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Crime in the Built Urban Environment: Exploring the Impact of Road Networks and Land Use on Residential Burglary Patterns

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Crime in the Built Urban Environment: Exploring the Impact of Road Networks and Land Use on Residential Burglary Patterns

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INTRODUCTION

For decades, environmental criminology theory has emphasized the connections between the built urban environment and criminal activity. The urban landscape determines both the origins and destinations of everyday journeys from home to work, school, shopping or entertainment areas, and it provides the pathways on which residents travel. As such, the built environment guides and limits the locations that offenders may search within in order to identify potential criminal opportunities. For these reasons, access and proximity to major roads, as well as key local activity nodes such as shopping malls, transit stations and schools, have been frequently found to be an important indicator of local crime. Advancements in spatial data availability have allowed for further exploration of these connections at the micro-spatial scale.

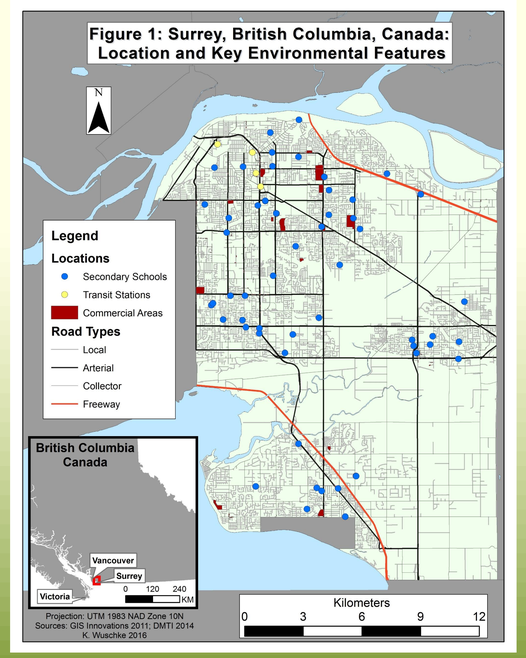
This research explores the micro-spatial concentrations of residential burglary within one Canadian municipality. The spatial distribution of residential burglary events are explored in relation to the street network, as well as local crime attractors and generators. Findings emphasize that the concentrated nature of residential burglary may be influenced by physical structure of the urban environment.

DATA

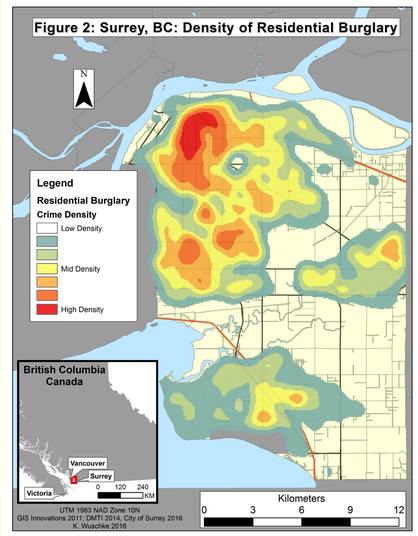
The City of Surrey was selected as the study area. Surrey is located 20 kilometers south east of Vancouver, British Columbia.

A municipal taxation dataset provided by the British Columbia Assessment Authority was used to identify the location and actual land use of properties within the city (BCAA, 2005). From this dataset, all single family residential properties within the city limits were selected (n = 136,188).

In addition, a number of key local environmental features were selected from within the actual use data, based on previous academic findings supporting their relationship with urban crime. The location of secondary schools, transit stations, malls and other commercial areas have each been identified as crime attractors in previous research, and have been selected for exploration within this study (see for example, Roncek and LoBosco, 1983; Kinney et al., 2008; McCord and Ratcliffe, 2009; Gallison, 2014). All major roads were also selected for further analysis at this stage, defined for the purposes of this study as arterial and collector roads (for a review of major roads as crime attractors, see Brantingham and Brantingham, 1993; Johnson and Bowers, 2010; Weisburd, 2015) (Figure 1).

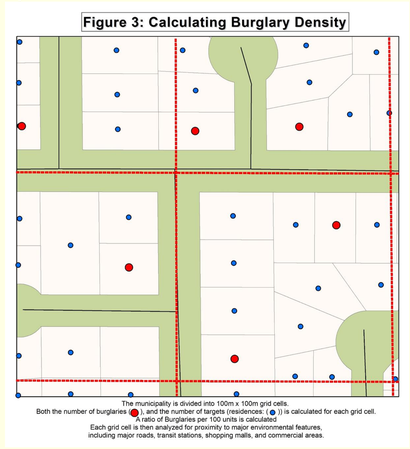


METHODOLOGY



Crime data were acquired from the Royal Canadian Mounted Police (RCMP) PIRS database, which includes detailed address-level information for all reported police incidents between 2001 and 2006. From this dataset, all residential burglaries occurring at one of the identified single family residential properties were queried for further analysis (n = 13,575). Figure 2 displays a kernel density map of residential burglary patterns within the City of Surrey.

The municipality was then spatially divided into micro-level grid cells (100m by 100m), and a rate of residential burglaries per 100 residential properties was calculated for each cell. Figure 3 provides an illustration of this process.



Each cell was then analyzed based on proximity to the pre-identified crime attractors. This proximity is measured by Euclidean distance from the boundary of each grid cell, to the nearest feature within each type of attractor.

The relationship between burglary and urban features were explored in two phases.

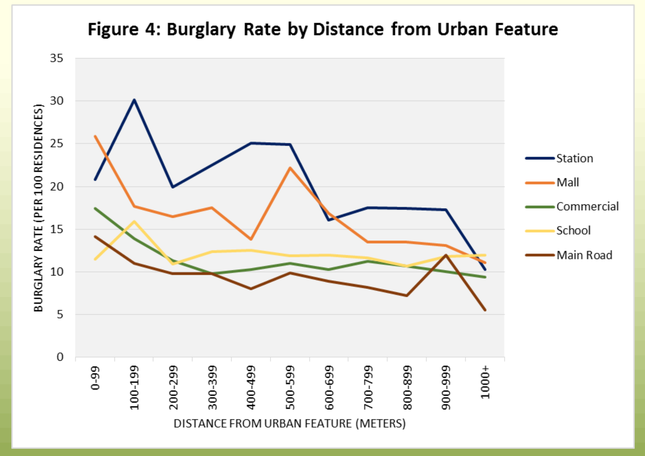
- Phase 1 investigates how the rate of burglaries per 100 residential properties changes as distance from key urban features increase.
- Phase 2 explores the combined impact of proximity to multiple urban features on the burglary rate of each cell.

RESULTS

PHASE 1:

Figure 4 illustrates the changes in burglary density as distance from each selected urban feature increases. Out of the five selected urban features, four follow a pattern consistent with distance decay, in that the rate of burglaries per 100 residences generally decrease as distance from the urban features increase. Transit stations, malls and other commercial areas, and proximity to major roads display this general trend. In contrast, burglary rates in Surrey do not appear to predictably fluctuate as distance from secondary schools increase.

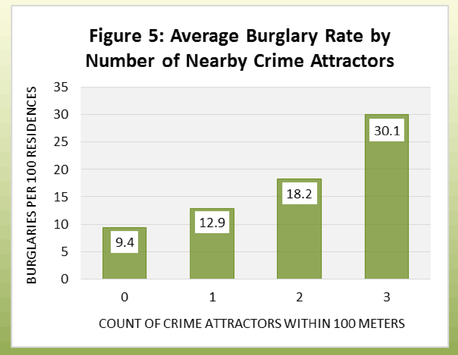
With these results in mind, secondary schools have been removed from subsequent phases of this study.



PHASE 2:

Figure 5 begins to explore the impact of multiple crime attractors within close proximity to residential areas. Grid cells that are not located within 100 meters of any investigated crime attractor (secondary schools excluded) have, on average, 9.4 burglaries per 100 residences. This density increases as the number of nearby crime attractors increases:

- Grid cells with one attractor located within 100 meters display an average of 12.9 burglaries per 100 residences. This is a 37% increase from cells with no nearby attractors.
- This trend continues as the number of nearby attractors increases: cells with two nearby attractors have an average of 18.2 burglaries per 100 residences (a 94% increase on the no-attractor baseline).
- Cells with 3 nearby attractors experienced 220% more residential burglaries than those with no attractors (30.1 burglaries per 100 homes).



DISCUSSION

This research continues to emphasize the connection between the built urban environment and criminal events. In this study, rates of residential burglary are explored in relation to five commonly identified crime attractors. While the findings of this research are largely consistent with previous work within the field, several differences emerge within the local context of Surrey, British Columbia.

Within Surrey, residential areas in close proximity to transit nodes and shopping centres have consistently higher rates of residential burglary. The same is true of other commercial areas, and major roads – though the average rates of burglary in proximity to these features are consistently lower than that of either transit nodes, or shopping malls. These findings largely support the results of studies focusing on nearby municipalities, as well as findings from other regions (for local examples, see Brantingham and Brantingham, 2000; Kinney et al., 2008; Song et al., 2016; Andresen and Curman, 2016, as well as forthcoming work by Wuschke and Kinney. For studies centered outside of the Lower Mainland area of British Columbia, see McCord and Ratcliffe, 2009; Johnson and Bowers, 2010 and Groff and Lockwood, 2014, to name just a few).

Residential burglary rates in proximity to secondary schools, however, do not follow a clear distance decay trend within Surrey. This finding emphasizes the importance of local-level analyses – while general and specific crime events have been found to cluster around such facilities in previous research (see Roncek and LoBosco, 1983; Kinney et al., 2008; Groff and Lockwood, 2014; Wuschke, 2016), this finding is not supported in regards to burglary rates in Surrey.

While this study both supports and contrasts with existing research within the topic area, it further contributes to an under-studied sub-area of environmental-based research by exploring the combined relationship of multiple crime attractors on nearby crime (McCord and Ratcliffe, 2009; McCord et al., 2009; Brantingham et al., 2009; Groff and Lockwood, 2014; Song et al., 2016; Wuschke, 2016). These findings highlight the considerable association between the built environment and crime: while residential areas with no nearby crime attractors experience an average of 9.4 burglaries per 100 residences, areas near three attractors experience burglary rates that are 220% higher. This considerable increase in burglary rates warrants further research to differentiate between the type of attractors.

CONCLUDING REMARKS

Micro-scale analyses of the relationship between built environmental features and urban crime continue to emphasize the influence of our physical surroundings on criminal events. This study explores the interrelationships between five urban features that are frequently found to be associated with urban crime, and residential burglary. This research has noted that the relationship of crime attractors and nearby burglaries varies according to distance from the crime attractor, and type of feature. Further, residential areas with more crime attractors located nearby have considerably higher rates of burglary than those with fewer attractors. These findings have potential implications within the context of planning: both in regards to allocating existing police resources, and within urban planning. Clearer understanding of the potential connections between urban developments and nearby crime can provide opportunities to mitigate potential negative impacts at the planning stage.

These findings continue to emphasize the important relationship between the built environment and crime. Further research continues to explore alternative measures of proximity and nearness, as well as alternative micro-scale units of analysis. In addition, continued research is needed to further explore the combined impacts of multiple crime attractors.

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