., 2012; Pyrooz et al., 2014); and sex offenders may be targeted by victims, their kin, or their sympathizers (Cubellis et al., 2019; Orth et al., 2006).

Unfortunately, Hyatt and Han (2018) were unable to disclose the study area in honour of a request from the collaborating agency, so a more concrete comparison and better-informed speculation cannot be offered. But it is important to highlight the authors'

quasi-experimental design, which is much stronger than the cross-sectional studies (e.g., Groff & Lockwood, 2014; McCord & Ratcliffe, 2007) finding either no or negative association with halfway houses, including this thesis. While it appears that there are more pieces of evidence that halfway houses are not criminogenic (i.e., more null or negative findings) or at least not as criminogenic as NIMBY supporters believe, Hyatt and Han's (2018) study merits considerable discussion and cannot be set aside.

6.5.2. Strengths: What does this thesis add to the literature?

There are five ways in which the methodological choices in this thesis contribute to the extant literature on halfway houses and crime. First, this is the only study to my knowledge investigating this relationship in a Canadian jurisdiction, which innately contributes to the external validity of this underdeveloped body of literature. Of the four studies explicitly mentioned in the preceding section, three are conducted in Philadelphia and the remaining study by Hyatt and Han (2018) examines an unspecified jurisdiction also in the United States. Though it has similarities with the other study areas as a diverse metropolitan city, Vancouver has a vastly different environmental backcloth. Not only does it function according to a different set of laws with a different population (i.e., sociodemographic composition), the correctional system as a whole and community corrections system more specifically operates on a much smaller scale with fewer offenders and halfway houses; a scale more comparable to other countries (Walmsley, 2018). Indeed, the United States penal system has the highest rate of incarceration in the world at 655 per 100,000, as well as the largest number of people incarcerated overall with 2,121,600 individuals, whereas Canada incarcerated 41,145 individuals at a rate of 114 per 100,000. For comparison, 53% of countries have a rate of incarceration under 150 per capita (Walmsley, 2018). These findings are perhaps therefore more generalizable to metropolitan areas from other jurisdictions in the world. Put differently, since the results here align somewhat with those of two studies in Philadelphia (Groff & Lockwood, 2014; McCord & Ratcliffe, 2007), this thesis also suggests a certain degree of robusticity to the observation that halfway houses are not strongly associated with higher levels of crime; they may be weakly associated with crime, not associated at all, or even negatively associated.

Second, to my knowledge, this thesis is the first study of the relationship between crime and halfway houses to consider the relationship as a function of the number of

offenders residing in each facility through the WISD variable. The approach follows the lead of Hipp and Yates (2009) who studied the association between parolees per capita and crime in Sacramento, California. However, whereas Hipp and Yates (2009) found that monthly increases in parolees per capita predicted significant increases in the number of aggravated assaults, burglaries, and robberies, this thesis reveals little to no difference between ISD and WISD. This suggests that the degree to which returning offenders contribute to crime may be mediated by factors such as housing type (McNeeley, 2018a; 2018b) and should be considered in future studies of returning offenders and crime.

Third, by analyzing rates of property crime, this thesis has operationalized the dependent variables differently from the other studies researching the relationship between crime and halfway houses. Of those four studies reviewed here (Groff & Lockwood, 2014; Hyatt & Han, 2018; McCord & Ratcliffe, 2007), two analyze counts of crime. That is, they evaluate whether the number of crimes is significantly higher in proximity to halfway houses. This is highly relevant to parties such as law enforcement agencies who must allocate resources to beats with more crime and local place managers who must organize the security of their facilities, but it can also be misleading because it does not consider a population at risk. In fact, using crime rates to account for populations at risk can lead to a different result than when measuring the volume of crime alone (Andresen, 2019). Although the risk of a crime occurring in some area tends to increase as the number of opportunities increases (i.e., greater number of targets and potential offenders), this is not the same as the risk of any one target experiencing victimization in that area. For instance, a parking lot with three vehicles stolen out of 50 has a higher risk of auto theft *occurring* than a street with 10 vehicles experiencing one vehicle theft (i.e., the lot has 200% more auto thefts than the street), but the risk of victimization *to any one car* is actually higher in the street (i.e., 6% of vehicles victimized in the lot vs 10% in the street). This distinction is especially salient in the study of halfway houses and crime because these facilities tend to be located in urban areas that are densely populated and/or highly frequented by those residing outside the neighbourhood (Bell & Trevethan, 2004; Costanza et al., 2013), which can inflate the volume of crime without affecting the risk of victimization. In fact, all halfway houses in Vancouver are sited in such places. Finding a positive relationship between halfway houses and the frequency of crime under this circumstance could be an artefact of a

large number of opportunities that are independent of the halfway house. This risk of victimization may be more relevant to individuals who frequent the area and wish to know whether they are more likely to be victimized themselves. It is also pertinent to local residents and business owners who must choose between added security measures or some other expenditure to know whether their risk of victimization is higher around halfway houses. Thus, this thesis adds to the literature as the first study on halfway houses and crime to integrate populations at risk by studying crime rates.

This thesis also forces one to consider whether Hyatt and Han (2018) may have found different results if they tested rates instead of (or in addition to) counts of crime. Take for instance the risk versus frequency of violent offences. Siting a halfway house inevitably adds to the ambient population of the surrounding area in the form of residents (i.e., offenders) and staff, so if the risk of victimization remains unchanged, the frequency of violence should naturally increase. Could this explain any part of Hyatt and Han's (2018) results? The trouble with addressing this question is that data that quantifies a population at risk is not always readily available, especially for certain units of analysis. Two reasons for this are the preference for microspatial units of analysis (i.e., street segments; Weisburd et al., 2009) in modern environmental criminology and the conventional use of the residential population as a population at risk (Andresen, 2019). That is, residential population counts are commonly taken from census data, which in many jurisdictions does not disseminate these quantities at the microspatial level. To compute a crime rate, one must therefore use an aggregated unit of analysis for which this information is disseminated, such as a census tract or DA (the Canadian equivalent to an American block group), leaving subsequent analyses exposed to the MAUP (Fotheringham & Wong, 1991). However, the approach in this thesis of using more meaningful alternative populations at risk represents a way around this problem to compute rates for street segments. For example, this thesis uses the number of licensed businesses as the denominator for commercial break and enter. As the addresses of licensed businesses other than those operating from a home are freely available in the city of Vancouver, once geocoded, they could have been used to compute rates of commercial break and enter at street segments. Dismissing the notion that rates *must* be

calculated using the number of residents as the denominator enables one to be more resourceful with available data to calculate crime rates for microspatial units.[33]

Together with the null and negative results of Groff and Lockwood (2014), this thesis shows that in addition to the risk of property crime occurring being no different or reduced (depending on the distance) in places near halfway houses, the risk of victimization is also not significantly elevated for targets of property offences requiring little time and effort. When considering Groff and Lockwood's (2014) null and negative findings regarding violent crime and McCord and Ratcliffe's (2007) finding in their analysis of location quotients that drug arrests are not overrepresented and may even be underrepresented in areas near halfway houses after controlling for other environmental risk factors, the evidence becomes more compelling that halfway houses on average are not associated or only weakly associated with higher levels of crime. That is, primarily weak, null, or negative findings have emerged in three studies operationalizing the intensity of crime in different ways: count, measuring the volume of crime; rates, measuring the risk of victimization; and location quotients, measuring the over- or under-representation of a type of crime (Andresen, 2019). Despite Hyatt and Han's (2018) strong quasi-experimental design finding a positive relationship between halfway houses and crime, evidence for the opposite is becoming stronger and more consistent.

Fourth and related to the third point on operationalization of the dependent variables, this thesis also provides more detailed insight on the relationship between halfway houses and crime by disaggregating crime types. That is, the analysis of six types of property crime further adds to the literature by breaking down the broad category of "property crime" into some of its constituent elements. Whereas Groff and Lockwood (2014) reported that property crime overall had no significant relationship to counts of crime at street segments within 400ft and a negative relationship within 800ft and 1200ft, the results above demonstrate that this may not be true for certain types of property offences and reinforces the salience of disaggregating broad categories of crime for analysis (Andresen & Linning, 2012). As the majority of property crimes tested in this thesis are not significantly related to proximity to halfway houses, measuring property crimes in the aggregate would have obfuscated the significant relationships with

[33] Boggs (1965) and Harries (1981) outline a set of operations for computing crime rates based on alternative denominators and makes a number of suggestions for direct and indirect denominators to estimate meaningful populations at risk to this end.

mischief and theft from auto. Similarly, McCord et al. (2007), incorporated halfway houses into a crime attractor index found to be significantly ($p < .05$) associated with indices of perceived crime and incivilities. But whereas this method of aggregation is isolated to the dependent variable in Groff and Lockwood's (2014) study, and researchers (e.g., Andresen & Linning, 2012) have documented the inappropriateness of studying broad categories of crime, aggregation is two-fold in the McCord et al. (2007) study, as it is also performed on the independent variables.[34] By showing that many criminogenic places are only associated with some crime types and not others, the regression models above again illustrate that aggregating these variables to generate indices of (perceived) crime and incivilities is inappropriate, but that this also applies to computing indices of crime generators and attractors. Perhaps care should be taken in future studies to only use dimension reduction or aggregation out of methodological necessity (as is done above to compute the social disorganization variables), such as in cases of high multicollinearity or small sample sizes to preserve statistical power. This would enable a much more detailed and nuanced exploration of phenomena of interest.

Finally, this thesis uses a different unit of analysis than the other four studies examining the relationship between crime and halfway houses: DAs, which are small census geographies of roughly equal population (typically 400-700 residents), the boundaries of which conform to existing street networks and natural barriers. While they are an aggregated unit of analysis, they do conform somewhat to people's activity spaces (nodes and pathways). As mentioned above, a weakness of the analysis is that the use of meso-level spatial units makes the analyses amenable to the MAUP to some degree (Fotheringham & Wong, 1991; Weisburd et al., 2009). However, there are two advantages to the use of DAs. First, it enables the use of rich demographic data from the Canadian census without committing the ecological fallacy. This data is essential to creating variables that represent well-known sociological covariates of crime critical to disentangling the covariance of halfway houses and crime from the characteristics of the neighbourhoods in which halfway houses are located. Second, although the MAUP is applicable to the results of this thesis because of the use of DAs, for the same reason,

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[34] I acknowledge that the indexes of perceived crime and incivilities as well as crime generators/attractors have high Cronbach's alphas (see McCord et al., 2007, p. 302, 305), but it is still possible that analyzing the survey items separately may have yielded slightly different results and a more nuanced understanding of how the independent variables affect crime in the study area, Philadelphia.

this choice improves the reliability of results and dispels MAUP to some extent in the overall literature. That is because the body of research on halfway houses and crime now has three studies with mostly weak, null, or negative findings, each investigating the relationship at a different unit of analysis. McCord et al. (2007) aggregated crimes within various distances of halfway houses to compute location quotients. Groff and Lockwood (2014) similarly studied the relationship between crime and halfway houses within different buffers, but aggregated offences to street segments for analysis. The use of DAs thus helps to address the overarching issue of MAUP across studies and contributes to the robusticity of these results.

Contextualizing the thesis results in the extant literature, it is apparent there may not be a definitive answer to the question of whether halfway houses are associated with crime, given the handful of studies on the subject and mixed findings. However, the general impression is that crime is not always higher – and may sometimes be lower – around them. These facilities may alter the local milieu to be more criminogenic, but existing practices (e.g., the administration/operation of halfway houses) may also simultaneously and proportionately bolster local guardianship to counteract those effects to a degree. A possible outcome is that offenders frequenting the area around a halfway house may only be able to seize opportunities for crimes that can be committed inconspicuously and with little effort or view only these types of offences as worthwhile. This explains the combination of null and positive findings in this thesis and can also explain why findings from studies in Philadelphia yield negative results. That is, there may simply be a difference in existing policy and practice between Vancouver and Philadelphia, where the latter is more effective at building a resistance to the criminogenic milieu exuded by correctional halfway houses. Another possibility is that practices may not be so different but simply work better in Philadelphia. Thus, consideration of such a question (i.e., are halfway houses associated with crime?) should not chase a simple and categorical yes or no in the abstract, but instead specifically inquire about crime opportunities in real places and in light of these settings' various backcloths.

6.6. Implications for policy and practice

6.6.1. Crime prevention near correctional halfway houses

The fact that only half the crime types studied here are associated with halfway houses suggests that existing policy and practice is working to some degree to prevent increases in crime. As stated above, the guardianship provided by halfway house staff, specialized police units, patrol officers, parole officers, and other place managers may severely limit the opportunities for more serious offences. Moreover, the use of curfews and, in some cases, visual check-ins at regular intervals constrains the search for opportunities and the time available to pursue the opportunities encountered. Nonetheless, the ability for offenders to go out during the day into target-rich environments – where their halfway houses are often sited (Costanza et al., 2013; Drawve et al., 2019; Simes, 2018) – presents a window of opportunity for lesser offences that can be perpetrated more inconspicuously. According to the results, an even more serious problem may be the rendering of the host community as more attractive to offenders other than those residing in halfway houses who are likely responsible for the bulk of the elevated rates of mischief, theft from auto, and other theft.

These conclusions have two important implications for crime prevention. Most obviously, they indicate which types of offences require greater attention and what kinds of resources ought to be allocated for this purpose. Clarke and Cornish (1985) argue that since the decision-making process is unique to specific types of crime and even individual opportunities, crime prevention should be designed with this idiosyncrasy in mind. Recommendations for interventions are made below by cross-referencing the statistically significant crime rates with evaluations of crime prevention initiatives. Second, the potential for halfway houses to be crime attractors invites environmental corrections to consider that recidivism is only one piece of the crime puzzle tied to re-entry, in the same way offenders are. That is, although the emergence of environmental corrections is a major turning point in the study and practice of corrections, it still primarily highlights the role of criminal justice agents (mainly agents of the correctional system) to appropriately manage and supervise the offender to prevent recidivism (Cullen et al., 2002; Schaefer et al., 2015). This is critical because if halfway houses can/do function more as crime attractors than generators, the supervision of offenders can only have a limited impact on mitigating the risk of victimization. Fortunately, this

also means that the burden of crime prevention can be offset somewhat to others besides police and community corrections personnel. To reduce rates of victimization, crime prevention interventions tailored to mischief, theft from auto, and other theft can be implemented by a range of stakeholders in the community. Furthermore, as the types of offences associated with halfway houses share similar characteristics, such as often being low-risk and low-effort, the specific interventions suggested here may have complementary effects, creating a holistic crime reduction effect.

To combat theft from auto, street lighting could be improved, and CCTV cameras could be installed on streets with available parking near halfway houses and in parking lots/structures with appropriate signage informing passersby of the presence of cameras. Both measures could improve guardianship by improving present guardians' lines of sight (i.e., natural surveillance). CCTV could additionally deter theft from auto by adding a layer of perceived guardianship, as well as by improving the clearance rate of theft from auto investigations. The subsequent effects on the reputation of vehicle crime opportunities around halfway houses may be particularly beneficial insofar as the results suggest halfway houses likely function as crime attractors more than generators. Strong evidence exists for the effectiveness of both interventions. A systematic review conducted by Farrington and Welsh (2002) found significant reductions in crime overall in areas with improved lighting, relative to control areas, including theft from vehicle and other vehicle crimes. Piza et al. (2019) in their systematic review of 76 CCTV evaluations published over 40 years in nine countries report significant reductions in drug, property, and vehicle crime following the implementation of CCTV.

Although evidence of the effectiveness of CCTV at preventing vehicle-related property crime in parking structures is robust (Eck, 2003; Piza et al., 2019), open-street cameras should arguably be prioritized in the face of resource-constraints in Vancouver because private lots are not positively associated with higher risk of victimization in this thesis. In any case, many lots near halfway houses already have a dynamic security presence and CCTV. An added benefit of both interventions is that the exorbitant cost of installation can be divided and covered separately by the municipality, CSC (or other correctional service/department), and local business owners, depending on their placement. For example, the CSC can cover the cost of CCTV within halfway houses, while the city can be responsible for open-street installation and building managers can set up cameras around their perimeters to monitor their properties with perhaps even

partial coverage of the street. Lighting can be installed on the street itself by the city, but residents and business owners can install lights on the facades of their buildings or storefronts which illuminate parts of the street in front of them. Evidence suggests these crime prevention tools should also contribute to reductions in offences other than theft from auto (Eck, 2003; Farrington & Welsh, 2002; Piza et al., 2019).

Mischief could similarly be addressed in numerous ways. Security gates could be installed for storefronts to prevent damage to or defacement of those properties outside business hours when guardianship is low (Jenion, 2003). Another option is to implement rapid cleanup and repairs of damaged property. Consistent with the broken windows hypothesis, this has been shown to reduce further disorder crimes such as mischief in various types of settings such as public transportation stations and vehicles (Branas et al., 2018; Eck, 2003; Wilson & Kelling, 1981). This tactic could also indirectly reduce other forms of crime by signalling to potential offenders a care for the community and willingness to intervene (Cozens & Love, 2015; Reynald, 2010; 2011; Wilson & Kelling, 1982). Alleygating is also an intervention which could not only limit access to targets (e.g., sides of buildings make attractive targets for graffiti), but also reduce the number of hiding places for offenders lying in wait for opportunities and eliminate possible routes for escape (Armitage & Smithson, 2007; Bowers et al., 2004; Sidebottom et al., 2018). The latter is especially important as the offences associated with exposure to halfway houses in this thesis are characterized in part by the ease of escape.

This technique has seen success in many jurisdictions (Sidebottom et al., 2018), but may not be a viable option around two of the six halfway houses in Vancouver located in the central business district and DTES. Alleys in both areas may also provide operationally necessary access to buildings. For the DTES especially, homeless persons rely on alleys as places to sleep/rest or use drugs. Alleygating could displace this population to areas not as well-equipped to deal with them. Crackdowns in the DTES have historically been shown to increase the rate and frequency of overdose for intravenous drug users (Wood et al., 2003). Organized crime groups may also relocate their drug selling activities, following their clientele to other spaces, which could inadvertently draw other types of crime to new neighbourhoods. Much of the homeless population in the DTES also has severe mental health problems. New neighbourhoods receiving these persons may not have the resources (e.g., shelters, outreach centers) nor experience (e.g., overdose response, knowledge of how to respond to persons in a

psychotic state) to deal with the unique and multifaceted demands that the homeless population in Vancouver can place on a community.

It is more difficult to find a tailored crime prevention initiative for other theft because it is a residual category of theft not belonging to theft of or from auto. Types of theft that may be common in the neighbourhoods with halfway houses – which tend to be in or near commercial areas – are shoplifting, theft of bicycles used for commuting, and theft of personal property while at a restaurant, park, or other area where one may have valuables but be distracted by their surroundings (Johnson et al., 2010). These can be addressed using specific applications of general target hardening techniques adapted to different settings and targets. For example, providing secure storage (e.g., lockers) or retrofitting furniture with anti-theft features such as bag clips could reduce the risk of personal property theft (Johnson et al., 2010). This affects the inertia and accessibility of targets. Use of “bait” targets such as bicycles or phones, which are monitored and fitted with GPS by law enforcement, could aid in the apprehension of offenders attracted to the vicinity of halfway houses making the area safer, as well as deter prospective thieves. Additionally, increasing the presence of security officers/attendants has been shown to be effective at reducing the risk of theft in general on top of other types of crime (Eck, 2003). These last two suggestions should increase the volume and intensity of guardianship in the area (i.e., more *intervening* guardians; Reynald, 2009).

Similarly, as a generic approach, an increase in police patrol around halfway houses should help to lower the risk of all three forms of property crime by increasing both the volume and intensity of guardianship. This police response should be separate from that of specialized units tasked with monitoring offenders in the community. Because these units’ roles as handlers and guardians (Felson, 1995) may be integral to curbing recidivism and be a reason why halfway houses in Vancouver appear not to function as (much as) crime generators, it is important to minimize distractions from their mandate of supervising offenders themselves. Meanwhile, the addition of patrol officers around halfway houses as place managers (Eck, 1994) can improve perceptions of safety for locals, deter crime, and intervene in crimes in progress. There is abundant evidence of the efficacy of hotspots policing for reducing crime and improving community-police relations (Braga et al., 2014). At the same time, given the recent tensions between communities and police, this may not be as appropriate in some jurisdictions compared to others. Wherever it is implemented, adherence to the tenets of

community policing is vital (Schaefer Morabito, 2010). Where an enhanced police presence is deemed less appropriate or there are not enough resources to increase or redirect patrol, community watch programs may be a viable alternative and have been increasingly reported as an overall effective format for crime prevention (Bennet et al., 2006). It may have a similar effect of increasing the volume of guardianship through place managers but may be more effective at enhancing collective efficacy, though the intensity (i.e., number of intervening or capable guardians) may not significantly change.

One thing each of these interventions has in common is high cost of implementation. Another more cost-effective approach is “nudging” or public education of the risk of victimization and advice on how to reduce this risk for oneself using signage, leaflets, or other forms of easily read literature (Johnson et al., 2010; Roach et al., 2017). Nudging goes beyond simply warning others of crime in the area, illuminating to readers common bad practices that increase their own risk of victimization (e.g., leaving items in plain view) and misconceptions about the security of their belongings (e.g., vehicles in driveways are immune to theft), and also explains what they can do to make themselves harder targets for crime (Pogarsky & Herman, 2019; Roach et al., 2017; Sas et al., 2021). This serves to lower target suitability. Evaluations of nudging have yielded desirable results for crime reduction. For example, an experiment in the United Kingdom saw a noticeable reduction in all theft from auto for treatment areas relative to control areas and a significantly smaller proportion of theft from auto incidents from insecure vehicles more specifically in treatment areas (Roach et al., 2017). Another quasi-experimental study of a nudging-based bicycle theft prevention initiative on a Belgian university campus showed a significant positive influence on cyclists’ locking behaviour (Sas et al., 2021). Nudging can be applied to other forms of theft as well, with signage in parks and other areas reminding patrons to be vigilant. Applied to mischief, it could encourage building managers and other place managers to implement their own prevention measures or at least better monitor the properties for which they are responsible. Nudging can also deter potential offenders by affecting their perceptions of the effort required to commit a crime or risk of being caught (Pogarsky & Herman, 2019).

The implementation of all the interventions listed should consider the possibilities of buffer zones around halfway houses discussed above. That is, when confronted with resource deficits such as budgetary constraints and limited person-power, how should areas near halfway houses be prioritized for crime prevention? Since there is very weak

evidence of a buffer zone for theft from auto, crime prevention strategies can be employed more diffusely. Crime prevention for mischief, which appears to have the largest buffer zone, should be targeted more in areas outside a one DA buffer (typically one to three street blocks). Finally, other theft appears to have a very small buffer zone, since the DAs containing halfway houses do not have significantly higher rates of this offence, but the DAs immediately neighbouring them do. Additionally, the relationship between halfway house exposure and other theft drops off abruptly outside these circles of DAs. Opposite to mischief, crime prevention can therefore be concentrated on the immediate neighbours if needed without a need to extend much beyond them. For all types of offences, attention must be paid to displacement or the diffusion of detriment after implementation (Hodgkinson et al., 2020; Weisburd, 2018).

Lastly, I am hesitant to provide recommendations on the siting of future halfway houses based on the findings. Since the data are cross-sectional, there is no information about how neighbourhoods reacted to the siting of halfway houses. Moreover, conflicting recommendations can be derived from the results. On the one hand, the coefficients for exposure to halfway houses are reasonably small, which is desirable for the community; however, halfway houses that are close to each other cast overlapping spheres of influence, stacking the effects of exposure and creating more appreciable swells in the risk of victimization. This suggests that halfway houses should not be sited so close to one another. On the other hand, significant relationships between halfway houses and three crime types were detected using a large buffer of 3.623km. This buffer was selected because it is the greatest distance between any two CRFs: since residents of these facilities may travel frequently to others in fulfilment of conditions of release (e.g., programming, urinalysis), the farthest distance between two CRFs represents a reasonable sphere of influence. Consequently, siting them farther apart may extend this sphere and not only increase the number of areas within them but increase the number of areas located within overlapping spheres. This is supported by the geometry of crime. Brantingham and Brantingham (1981) posit that individuals are able to recognize opportunities better and feel more comfortable seizing those opportunities in their awareness spaces where their cognitive maps are well-developed. As frequent travel develops one's cognitive map, requiring offenders to travel farther can make them feel more comfortable committing crime in more places. Contrary to the initial recommendation, this suggests that future halfway houses should be sited closer to

existing ones. Doing so would also enable easier and less diffuse resource allocation for law enforcement and crime prevention.

This brief discussion of where to site halfway houses presents an idea of how unreliable any recommendations based on the findings of this thesis and even other studies can be. Even Hyatt and Han's (2018) quasi-experimental study did not present any information on the proximity of halfway houses to one another, citing overlapping spheres of influence as a methodological problem that created issues of identification and association, and prompting them to analyze crime in smaller buffers around halfway houses. Conversations over the locations of future halfway houses should instead focus on the benefits for offender reintegration and decreasing the likelihood of recidivism, as opposed to minute increases in the risk of victimization and compounding effects from overlapping exposure. For example, locations should be prioritized based on protective factors that improve program efficacy and reduce offenders' likelihood of recidivism such as affluence and community resources (Costanza et al., 2013; Drawve et al., 2019; Hipp et al., 2010; Houser et al., 2018; Johnson, 2006; Kubrin & Stewart, 2006; McNeeley, 2018b; Wright et al., 2012; 2013). Successful reintegration is ultimately also in the best interest of the community, and any increases in crime rate can be appropriately addressed or prevented by an integrated evidence-based crime prevention response by agents of formal social control and community members alike, as described above.

6.6.2. Do the results support a NIMBY response?

Despite half the crime types tested being associated with proximity to halfway houses, the findings do not provide strong support for a NIMBY response in Vancouver. The results are consistent with the assumption that law enforcement attention received by any one halfway house is commensurate with the number of offenders residing therein and the risk they pose to the community, and that larger facilities are staffed by a greater number of guardians and handlers: more caseworkers and/or parole officers as well as support staff to manage a larger case load (Maier, 2020b). That there are no meaningful differences detected between ISD and WISD means that individuals need not be alarmed by the maximum occupancy of offenders if a halfway house is being sited in their neighbourhood or they are looking to move homes and feel deterred by a nearby halfway house (or an existing halfway house has reported that it will raise the number of available beds for offenders). The heightened risks of victimization are

ultimately also for less serious offences that can be combatted by myriad crime prevention strategies, not limited to those listed above. These include simple behavioural changes to reduce individuals' personal risk of victimization which individuals can also adopt to make themselves harder targets in areas with other criminogenic places. In fact, because halfway houses are located in and around areas with many other significant covariates of property crime, there is no extension of the activity spaces in which these self-protective crime prevention behaviours should be undertaken.

For example, community members can contend with the increase in the risk of theft from auto by leaving nothing of value in their vehicles, and if they must, storing those items out of plain view and being sure not to interact with those items before leaving their vehicles after parking. Vehicle owners could also seek out well-patrolled parking lots/structures, especially those with CCTV (Eck, 2003; Piza et al., 2019). This does not make an automobile immune from unauthorized entry, but greatly reduces the risk of it, and if the driver and any passengers remove all valuables from the vehicle before exiting, eliminates the opportunity for theft entirely. For those commuting to these areas, one can similarly limit the chances of other theft and mischief victimization by minimizing the amount of personal property they take. For instance, if one must commute to a neighbourhood high in vandalism to vehicles, travelling by other means of transportation (e.g., public transit or taxi) helps an individual present the fewest opportunities to others to damage or deface their vehicle. As antitheft measures, if one cannot avoid commuting to and from an area with many valuable items, they can seek options for safe storage (this would also protect against mischief); invest in personal security items such as lanyards attached to audible alarms, which sound off if removed from the attached valuable (e.g., phone, wallet, bag); and participate in registration programs managed by the police, which allow them to more easily match recovered stolen property to their owners and may come with stickers to mark registered items, deterring potential thieves from stealing them (Johnson et al., 2010). These behaviours would also complement the area-based crime prevention efforts by place managers, guardians, and handlers near halfway houses recommended above.

Unfortunately, the greater risk of mischief, theft from auto, and other theft in DAs near halfway houses is more pronounced for residents of those areas, as much more of their personal property is available to be targeted. Those who reside or operate businesses in these DAs cannot easily move their property to safer areas. Commuting

away from these areas also means that their residence or business will lose a place manager or guardian. The only recourse is for them and/or others (e.g., law enforcement agencies, municipality) to participate in more costly forms of crime prevention, such as installation of CCTV or increasing the frequency and intensity of police patrol. This also engages the self-interest concern briefly touched on above, regarding the impact of halfway houses on property values and local economy (Colwell et al., 2000; Garland & Wodahl, 2017). Though not measured directly, the greater risk of damage to property could devalue both residential and commercial properties and make the area less attractive to prospective businesses looking for real estate opportunities, despite halfway houses in Vancouver (and elsewhere) being located in convenient and commercially active neighbourhoods (Colwell et al., 2000). That said, the fact that the somewhat more serious crime types of residential break and enter, commercial break and enter, and theft of auto are not significantly associated with halfway houses should arguably moderate or counteract to an extent any devaluation of property. If measures can be taken to negate the positive relationship between halfway houses and the crimes of mischief, theft from auto, and other theft, reductions in property value or the attractiveness of relevant DAs for new businesses and residents should theoretically reverse. Recommendations for policy and practice are discussed in more detail in the section above.

Of course, much of the impetus for NIMBY stems from the fear of violent victimization. The results of this thesis do not speak to this. However, if the claim that proximity to halfway houses is only associated with offences requiring higher effort and temporal investment holds, it can be inferred that individuals whose routine activities intersect the vicinity of halfway houses are not at increased risk for violent offences perpetrated in a *certain way*. In other words, an increase in the risk of violent crimes cannot be ruled out, but the results hint that the manners in which they can be committed are perhaps limited. For example, kidnapping and certain forms of homicide generally require more time and effort and present an elevated risk to the perpetrator could be less likely to occur. The risk of common assaults and daylight street robberies which can be difficult to perpetrate inconspicuously may also be reduced. Changes in the backcloth of a neighbourhood (e.g., more guardianship and reduced target suitability) may counter and nullify other changes in the backcloth that increase the risk of crime, potentially even decreasing the overall risk of violent victimization. There is nevertheless also a possibility that people amend their offending scripts to reduce the

time and effort needed, as well as ensure a more successful getaway. For instance, there are ways to commit robbery and assault more inconspicuously, and anyone premeditating an act of violence can attempt to discern routine variation in guardianship and other elements of the backcloth that makes the desired offence easier to perpetrate at some times and places compared to others. The unavailability of violent crime from the analyses is an unfortunate limitation, but the much higher prevalence of property crimes relative to acts of violence means that the offences expected to affect the most individuals are considered in this thesis.

In sum, the argument that this thesis does not strongly support a NIMBY response to halfway houses is not a claim that community members should let their guard down. Rather, it is an assertion that because the elevated risk of crime can be jointly managed by various stakeholders, individuals should still be cautious but need not be alarmed or unnerved by the presence of a halfway house in/near their activity space or news that one will be sited nearby. If the measures such as those discussed in this section are executed properly and can successfully manage these risks, proponents of this form of correctional release will not have to rely on the argument that at least the deleterious consequences of halfway houses on local crime are outweighed by their benefits (Hyatt & Han, 2018). Once the “costs” are addressed, the focus can be solely on how to maximize the value of halfway houses for the gradual release and supervision of returning offenders and their ability to reintegrate those offenders as contributing members of society (Hipp & Yates, 2009; Rose & Clear, 1998).

6.7. Limitations and directions for future research

This thesis has several limitations that signify avenues of inquiry for future research on the relationship between halfway houses and crime, as well as returning offenders and their communities more broadly. First, there are only six halfway houses spread across five DAs out of a total n = 993. This does not offer much variation in the key independent variables of interest on which to regress the dependent variables. Similar research should therefore be conducted in other jurisdictions to further investigate the relationship between the proximity to halfway houses and crime and aid the generalizability of this growing area of literature. More Canadian insight could be garnered by replicating these analyses in cities with more halfway houses, such as Montreal (n = 14) or Winnipeg (n = 10). For a bigger picture, whole provinces could be

studied, such as Ontario and Quebec, which have more halfway houses than other provinces in Canada (CSC, 2018a). Similarly, the scale of the correctional system in the United States would enable far more reliable analyses and also yield an understanding of how the relationship between halfway houses and crime differs across jurisdictions.

Studying jurisdictions with a larger number of halfway houses and greater diversity in the types of facilities in operation also permits a distinction to be made within the research design among these different types of facilities, such as CRFs and CCCs. A distinction between CRFs and CCCs, could not be made in this thesis as there are no CCCs in the city of Vancouver. However, the differences in security and other aspects of operational policy/practice between these two types of facilities could have implications for crime. Analyses could further be stratified by inclusion/exclusion criteria (e.g., sex, Indigenous heritage, gang or organized crime affiliation, sexual offending history, addiction, etc.) or administrative differences. Conversely, these factors could be represented as control variables. Depending on the study area and units of analysis, it would also allow halfway houses to be more reliably operationalized as a count variable, more in keeping with how control variables in this thesis are treated. In any case, there is value to the analyses conducted above, as they are the first to investigate the relationship between community corrections facilities and crime in a Canadian jurisdiction. The use of proximity to halfway houses as a solution to the problem of small numbers (of CRFs) could also inform research on the relationship between crime and halfway houses in jurisdictions which similarly have few facilities.

Second, there is an important gap to bridge between the findings in this thesis and recidivism. One of the claims made above is that recidivism is unlikely to have a simple additive effect on crime, as changes in the neighbourhood's opportunity surface and feasibility of opportunities may ensue in response to a halfway house. These two forces may ultimately negate each other. Another claim is that, on comparison of the coefficients and significance of the ISD and WISD variables, it is the presence of a halfway house itself rather than the number of offenders residing therein which is more important for predicting crime. This implies that halfway houses in Vancouver function more as crime attractors than generators and/or render their host community more criminogenic through social changes. However, to properly test these claims, information on the frequency and location of recidivism for residents of each halfway house is needed. This would permit an explicit evaluation of the direct contribution of halfway

house residents to crime in the study area. It would also help to establish a buffer zone of offending by halfway house residents and juxtapose this against the spatial distribution of crime not committed by those residents to reveal any differences in the geographic manifestation of crime generator and attractor effects. Information on the activity spaces (i.e., frequently used nodes and pathways) of halfway house residents – other than their home nodes – would also help to identify whether there are contributions to crime that are not patterned around halfway houses. For example, if there is significant overlap in the activity spaces of offenders outside the CRF, analyses could test whether this concentration of offender activities is associated with crime.

The availability of other individual-level data in addition to recidivism outcomes would also enable a much more complex and complete understanding of returning offenders and crime. That is, there is a substantial body of literature examining individual-level predictors of recidivism (e.g., Wong et al., 2019) and increasingly more research is being conducted on ecological predictors of recidivism (e.g., Houser et al., 2018; Kubrin & Stewart, 2006; McNeeley, 2018a; 2018b; Miller et al., 2016a; 2016b; Wright et al., 2012; 2013). However, relatively little research (e.g., Hipp & Yates, 2009; Rose & Clear, 1998) connects returning offenders to measures of overall crime in the community, and none to my knowledge explicitly connect recidivism of returning offenders to measures of overall crime. In other words, the literature is surprisingly fragmented given the myriad of community-level changes that should have a bearing on crime levels, expected from applying theories in environmental criminology and the social ecology of crime (outlined in Chapter 2) to returning offenders. A halfway house should indirectly affect crime in both negative and positive ways (Rose & Clear, 1998), separate from increasing crime directly through the recidivism of its residents. At the same time, the likelihood of recidivism is shaped by individual-, community-, and system-level factors, all of which are also expected to interact with each other (Simes, 2018; Wright & Cesar, 2013; Wright et al., 2012; 2013). All things considered, what is the net-effect on crime and other neighbourhood-level outcomes and what is the extent to which each of these variables contributes? Studying and further explicating this system, I argue, is crucial for policymakers, criminal justice personnel, and community members to properly address the crime risk posed by returning offenders and facilitate reintegration. Data (un)availability is expected as a significant barrier to such a comprehensive study.

A third limitation is that the analyses in this thesis are cross-sectional. If longitudinal data predating the siting of each halfway house were available, this would further allow researchers to untangle the contributions of a halfway house to crime. Such an approach, as taken by Hyatt & Han (2018), would allow the changes in crime patterns (or lack thereof) after the siting of a halfway house to be observed. Combined with recidivism data, this would indicate how much post-siting crime around a halfway house from one time period to the next can be attributed to recidivism on the one hand and changes in target suitability, guardianship intensity, routine activities of locals, and other elements of the backcloth on the other. It would also enable a proper test of the dynamic and holistic model outlined in Chapter 2 (Figure 2.1) and briefly described in response to the second limitation listed above. That is, existing research suggests an interplay between returning offenders and their surrounding environment (Rose & Clear, 1998; Wright & Cesar, 2013). A time series design could reveal how the offender responds to their surroundings, how the environment (the community and its members) responds to the offender, and how this dynamic system of interactions progresses over time.

Analyses could be conducted to investigate whether communities follow similar or dissimilar trajectories when halfway houses are sited and the determinants of those trajectories. For instance, do neighbourhoods tend to decline economically and see increases in population turnover after the siting of a halfway house? Are these declines or increases steady or is there only a short-term effect reflecting initial growing pains? In light of research by Miller et al. (2016a; 2016b) who studied the relationship between recidivism and proximity to hotspots and criminogenic places, trajectories of nearby crime generators and attractors could also be studied. For example, if some major activity nodes become more criminally active (generate or attract more crime) or become crime detractors (Kinney et al., 2008; Weisburd et al., 2004), this may be relevant to our understanding of how a halfway house may change the local milieu. Conversely, Individual-level trajectories of the offenders themselves (trajectories for offending, employment, drug relapse, return to prison, or other outcomes) could also be identified, and the composition of trajectories for residents at each halfway house could be regressed on the trajectory of their host-communities or other characteristics of those neighbourhoods. That is, are the trajectories of offenders for any outcome significantly tied to the trajectories of communities after a halfway house is sited? If the offenders in some halfway houses have the same modal pathway and offenders in others have

another modal pathway, can this be predicted by neighbourhood-level variables, such as how neighbourhoods respond to halfway houses? These types of studies would grant a much better appreciation of what a halfway house does to a community, and subsequently what it does to crime in the community.

Fourth, none of the data sources in this thesis were judged to have good measures of neighbourhood-level protective factors. Such factors could therefore not be included in the analyses, though they ought to have been. Social ecology of crime research has theorized and empirically supported the salience of indirect relationships between the structural variables examined here and crime through the deterioration of protective factors such as a neighbourhood's regulatory capacity (Bursik & Grasmick, 1993; Gau et al., 2014; Sampson & Groves, 1989; Sampson et al., 1997). Others have shown that the likelihood of recidivism can be moderated by protective factors such as the number of service providers (Hipp et al., 2010). High-quality measurement of the former is best done through survey research (e.g., Sampson & Groves, 1989; Sampson et al., 1997). The use of surveys as a data collection technique could also open the door to victimization as a measure of crime over official data, allowing the robustness of the above findings to be evaluated. Operationalizing access to services can be done somewhat reliably with online searches of services, provided one has a systematic search strategy and knows the types of services to look for. Even so, researchers in future studies must be mindful that many social services have transitioned online in the wake of the COVID-19 pandemic. Mapping the physical locations of these services may therefore not fully capture their availability and accessibility for offenders.

Fifth (and related to the second, third, and fourth limitations), information on the home addresses of recently released offenders *other than* those residing in halfway houses was not available. Because the crime risk posed by these facilities is tied to their essence as major activity nodes for returning offenders, it is pertinent to control for the distribution of other returning offenders in the community (similar to Hipp et al., 2010; Hipp & Yates, 2009). This would permit an understanding of the relationship between returning offenders and housing type, which other studies (e.g., McNeeley 2018a; 2018b) have found relevant, but would also prevent conflation of results from failure to control for a lurking variable. For example, if a large number of offenders reside near facilities with few residents and a small number of offenders reside near facilities with many residents, this would compromise the validity of the WISD variable and invalidate

conclusions drawn from the differences between ISD and WISD in the results, especially if offenders under less strict supervision tend to recidivate at a higher rate.

Offenders may be released directly from prison on full parole or statutory release without a residency condition, bypassing the halfway-house-step altogether. Similarly, residents of halfway houses who successfully finish their stint must move somewhere. In both cases, it is unknown whether these offenders move to neighbourhoods far from, near, or containing halfway houses. Many incarcerated offenders are from the kinds of disadvantaged neighbourhoods in which these facilities tend to be sited and frequently return to those neighbourhoods (Costanza et al., 2013; Kirk, 2009; 2012). If they are looking for accommodations beyond a halfway house, financial difficulties coupled with the exorbitant costs of housing in many urban jurisdictions may limit their options to the same disadvantaged neighbourhood as a halfway house. Thus, regardless of whether an offender is released without a requirement to reside in a halfway house or has finished their mandated stay in one, it may be common for them to reside in areas with or near these facilities. On the other hand, halfway houses are limited in number and mostly located in and around metropolitan centers (Bell & Trevethan, 2004). Consequently, a significant number of offenders returning to their homes or looking for housing can be expected to reside well-outside these neighbourhoods. The key takeaway here is that it is important to account for populations of returning offenders not residing in halfway houses and that without this information, no study can assume that the number of halfway houses or residents in each halfway house is representative of the whole landscape of returning offenders across communities.

Sixth, the absence of rich qualitative data necessitated much speculation in the interpretation of results (theory-driven speculation but speculation nonetheless). Many of the changes in the environmental backcloth hypothesized above cannot be measured with census or other often superficial neighbourhood-level data routinely made available. Future studies should employ qualitative methods for a more in-depth insight into how communities respond to halfway houses, and subsequently, how this response affects crime patterns. Collecting data directly from different groups of stakeholders, from residents to offenders to agents of the criminal justice system, would enable an examination of aggregate patterns of routine activities in the community along with measures of guardianship, target suitability, and offender motivation, all of which are expected to be affected after the siting of a halfway house and impact local crime. For

example, only surveys or interviews of local business owners and residents could investigate awareness and perceptions of new halfway houses and precautionary measures taken if any. If most locals are unaware of the presence of a halfway house and do not alter their routine activities, this would rule out reduction in ambient population as a potential explanation for the higher rates of mischief, theft from auto, and other theft in this thesis (and positive findings in other studies: e.g., Hyatt & Han, 2018). If they do not employ effective crime prevention techniques, reductions in target suitability would be ruled out as an explanation for the unchanged crime rates in this thesis (i.e., theft of auto and both residential and commercial break and enter) or the significant decreases in crime levels in other studies (Groff & Lockwood, 2014; McCord et al., 2007). A mixed methods approach – or at the very least, a quantitative study that utilizes survey data in addition to individual-level data for offenders and the neighbourhood-level data used in this thesis – would further complement research on the holistic model of offender re-entry and crime (Figure 2.1) discussed with the second and third limitations listed above.

A seventh limitation may be the use of Euclidean distances over Manhattan or street distances to estimate halfway houses' spheres of influence and compute the ISD and WISD variables. Whereas Euclidean distance is measured as a straight line between two points, Manhattan distances are measured as the sum of absolute differences between X and Y coordinates, and street distances are based on the shortest route between those points based on the study area's street network. In a city such as Vancouver with a predominantly grid-based street network, Manhattan and street distances are a better representation of the true distances travelled by people (Andresen, 2019; Rossmo, 1999). That said, journey-to-crime research, including studies analyzing crime specifically in the city of Vancouver (e.g., Andresen et al., 2014), has yielded robust results with Euclidean measures of distance. While theoretically more valid, Manhattan distances do not conclusively outperform Euclidean distances in empirical research (Haginoya et al., 2020; Pizarro et al., 2007). Orientation of the street grid also changes between the central business district – where a significant proportion of crime occurs – and the rest of Vancouver (the central business district's street grid is oriented diagonally relative to the rest of the city), which may also affect the validity of Manhattan distances. For this reason, street distances may be preferred to Manhattan. Indeed, results of analyses with street distances appear to differ more from analyses

with Euclidean distances than Manhattan (e.g., Stamato et al., 2021), though these differences can be modest (Haginoya et al., 2020). In any case, it would be worthwhile to compare results generated with these three measures of distance in future studies on re-entry and crime because of the practical implications for crime prevention and offender supervision.

Eighth, this thesis is also limited by its study of only property offences. Future research should certainly test the relationship between halfway houses and different forms of violence. As mentioned above, much of the fear driving opposition to halfway houses is rooted in the fear of violent victimization, and it is unfortunate that this data was not available for analysis. Moreover, it is possible for violent crime to behave quite differently from some of the property offences examined here, in that violence is not inextricably tied to the built environment, unlike break and enter and various forms of mischief and other theft. Suitable targets for violence are much more dynamic and can move away from the vicinity of halfway houses, whereas targets for many property crimes do not have this luxury. Even vehicles must at some point be parked somewhere while their drivers carry on with their routine activities. This more static nature of the opportunity surface for property crimes such as break and enter is reflected in the research finding that the journey to crime tends to be shorter for violent offences than for property offences (Ackerman & Rossmo, 2015; Andresen et al., 2014). For example, insofar as halfway houses tend to be sited in less affluent areas (Costanza et al., 2013), offenders residing therein would likely have to travel farther distances for worthwhile residential burglary targets (Ackerman & Rossmo, 2015); conversely, they may frequently find themselves surrounded by suitable targets for violence no matter where they venture in their community, simply by having shared activity spaces (Brantingham & Brantingham, 1993b). Thus, not only is violence interesting in itself and relevant to community members and criminal justice personnel, but it also has unique characteristics not as present for the crime types studied here that may affect its relationship to halfway houses.

As is also mentioned above, testing more crime types will also help to evaluate the conclusions of this thesis. For instance, does exposure to halfway houses tend to only be associated with crimes that can be perpetrated inconspicuously and with little effort, time, and risk of apprehension? Other offences not explicitly tested here which fall into this category are incivilities and disorder offences (e.g., causing a public

disturbance) and certain violent and sexual offences (e.g., voyeurism, consumption and distribution of illicit media content such as child sexual exploitation images). Additionally, replicating the analyses for other crime types would allow us to see whether the claim that the presence of a halfway house matters more for predicting crime rates than the number of offenders residing in that halfway house holds for other offences. Lastly, for each of the three crime types significantly associated with halfway houses in this thesis, there are differences in the measures of exposure with which they are associated. These allude to differences in the functional form of the relationships, including the presence and size of buffer zones and the gradualness of distance decay. Just as more types of crime should be studied to examine variation in how crime rates behave in response to halfway houses (and whether similarities or differences in the behaviour of these relationships can be predicted based on common or diverging characteristics of crime types), these relationships should also be explicitly modeled in different ways, instead of focusing on a single form, such as the log-linear form I have modeled in this thesis.

Ninth (and related to the eighth limitation), crime levels in Vancouver are measured only as rates. Future research should operationalize the dependent variable in multiple ways. As is outlined above, the literature on halfway houses and crime has analyzed counts, rates, and location quotients of crime. This diverse treatment of the crime construct is impressive considering what few studies exist on its relationship with halfway houses, but it also means that discrepancies in findings could be an artefact of differences in the way crime is operationalized. The implications of comparing results of studies with different measures of crime is discussed in detail above (see section 6.5.2) and will not be repeated here. It is important, however, that future research measures crime in more than one way for (1) valid comparison of results from other studies for generalizability, and (2) a more comprehensive understanding of the impact of returning offenders on the volume, risk, and specialization of crime in the study area, as there are reasons to expect different outcomes depending on the variable analyzed (Andresen, 2019). For example, the volume of crime (count) may go up while the risk (rate) stays the same simply because more people are present, such as halfway house staff and residents. The rate may also increase without the count changing significantly if there are proportional decreases in the population at risk. Increases in one type of crime but not another would elevate the area's degree of specialization for that crime type (location quotient) and invite a reconsideration of crime prevention priorities.

A tenth and important limitation of the analyses in this paper is the modifiable areal unit problem (MAUP), where the aggregation of events to spatial units of varying shapes (i.e., *zone* problem) and sizes (i.e., *scale* problem) can meaningfully alter the presentation of spatial patterns and the outcomes of analyses. This ultimately makes the process of aggregation arbitrary and unreliable (Fotheringham & Wong, 1991). An analysis of microunits such as street segments has been advocated by environmental criminology scholars to avoid issues with aggregated data, but there are important trade-offs to consider, which would alter the theoretically informed variables used in the analyses (Groff et al., 2010; Weisburd et al., 2009). For example, the use of these units would preclude the inclusion of theoretically relevant sociodemographic variables which tends to only be disseminated at aggregated levels. Though this data is still commonly used in studies analyzing street segments, this practice suffers from the ecological fallacy (Andresen & Hodgkinson, 2018). The inability to use residential population to compute rates is another trade-off, but one that can be addressed by substituting alternative, more meaningful populations at risk for the denominator. Unfortunately, I was unable to assess the robustness of results under the MAUP by testing hypotheses at different levels of aggregation. The only other spatial units available to study are census tracts (CTs) – which are the only census unit other than DAs smaller than the study area for which the sociodemographic information used for the control variables has been disseminated – and as there are only 117 CTs, there is not enough statistical power to reliably replicate the analyses conducted on DAs. In any case, future research exploring the relationship between halfway houses and crime should be conducted on different units of analysis to address shortcomings associated with studying a single type of unit and evaluate robusticity and generalizability of results.

6.8. Summary

For more than 70 years, correctional halfway houses have been used extensively as a form of transitional housing providing supervision, counselling, treatment, and case management for conditionally released offenders in Canada (Bell & Trevethan, 2004; CSC, 2018a; Maier, 2020a) and other jurisdictions (Sullivan et al., 1974; Latessa & Allen, 1982). Within Canada, the use of halfway houses for these purposes has also been steadily increasing with the growing offender population and higher rate of residency conditions imposed requiring these offenders to reside in such facilities upon

release (Gobeil & Cosineau, 2015). Despite this longstanding and widespread use of correctional halfway houses, no studies have examined their potential role as crime generators or attractors in Canadian communities. This gap in the literature is all the more noteworthy considering the lively community opposition to these facilities born from fear of crime, disorder, and other deleterious consequences for the neighbourhoods containing them (Garland & Wodahl, 2017; Garland et al., 2017). Literature examining the relationship between halfway houses and crime have mixed results and are often unable to explore them in depth, treating these settings as one of several criminogenic land uses. Given the ongoing and increasing popularity of halfway houses by correctional agencies and the concentration of offenders in and around them, further research must be conducted to examine their implications for local crime. The purpose of this thesis is to take a step toward this end.

Routine activity theory (RAT) and the geometry of crime (GOC) supplemented by broken windows (BWT) and social disorganization theories (SDT) form the theoretical framework for exploring this relationship and interpreting relevant literature. RAT and GOC, from environmental criminology, yield an appreciation of how the spatial patterning of crime opportunities may be affected by halfway houses, whereas BWT and SDT, from the social ecology of crime literature, suggest how the social milieu of the surrounding neighbourhood(s) may be affected with implications for the risk of crime. This framework, combined with the literature on the efficacy of halfway houses, neighbourhood-level predictors of recidivism, impact of returning offenders on neighbourhood structure, and the few empirical studies of halfway houses as criminogenic places, points to a complex and holistic system of both beneficial and criminogenic changes in the neighbourhood triggered by halfway houses specifically and re-entry more broadly (Figure 2.1).

That is, there are two sets of competing forces that can markedly change the way opportunities for crime (and their feasibility) are structured in a neighbourhood containing a halfway house. Returning offenders themselves represent an increase in the concentration/number of motivated offenders and may contribute to local crime directly through recidivism. Their return may also attract other motivated offenders in the form of criminal associates or individuals seeking opportunities for retribution. Both types of individuals could commit crime themselves, regardless of whether they attend the area for legitimate or illegitimate purposes or increase the risk of the returning offenders committing crime (the former type of individual by being an antisocial peer and the latter

type by antagonizing the offender). The halfway house may also attract offenders for other reasons, such as to attend programming, provide urinalysis samples for drug/alcohol testing, or otherwise comply with conditions of release. Increases in crime and the presence of offenders may erode social cohesion, communal trust, and informal social control, creating a milieu that is ultimately more conducive and inviting to future crime (Chamberlain, 2018; Hipp & Yates, 2009; Rose & Clear, 1998). At the same time, the siting of a halfway house is accompanied by increases in guardianship in the form of halfway house staff (e.g., parole or case workers, counsellors, support workers) and law enforcement agents. Local residents, business owners, and others who frequent the area may employ various measures to make themselves harder to victimize and increase the real or perceived risk to the offender. Individuals whose routine activities are more loosely tied to the area may simply choose to avoid the area or spend less time there. Offenders themselves may also be reunited with loved ones or wish to lay down roots, prompting them to contribute to the improvement of the economic and social conditions of the neighbourhood, improving collective efficacy and informal social control to reduce the risk of crime (Hipp & Yates, 2009; Rose & Clear, 1998).

To examine the outcome of this theorized holistic model, cross-sectional data from Vancouver DAs in 2016 are used to estimate spatial lag models of the associations between four measures of exposure to halfway houses and six property crime rates calculated using theoretically appropriate populations at risk – mischief, residential break and enter, commercial break and enter, theft from auto, theft of auto, and other theft – controlling for sociodemographic covariates of crime, physical indicators of disorder, and criminogenic places. The measures of exposure are: (1) the count of halfway houses; (2) whether an immediately neighbouring DA contains a halfway house; (3) ISD or proximity of a DA to halfway houses within a 3.6km radius measured using the sum of inverse square distances; and (4) WISD, which is the same as ISD but adjusted to account for the relative size of each halfway house within the 3.6km radius. At the bivariate level, three of the four measures of exposure to halfway houses are significantly associated with each crime rate. Count is only significantly associated with other theft, although the null findings are fully expected due to methodological reasons, including the low number of non-zero values (n = 5) and small range of values for the variable, leading to low statistical power. After controlling for criminogenic places, sociodemographic characteristics of the neighbourhood, and physical indicators of disorder, only three

crime types are significantly positively associated with at least one measure of exposure to halfway houses. Theft from auto is still significantly associated with all measures of exposure except for the count of halfway houses; mischief is significantly associated with ISD and WISD; and other theft is significantly higher in DAs neighbouring those DAs with halfway houses. But in all cases, the association appears weak, and the inclusion of these halfway house variables does not meaningfully improve the amount of variance in crime rate explained when just using control variables.

It is important to note that because of the use of cross-sectional data and unavailability of individual-level information on offenders and recidivism, the holistic model of offender re-entry described above cannot itself be evaluated. Instead, the cross-sectional data represents a snapshot of this system at one point in time. With this in mind and considering the holistic model of offender re-entry and crime described above, the results may represent a situation where the stream of risk factors of crime tied to re-entry are cancelled by protective factors for offences that typically require more time, effort, and risk to the offender, whereas those protective factors are outweighed by the risk factors for offences requiring less time, effort, and risk. The pattern of which measures of exposure are significant for each crime rate also suggest that the spatial relationship between halfway houses and crime differs by crime type. For the three crime types associated with at least one halfway house variable, the statement that crime increases with proximity to these facilities broadly applies. However, buffer zones appear to exist around them, where crime may not be significantly higher. Evidence for the largest buffer zone exists for mischief, with a smaller buffer zone for other theft and the smallest for theft from auto. Lastly, the differences in results (or lack thereof) observed between ISD and WISD indicate that the number of offenders residing at each facility may play only a very small role if any at all. It may be the presence of the facility itself more than the offenders therein that matters. This affirms the importance of examining crime as a dependent variable and building beyond the extant literature's preoccupation with recidivism. This is consistent with the holistic model (Figure 2.1) informed by environmental criminology and the social ecology of crime, showing how the risk of crime may be altered in many ways beyond the offences of halfway house residents.

These results have numerous implications for crime prevention around correctional halfway houses. Interventions should be tailored to the specific offences that tend to be higher near halfway houses and can be implemented by not just criminal

justice professionals but a range of other stakeholders in the community to increase the intensity of crime prevention efforts and make more manageable the exorbitant cost associated with some forms of effective crime prevention. CCTV and increased lighting can improve sightlines and extend the range of effective guardianship in the neighbourhood and have been shown to be particularly effective for reducing vehicle-related crimes such as theft from auto (Eck, 2003; Farrington & Welsh, 2002; Piza et al., 2019). Mischief can be reduced through community clean-up initiatives and restoration of blighted land (Branas et al., 2018), as well as installation of security gates on storefronts and alleys (Eck, 2003; Sidebottom et al., 2018) where appropriate. As other theft is a catch-all category of crime, it is difficult to suggest specific crime prevention solutions. Prevention methods tuned to specific places or commonly available targets can instead be implemented. Generic approaches to crime prevention to supplement these crime-specific ones can range from increases in police activity around halfway houses to community watch and nudging. Nudging involves dissemination of infographic literature (e.g., pamphlets and posters) describing unsafe and safe practices for potential victims of crime and have been shown to be effective at promoting target hardening behaviours and reducing crime (Pogarsky & Herman, 2019; Roach et al., 2017; Sas et al., 2021). Lastly, crime prevention should also be implemented with the relative size of buffer zones in mind. Interventions for theft from auto should include the DAs containing halfway houses, whereas resources for the prevention of other theft and mischief can be concentrated farther away.

While this thesis represents timely research on an important yet chronically understudied relationship in the study of offender re-entry and community corrections, it is important to note that it also diverges methodologically from the extant literature in some significant ways. These differences in research design – which pertain primarily to the measurement of dependent variables and units of analysis – are meant to address gaps in the literature and limitations of past studies. For example, other studies of this relationship often study broad categories of crime (e.g., property, violent), commit the ecological fallacy by attributing smaller units of analysis (e.g., street segments) the characteristics of larger neighbourhoods, and examine counts of crime or location quotients instead of rates (let alone rates with unconventional albeit theoretically meaningful populations at risk). However, deviations from the research designs of those studies also means that similarities and differences in results could be an artefact of

these changes in research design. Additionally, as this is not a replication of another study, generalizability within the literature is still lacking.

Future research should examine other jurisdictions, especially those with a greater number of and diversity among halfway houses; control for individual-level data on offenders – including those not residing in halfway houses – their activity spaces, and their recidivism (and other) outcomes; explicitly examine changes in neighbourhood structure, social cohesion, and crime after the siting of a halfway house and differences in the concentration of returning offenders, with particular attention paid to varying trajectories of these neighbourhood-level changes and the determinants of those trajectories; utilize qualitative methods to gain a deeper appreciation of how community members react to local halfway houses; examine non-property offences; compare results across multiple operationalizations of crime (e.g., rates, counts, and location quotients); and investigate relationships at different units of analysis. In any case, the research design choices in this thesis still add to the diversity of this growing body of research and provides directions for how to investigate the association between halfway houses and crime, especially in jurisdictions with a small number of these facilities.

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Appendix A.

Choropleth Maps of Crime Rates (logged) in Vancouver DAs

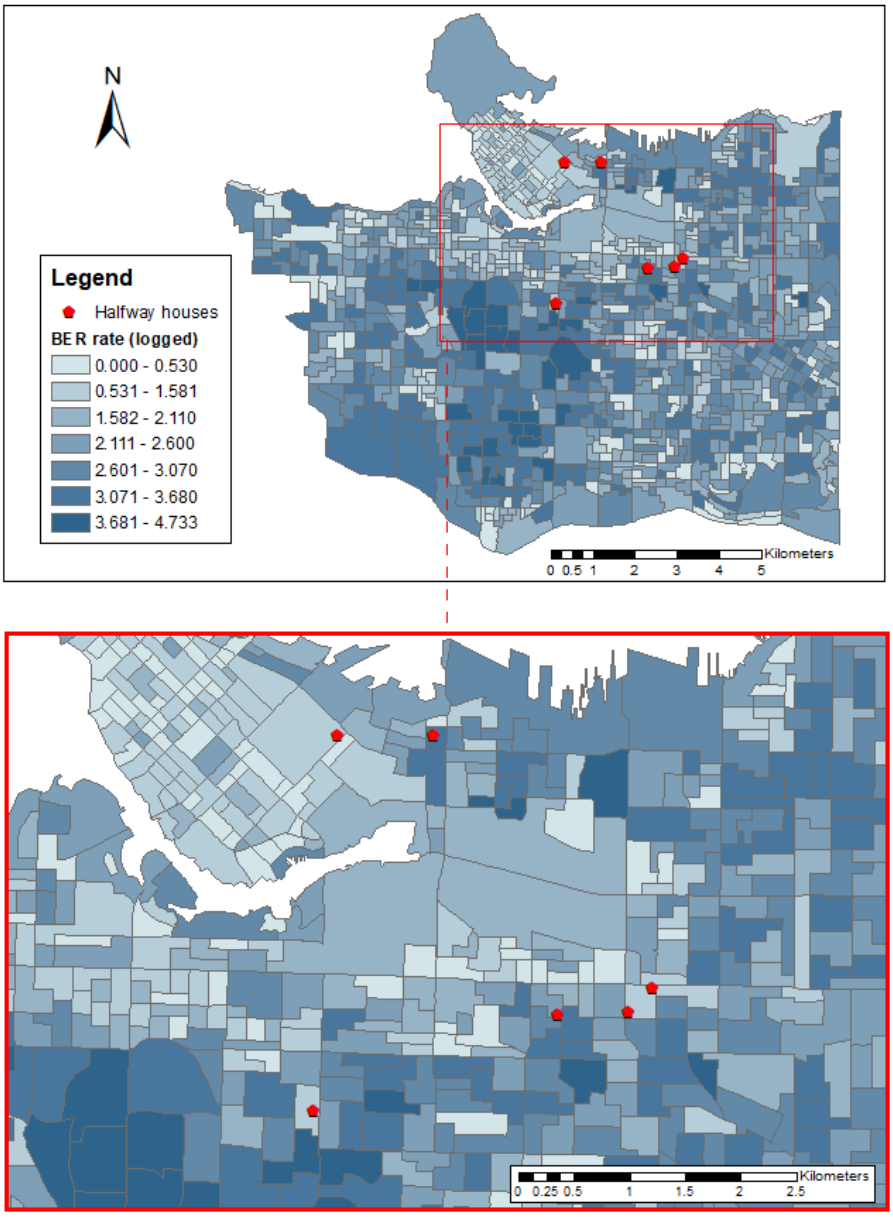

Figure A1 **Residential break and enter rate (logged) and community-based residential facilities in the city of Vancouver**

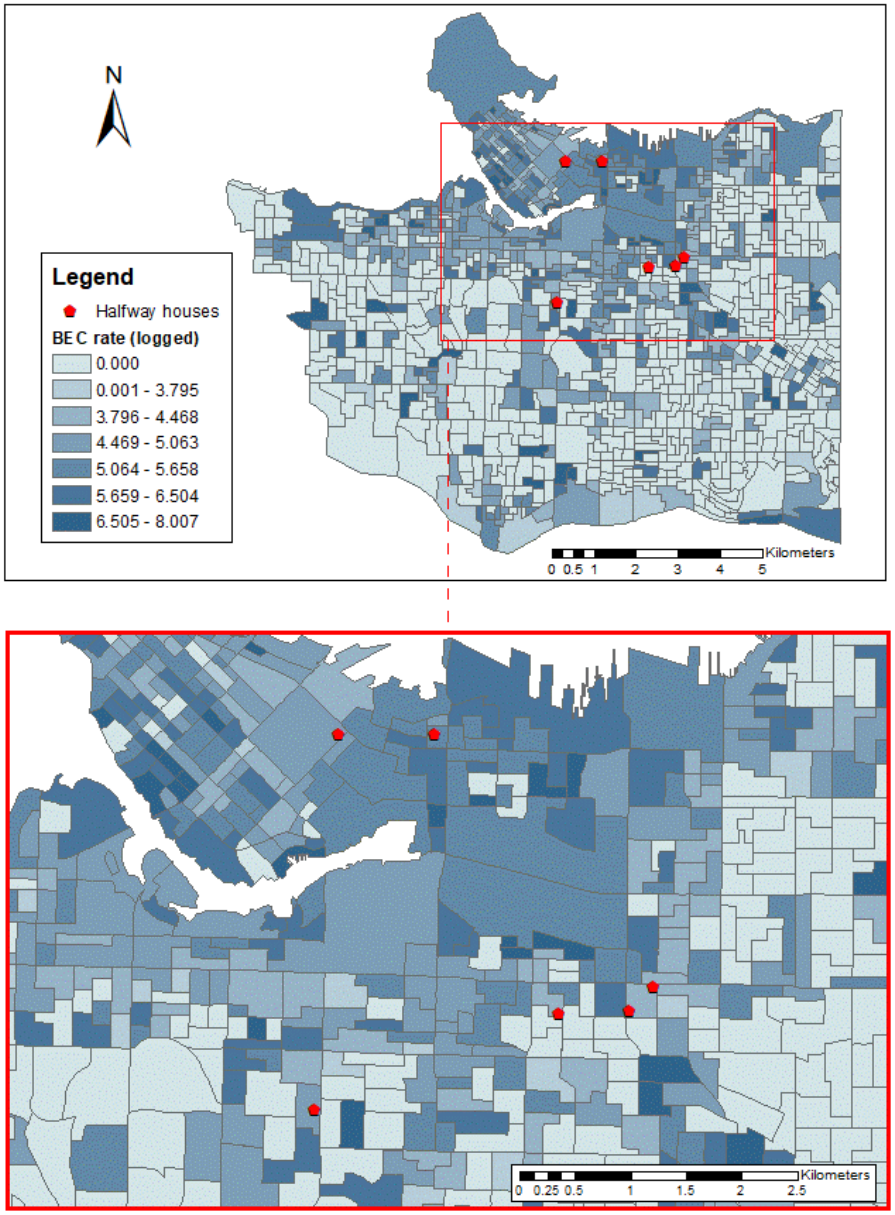

Figure A2 **Commercial break and enter rate (logged) and community-based residential facilities in the city of Vancouver**

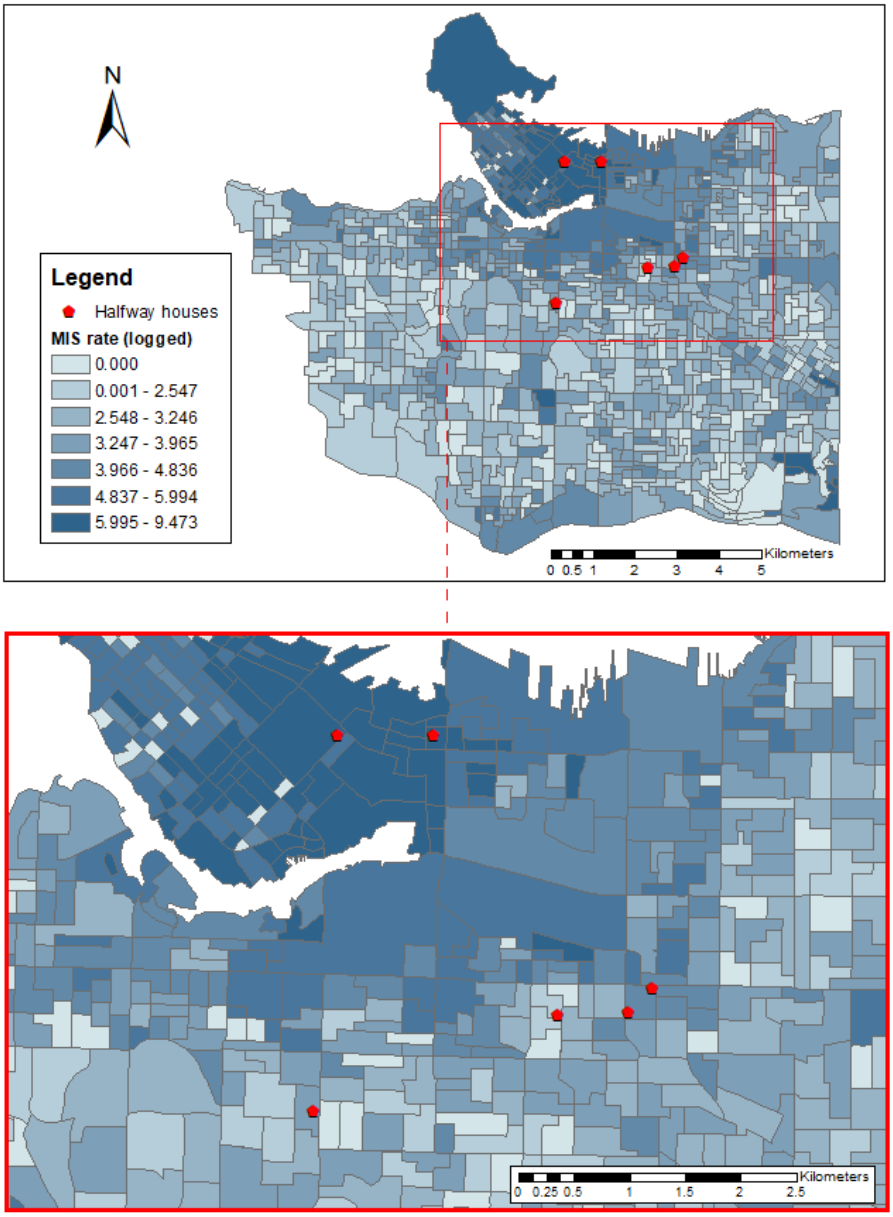

Figure A3 **Mischief rate (logged) and community-based residential facilities in the city of Vancouver**

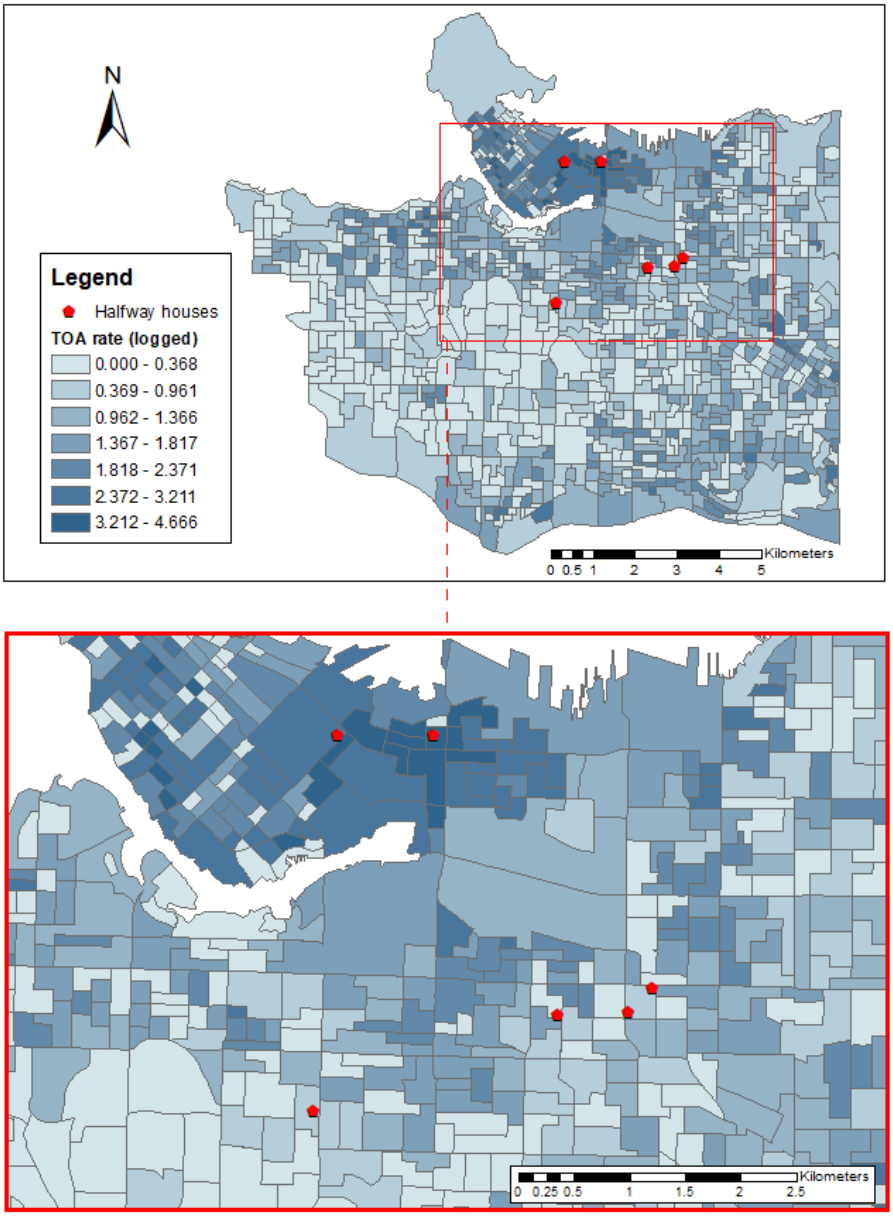

Figure A4 **Theft of auto rate (logged) and community-based residential facilities in the city of Vancouver**

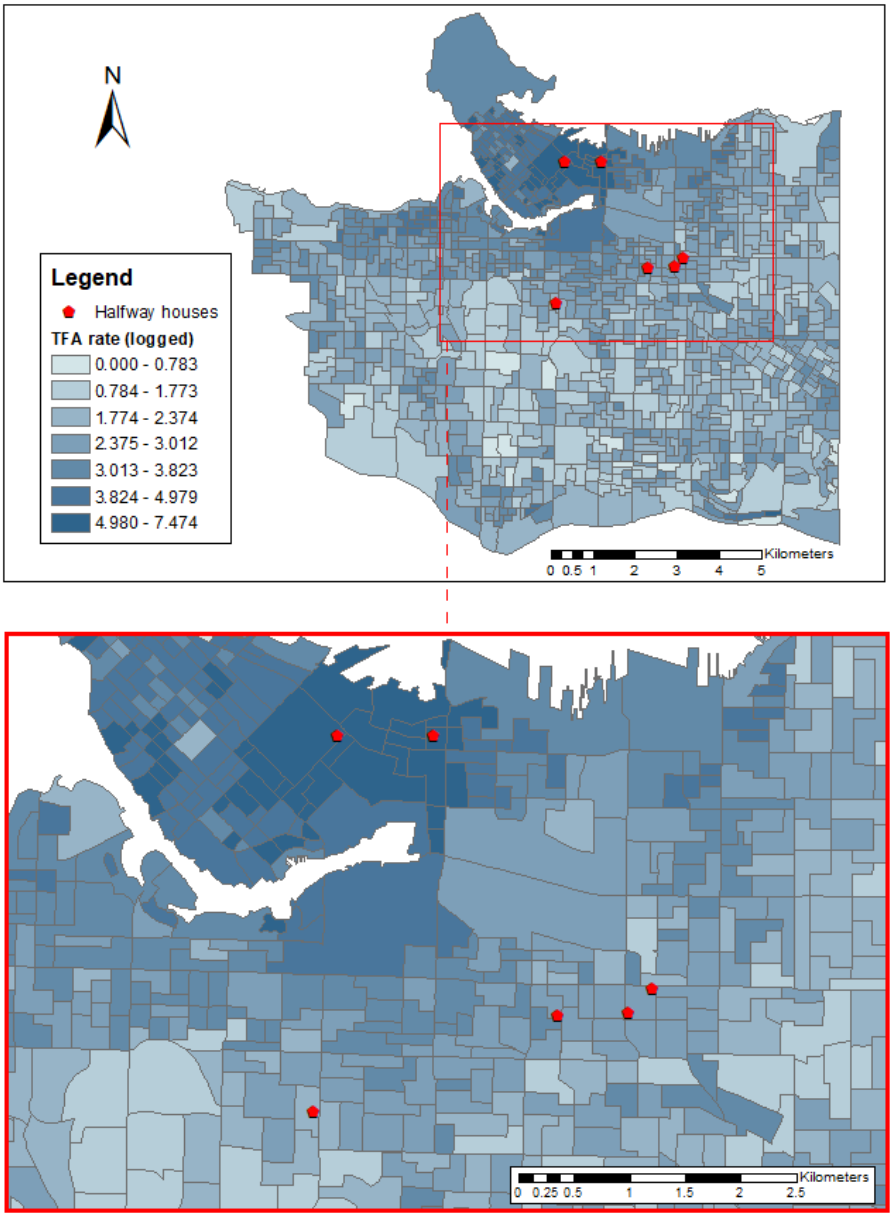

Figure A5 **Theft from auto rate (logged) and community-based residential facilities in the city of Vancouver**

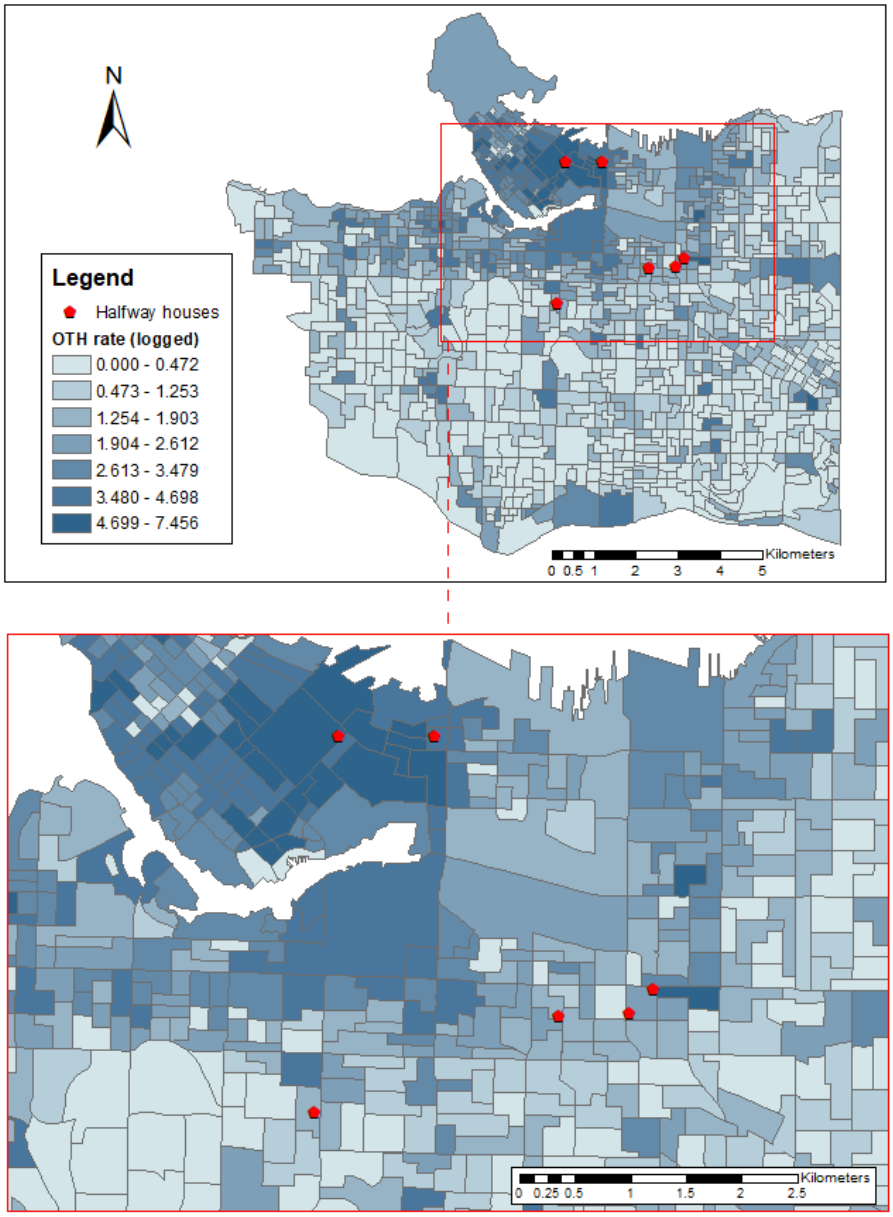

Figure A6 **Other theft rate (logged) and community-based residential facilities in the city of Vancouver**

Appendix B.

Tables of results with exact probabilities

Table B1 Bivariate associations between logged property crime rates and halfway houses with p-values in parentheses (corresponds to Table 5.1)

	BER	BEC	MIS	TOA	TFA	OTH
Halfway houses (count)	-.027	.046	.048	.022	.044	.071
	(.399)	(.148)	(.107)	(.496)	(.168)	(.025)
Q1 neighbours[a]	-.061	.097	.139	.113	.154	.189
	(.056)	(.002)	(.000)	(.000)	(.000)	(.000)
Inverse square distance	-.131	.320	.292	.198	.288	.378
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Weighted inverse square distance	-.177	.363	.345	.232	.359	.431
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)

a. Statistic shown is the measure of strength of association r for Mann-Whitney U. Variable is reverse coded (1 = not a neighbour; 0 = neighbour) for consistency in sign interpretation. All other rows show Spearman's correlations (rho).

Table B2 Simulated impacts of halfway houses on logged rate of residential B&E at equilibrium including spillover effects from lagged Y (corresponds to Table 5.4)

	Direct effects		Indirect effects		Total effects	
	z	p	*z*	p	*z*	p
Halfway houses (count)	-1.22	.222	-.386	.699	-.487	.626
Q1 neighbours	-1.11	.269	-.414	.679	-.515	.607
Inverse square distance	-.506	.613	-.261	.794	-.319	.750
Weighted inverse square distance	-.245	.806	-.092	.927	-.128	.898

Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.3 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

Table B3 Simulated impacts of halfway houses on logged rate of commercial B&E at equilibrium including spillover effects from lagged Y (corresponds to Table 5.6)

	Direct effects		Indirect effects		Total effects	
	z	p	*z*	p	*z*	p
Halfway houses (count)	-.110	.912	-.009	.993	-.033	.973
Q1 neighbours	-.885	.377	-.570	.568	-.647	.518
Inverse square distance	.242	.809	.189	.850	.209	.834
Weighted inverse square distance	.300	.764	.255	.799	.273	.785

Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.5 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

Table B4 Simulated impacts of halfway houses on logged rate of mischief at equilibrium including spillover effects from lagged Y (corresponds to Table 5.8)

	Direct effects		Indirect effects		Total effects	
	z	p	*z*	p	*z*	p
Halfway houses (count)	-.581	.561	-.535	.592	-.562	.574
Q1 neighbours	.989	.322	.934	.350	.979	.328
Inverse square distance	.288	.004	1.87	.062	2.33	.020
Weighted inverse square distance	2.41	.016	1.63	.104	1.98	.047

Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.7 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

Table B5 Simulated impacts of halfway houses on logged rate of theft of auto at equilibrium including spillover effects from lagged Y (corresponds to Table 5.10)

	Direct effects		Indirect effects		Total effects	
	z	p	*z*	p	*z*	p
Halfway houses (count)	-1.30	.194	-.151	.880	-.157	.875
Q1 neighbours	.091	.928	.028	.978	.031	.976
Inverse square distance	-.549	.583	-.120	.904	-.122	.903
Weighted inverse square distance	-.435	.664	-.177	.859	-.193	.847

Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.9 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

Table B6 Simulated impacts of halfway houses on logged rate of theft from vehicle at equilibrium including spillover effects from lagged Y (corresponds to Table 5.12)

	Direct effects		Indirect effects		Total effects	
	z	p	*z*	p	*z*	p
Halfway houses (count)	1.70	.089	1.47	.142	1.58	.115
Q1 neighbours	3.36	.001	2.49	.013	2.90	.004
Inverse square distance	2.82	.005	2.18	.029	2.44	.015
Weighted inverse square distance	2.67	.008	1.95	.051	2.21	.027

Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.11 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

Table B7 Simulated impacts of halfway houses on logged rate of other theft at equilibrium including spillover effects from lagged Y (corresponds to Table 5.14)

	Direct effects		Indirect effects		Total effects	
	z	p	*z*	p	*z*	p
Halfway houses (count)	-.471	.638	-.463	.643	-.474	.635
Q1 neighbours	3.92	.000	2.41	.016	3.09	.002
Inverse square distance	.872	.383	.664	.507	.739	.460
Weighted inverse square distance	.557	.577	.444	.657	.490	.624

Note: Produced from an "impacts" analysis of the count, ISD, and WISD models shown in Table 5.11 using the spatialreg R package. The direct, indirect, and total effects of control variables are not shown for brevity.

Table B8 Spatial lag models of the relationship between residential B&E and halfway houses, controlling for other environmental risk factors (corresponds to table 5.3)

	(1) Control	(2) Count	(3) ISD	(4) WISD
	z (p)	*z* (p)	*z* (p)	*z* (p)
Constant	1.45 (.147)	1.34 (.182)	1.39 (.164)	1.43 (.151)
ρ (rho)	7.55 (.000)	7.64 (.000)	7.56 (.000)	7.54 (.000)
Sociodemographic variables				
% dwellings not regularly occupied	2.79 (.005)	2.77 (.006)	2.73 (.006)	2.77 (.006)
% housing in need of major repairs	-.209 (.835)	-.188 (.851)	-.200 (.842)	-.207 (.836)
% males aged 15-24	1.03 (.303)	1.11 (.267)	1.08 (.280)	1.04 (.298)
Average weeks worked in a year	-1.00 (.316)	-.942 (.346)	-.940 (.347)	-.982 (.326)
Counts of graffiti	.520 (.603)	.396 (.692)	.378 (.705)	.456 (.648)
Density of population (ambient)[a]	2.54 (.011)	2.72 (.007)	2.58 (.010)	2.54 (.011)
Density of population (residential)[a]	-3.11 (.002)	-3.10 (.002)	-3.13 (.002)	-3.12 (.002)
Economic deprivation	-2.75 (.006)	-2.81 (.005)	-2.78 (.005)	-2.76 (.006)
Ethnic heterogeneity	-.432 (.666)	-.403 (.687)	-.439 (.661)	-.432 (.666)
Residential instability	-3.83 (.000)	-3.71 (.000)	-3.80 (.000)	-3.83 (.000)
Potentially criminogenic places				
Community centres	-.710 (.478)	-.756 (.450)	-.710 (.478)	-.709 (.479)
Convenience stores and pharmacies	-.026 (.980)	.210 (.833)	.030 (.976)	-.009 (.993)
DTES	3.19 (.001)	3.30 (.001)	3.24 (.001)	3.20 (.001)
Financial institutions	-.269 (.788)	-.227 (.820)	-.254 (.800)	-.263 (.793)
Gas stations	1.79 (.074)	1.79 (.073)	1.81 (.071)	1.79 (.073)
Homeless shelters	1.11 (.268)	1.43 (.153)	1.19 (.235)	.821 (.412)
Liquor stores	.423 (.672)	.325 (.745)	.435 (.664)	.429 (.668)
Parkades	.185 (.853)	.237 (.812)	.161 (.872)	.177 (.860)
Parks	-.477 (.633)	-.456 (.649)	-.474 (.636)	-.478 (.633)
Pubs, clubs, and bars	.967 (.334)	1.14 (.253)	.969 (.333)	.965 (.334)
Restaurants with liquor service	.731 (.465)	.702 (.482)	.689 (.490)	.716 (.474)
Retail dealers	2.00 (.045)	-1.96 (.050)	-2.00 (.046)	-2.00 (.046)
Schools	.878 (.380)	.946 (.344)	.896 (.370)	.881 (.378)
SkyTrain stations	1.66 (.098)	1.66 (.098)	1.63 (.104)	1.64 (.100)
Supermarkets and other grocers	1.14 (.254)	1.01 (.313)	1.13 (.258)	1.14 (.255)
Theatres & other entertain. venues	-1.30 (.194)	-1.26 (.209)	-1.29 (.198)	-1.29 (.196)
Halfway houses				
Halfway houses (count)	–	-1.32 (.186)	–	–
Q1 neighbours	–	-1.14 (.255)	–	–
Inverse square distance	–	–	-.614 (.539)	–
Weighted inverse square distance	–	–	–	-.191 (.849)
Model-fit statistics				
Pseudo R^2	.331	.333	.331	.331
Spatial pseudo R^2	.273	.275	.274	.274

Note: Lag is computed from 3rd order queen contiguity.

Table B9 Spatial lag models of the relationship between commercial B&E and halfway houses, controlling for other environmental risk factors (corresponds to Table 5.5)

	(1) Control	(2) Count	(3) ISD	(4) WISD
	z (p)	*z* (p)	*z* (p)	*z* (p)
Constant	-.837 (.403)	-.918 (.359)	-.809 (.418)	-.809 (.419)
ρ (rho)	6.65 (.000)	6.65 (.000)	6.66 (.000)	6.66 (.000)
Sociodemographic variables				
% dwellings not regularly occupied	-1.26 (.209)	-1.25 (.212)	-1.23 (.218)	-1.23 (.218)
% housing in need of major repairs	.227 (.820)	.214 (.830)	.219 (.827)	.222 (.824)
% males aged 15-24	-1.89 (.059)	-1.76 (.079)	-1.90 (.058)	-1.90 (.057)
Average weeks worked in a year	1.56 (.118)	1.58 (.114)	1.53 (.127)	1.53 (.127)
Counts of graffiti	1.24 (.214)	1.19 (.236)	1.28 (.202)	1.28 (.199)
Density of population (ambient)[a]	.037 (.970)	.103 (.918)	.009 (.993)	.029 (.977)
Density of population (residential)[a]	2.24 (.025)	2.16 (.031)	2.24 (.025)	2.24 (.025)
Economic deprivation	1.54 (.123)	1.52 (.128)	1.56 (.119)	1.56 (.119)
Ethnic heterogeneity	-.572 (.567)	-.484 (.628)	-.559 (.576)	.566 (.571)
Residential instability	2.92 (.003)	2.94 (.003)	2.90 (.004)	2.90 (.004)
Potentially criminogenic places				
Community centres	-.401 (.688)	-.420 (.674)	-.403 (.687)	-.405 (.686)
Convenience stores and pharmacies	1.04 (2.96)	1.16 (.244)	1.01 (.311)	1.01 (.311)
DTES	.890 (.374)	.969 (.333)	.850 (.395)	.846 (.398)
Financial institutions	1.44 (.149)	1.50 (.132)	1.44 (.150)	1.43 (.151)
Gas stations	2.52 (.012)	2.48 (.013)	2.51 (.012)	2.51 (.012)
Homeless shelters	-.221 (.825)	-.194 (.846)	-.361 (.718)	-.391 (.696)
Liquor stores	.261 (.794)	.226 (.821)	.255 (.799)	.251 (.802)
Parkades	-1.17 (.242)	-1.23 (.220)	-1.16 (.245)	-1.16 (.246)
Parks	2.73 (.006)	2.73 (.006)	2.73 (.006)	2.73 (.006)
Pubs, clubs, and bars	-1.81 (.070)	-1.74 (.081)	1.81 (.070)	-1.81 (.071)
Restaurants with liquor service	1.87 (.061)	1.88 (.060)	1.88 (.060)	1.88 (.059)
Retail dealers	-.543 (.587)	-.552 (.581)	-.543 (.587)	-.548 (.584)
Schools	3.29 (.001)	3.24 (.001)	3.28 (.001)	3.28 (.001)
SkyTrain stations	.920 (.358)	.924 (.355)	.931 (.352)	.935 (.350)
Supermarkets and other grocers	1.53 (.127)	1.44 (.151)	1.53 (.125)	1.53 (.126)
Theatres & other entertain. venues	-1.62 (.106)	-1.55 (.122)	-1.63 (.104)	-1.63 (.104)
Halfway houses				
Halfway houses (count)	–	-.081 (.936)	–	–
Q1 neighbours	–	-.860 (.390)	–	–
Inverse square distance	–	–	.286 (.775)	–
Weighted inverse square distance	–	–	–	.324 (.746)
Model-fit statistics				
Pseudo R^2	.344	.345	.344	.344
Spatial pseudo R^2	.328	.326	.328	.328

Note: Lag is computed from 4th order queen contiguity.

Table B10 Spatial lag models of the relationship between mischief and halfway houses, controlling for other environmental risk factors (corresponds to Table 5.7)

	(1) Control	(2) Count	(3) ISD	(4) WISD
	z **(p)**	***z*** **(p)**	***z*** **(p)**	***z*** **(p)**
Constant	-.546 (.585)	-.422 (.673)	-.379 (.705)	-.411 (.681)
ρ (rho)	6.98 (.000)	6.86 (.000)	7.02 (.000)	7.03 (.000)
Sociodemographic variables				
% dwellings not regularly occupied	-.884 (.377)	-.904 (.366)	-.789 (.430)	-.807 (.419)
% housing in need of major repairs	2.28 (.023)	2.29 (.022)	2.28 (.023)	2.28 (.023)
% males aged 15-24	2.29 (.022)	2.19 (.029)	2.22 (.026)	2.23 (.026)
Average weeks worked in a year	2.14 (.033)	2.13 (.033)	1.97 (.049)	1.99 (.047)
Counts of graffiti	–	–	–	–
Density of population (ambient)[a]	-3.68 (.000)	-3.72 (.000)	-3.75 (.000)	-3.66 (.000)
Density of population (residential)[a]	2.95 (.003)	3.01 (.003)	2.98 (.003)	2.96 (.003)
Economic deprivation	3.37 (.001)	3.43 (.001)	3.45 (.001)	3.44 (.001)
Ethnic heterogeneity	-.722 (.470)	-.803 (.422)	.705 (.481)	-.720 (.472)
Residential instability	3.26 (.001)	3.19 (.001)	3.21 (.001)	3.23 (.001)
Potentially criminogenic places				
Community centres	1.22 (.222)	1.25 (.210)	1.32 (.186)	1.31 (.191)
Convenience stores and pharmacies	3.72 (.000)	3.36 (.001)	3.67 (.000)	3.71 (.000)
DTES	3.36 (.001)	3.29 (.001)	3.37 (.001)	3.37 (.001)
Financial institutions	-1.18 (.236)	-1.30 (.195)	-1.22 (.223)	-1.22 (.221)
Gas stations	-.615 (.539)	-.502 (.616)	-.659 (.510)	-.660 (.509)
Homeless shelters	.921 (.357)	1.04 (.299)	-1.10 (.270)	-1.13 (.259)
Liquor stores	-.411 (.681)	-.374 (.709)	-.331 (.741)	-.331 (.740)
Parkades	-.965 (.335)	-.861 (.389)	-.918 (.359)	-.928 (.353)
Parks	-1.25 (.210)	-1.25 (.210)	-1.25 (.210)	-1.24 (.215)
Pubs, clubs, and bars	.754 (.451)	.762 (.446)	.701 (.483)	.711 (.477)
Restaurants with liquor service	3.45 (.001)	3.49 (.000)	3.65 (.000)	3.66 (.000)
Retail dealers	-.453 (.651)	-.421 (.674)	-.399 (.690)	-.397 (.692)
Schools	1.76 (.078)	1.88 (.061)	1.71 (.088)	1.74 (.082)
SkyTrain stations	.547 (.584)	.531 (.596)	.571 (.568)	.569 (.569)
Supermarkets and other grocers	1.56 (.119)	1.67 (.094)	1.52 (.130)	1.50 (.134)
Theatres & other entertain. venues	-.554 (.579)	-.677 (.498)	-.472 (.637)	-.457 (.647)
Halfway houses				
Halfway houses (count)	–	-.572 (.567)	–	–
Q1 neighbours	–	1.06 (.289)	–	–
Inverse square distance	–	–	2.72 (.006)	–
Weighted inverse square distance	–	–	–	2.45 (.014)
Model-fit statistics				
Pseudo R^2	.344	.345	.344	.344
Spatial pseudo R^2	.328	.326	.328	.328

Note: Lag is computed from 4th order queen contiguity.

Table B11 Spatial lag models of the relationship between theft of vehicle and halfway houses, controlling for other environmental risk factors (corresponds to Table 5.9)

	(1) Control	(2) Count	(3) ISD	(4) WISD
	z **(p)**	***z*** **(p)**	***z*** **(p)**	***z*** **(p)**
Constant	-.815 (.415)	-.834 (.404)	-.869 (.385)	-.857 (.391)
ρ (rho)	7.50 (.000)	7.39 (.000)	7.48 (.000)	7.49 (.000)
Sociodemographic variables				
% dwellings not regularly occupied	-2.85 (.004)	-2.88 (.004)	-2.89 (.004)	-2.89 (.004)
% housing in need of major repairs	1.33 (.183)	1.34 (.180)	1.34 (.180)	1.34 (.181)
% males aged 15-24	1.30 (.192)	1.25 (.212)	1.32 (.186)	1.32 (.186)
Average weeks worked in a year	1.98 (.048)	2.01 (.044)	2.04 (.041)	2.03 (.042)
Counts of graffiti	-1.28 (.200)	-1.32 (.185)	-1.40 (.161)	-1.40 (.162)
Density of population (ambient)[a]	-3.04 (.002)	-2.93 (.003)	-2.98 (.003)	-3.03 (.002)
Density of population (residential)[a]	-.475 (.635)	-.466 (.641)	-.486 (.627)	-.486 (.627)
Economic deprivation	1.23 (.219)	1.23 (.218)	1.20 (.228)	1.21 (.226)
Ethnic heterogeneity	-.687 (.492)	-.694 (.488)	-.693 (.488)	-.687 (.492)
Residential instability	1.77 (.077)	1.74 (.081)	1.79 (.074)	1.78 (.075)
Potentially criminogenic places				
Community centres	-.122 (.903)	-.151 (.880)	-.122 (.903)	-.117 (.907)
Convenience stores and pharmacies	2.18 (.029)	2.11 (.035)	2.21 (.027)	2.20 (.028)
DTES	4.00 (.000)	4.07 (.000)	4.15 (.000)	4.16 (.000)
Financial institutions	.727 (.467)	.701 (.483)	.740 (.460)	.742 (.458)
Gas stations	-.254 (.800)	-.187 (.852)	-.232 (.817)	-.232 (.817)
Homeless shelters	1.94 (.052)	2.12 (.034)	1.20 (.229)	1.07 (.286)
Liquor stores	-.571 (.568)	-.619 (.536)	-5.65 (.572)	-.560 (.575)
Parkades	-3.17 (.002)	-3.03 (.002)	-3.17 (.002)	-3.17 (.002)
Parks	-2.24 (.025)	-2.24 (.025)	-2.23 (.026)	-2.24 (.025)
Pubs, clubs, and bars	2.23 (.026)	2.31 (.021)	2.23 (.026)	2.23 (.026)
Restaurants with liquor service	.591 (.555)	.539 (.590)	.550 (.582)	.553 (.581)
Retail dealers	.173 (.863)	.248 (.804)	.179 (.858)	.186 (.853)
Schools	-3.72 (.000)	-3.58 (.000)	-3.71 (.000)	-3.72 (.000)
SkyTrain stations	.648 (.517)	.643 (.520)	.614 (.539)	.613 (.540)
Supermarkets and other grocers	.710 (.477)	.697 (.486)	.708 (.479)	.712 (.477)
Theatres & other entertain. venues	.798 (.425)	.752 (.452)	.807 (.420)	.808 (.419)
Halfway houses				
Halfway houses (count)	–	-1.29 (.196)	–	–
Q1 neighbours	–	.028 (.978)	–	–
Inverse square distance	–	–	-.617 (.537)	–
Weighted inverse square distance	–	–	–	-.520 (.603)
Model-fit statistics				
Pseudo R^2	.305	.306	.305	.305
Spatial pseudo R^2	.266	.268	.267	.267

Note: Lag is computed from 5th order queen contiguity.

Table B12 Spatial lag models of the relationship between theft from vehicle and halfway houses, controlling for other environmental risk factors (corresponds to Table 5.11)

	(1) Control	(2) Count	(3) ISD	(4) WISD
	z (p)	*z* (p)	*z* (p)	*z* (p)
Constant	.206 (.837)	.586 (.558)	.417 (.677)	.360 (.719)
ρ (rho)	12.8 (.000)	12.6 (.000)	13.0 (.000)	13.1 (.000)
Sociodemographic variables				
% dwellings not regularly occupied	.236 (.813)	.252 (.801)	.407 (.684)	.380 (.704)
% housing in need of major repairs	3.53 (.000)	3.56 (.000)	3.51 (.000)	3.52 (.000)
% males aged 15-24	-1.49 (.137)	-1.84 (.066)	-1.73 (.083)	-1.66 (.097)
Average weeks worked in a year	3.60 (.000)	3.56 (.000)	3.32 (.001)	3.34 (.001)
Counts of graffiti	-1.03 (.302)	-.852 (.394)	-.550 (.582)	-.490 (.624)
Density of population (ambient)[a]	-6.90 (.000)	-7.26 (.000)	-7.10 (.000)	-6.95 (.000)
Density of population (residential)[a]	3.79 (.000)	4.13 (.000)	3.89 (.000)	3.86 (.000)
Economic deprivation	-.865 (.387)	-.785 (.432)	-.789 (.430)	-.799 (.424)
Ethnic heterogeneity	-.756 (.449)	3.53 (.000)	-.744 (.457)	-.750 (.454)
Residential instability	2.44 (.014)	2.42 (.016)	2.39 (.017)	2.41 (.016)
Potentially criminogenic places				
Community centres	.078 (.938)	.128 (.898)	.079 (.937)	.063 (.949)
Convenience stores and pharmacies	2.43 (.015)	1.83 (.067)	2.27 (.023)	2.30 (.021)
DTES	3.03 (.002)	2.92 (.003)	2.87 (.004)	2.84 (.004)
Financial institutions	.157 (.875)	-.063 (.949)	.091 (.927)	.085 (.932)
Gas stations	-1.73 (.084)	-1.62 (.104)	-1.83 (.067)	-1.83 (.068)
Homeless shelters	.487 (.626)	.285 (.775)	-1.61 (.106)	-1.57 (.117)
Liquor stores	.043 (.966)	.153 (.878)	-.003 (.998)	-.021 (.983)
Parkades	-1.75 (.080)	-1.62 (.105)	-1.64 (.101)	-1.66 (.097)
Parks	-6.84 (.000)	-6.82 (.000)	-6.83 (.000)	-6.82 (.000)
Pubs, clubs, and bars	1.02 (.306)	.885 (.376)	1.03 (.302)	1.06 (.291)
Restaurants with liquor service	1.56 (.118)	1.64 (.100)	1.70 (.089)	1.67 (.094)
Retail dealers	1.64 (.101)	1.65 (.098)	1.60 (.109)	1.59 (.111)
Schools	-2.62 (.009)	-2.53 (.011)	-2.67 (.007)	-2.65 (.008)
SkyTrain stations	-.158 (.874)	-.182 (.856)	-.029 (.977)	-.019 (.985)
Supermarkets and other grocers	.596 (.551)	1.09 (.276)	.640 (.522)	.611 (.541)
Theatres & other entertain. venues	.825 (.410)	.634 (.526)	.800 (.424)	.793 (.428)
Halfway houses				
Halfway houses (count)	–	1.66 (.097)	–	–
Q1 neighbours	–	3.53 (.000)	–	–
Inverse square distance	–	–	2.78 (.005)	–
Weighted inverse square distance	–	–	–	2.62 (.009)
Model-fit statistics				
Pseudo R^2	.717	.719	.718	.718
Spatial pseudo R^2	.664	.673	.669	.668

Note: Lag is computed from 2nd order queen contiguity.

Table B13 Spatial lag models of the relationship between other theft and halfway houses, controlling for other environmental risk factors (corresponds to Table 5.13)

	(1) Control	(2) Count	(3) ISD	(4) WISD
	z **(p)**	***z*** **(p)**	***z*** **(p)**	***z*** **(p)**
Constant	.471 (.638)	.862 (.389)	.577 (.564)	.522 (.602)
ρ (rho)	8.55 (.000)	-4.45 (.000)	8.53 (.000)	8.56 (.000)
Sociodemographic variables				
% dwellings not regularly occupied	-1.15 (.251)	-1.18 (.236)	-1.08 (.282)	-1.11 (.269)
% housing in need of major repairs	.639 (.523)	.665 (.506)	.628 (.530)	.633 (.527)
% males aged 15-24	-1.18 (.239)	-1.67 (.095)	-1.28 (.200)	-1.22 (.221)
Average weeks worked in a year	1.61 (.108)	1.57 (.117)	1.48 (.138)	1.53 (.127)
Counts of graffiti	-.674 (.500)	-.515 (.606)	-.487 (.626)	-.527 (.598)
Density of population (ambient)[a]	-4.07 (.000)	-4.45 (.000)	-4.10 (.000)	-4.08 (.000)
Density of population (residential)[a]	1.05 (.293)	1.38 (.166)	1.11 (.266)	1.07 (.284)
Economic deprivation	2.01 (.044)	2.14 (.032)	2.04 (.041)	2.03 (.043)
Ethnic heterogeneity	-1.95 (.051)	-2.33 (.020)	-1.97 (.049)	-1.96 (.051)
Residential instability	4.78 (.000)	4.70 (.000)	4.76 (.000)	4.76 (.000)
Potentially criminogenic places				
Community centres	-.413 (.680)	-.336 (.737)	-.409 (.683)	-.418 (.676)
Convenience stores and pharmacies	2.19 (.029)	1.68 (.093)	2.12 (.034)	2.15 (.032)
DTES	-.353 (.724)	-.703 (.482)	-.425 (.671)	-.411 (.681)
Financial institutions	2.19 (.028)	1.94 (.053)	2.17 (.030)	2.17 (.030)
Gas stations	1.26 (.207)	1.43 (.152)	1.23 (.220)	1.24 (.216)
Homeless shelters	1.42 (.154)	1.51 (.130)	.026 (.979)	.174 (.862)
Liquor stores	2.54 (.011)	2.65 (.008)	2.50 (.012)	2.51 (.012)
Parkades	-2.47 (.013)	-2.44 (.015)	-2.41 (.016)	-2.44 (.015)
Parks	-2.02 (.043)	-2.02 (.043)	-2.02 (.044)	-2.02 (.043)
Pubs, clubs, and bars	-1.06 (.288)	-1.35 (.178)	-1.06 (.287)	-1.06 (.288)
Restaurants with liquor service	4.07 (.000)	4.18 (.000)	4.08 (.000)	4.05 (.000)
Retail dealers	.297 (.767)	.358 (.720)	.277 (.782)	.283 (.777)
Schools	.292 (.771)	.552 (.581)	.263 (.793)	.281 (.779)
SkyTrain stations	2.09 (.037)	2.04 (.041)	2.12 (.034)	2.10 (.036)
Supermarkets and other grocers	1.82 (.069)	2.10 (.036)	1.80 (.072)	1.80 (.071)
Theatres & other entertain. venues	-.818 (.414)	-1.15 (.250)	-.838 (.402)	-.834 (.404)
Halfway houses				
Halfway houses (count)	–	-.409 (.683)	–	–
Q1 neighbours	–	3.59 (.000)	–	–
Inverse square distance	–	–	.927 (.354)	–
Weighted inverse square distance	–	–	–	.535 (.592)
Model-fit statistics				
Pseudo R^2	.598	.605	.598	.598
Spatial pseudo R^2	.587	.596	.588	.588

Note: Lag is computed from 4th order queen contiguity.