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The decline and locational shift of automotive theft: A local level analysis

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ABSTRACT

Purpose: Investigate the changes in the spatial patterns of auto theft in Vancouver, British Columbia during a time of a significant crime drop.
Methods: Geo-referenced auto theft data, 2003 and 2013, is analyzed considering crime concentrations at the street segment level, kernel density estimation, and a nonparametric spatial point pattern test that identifies the similarity in spatial point patterns.
Results: Auto theft in Vancouver has dropped significantly, but does not appear to have a stable crime pattern. Specific and limited areas account for the crime drop in auto theft rather than occurring at all places. These places appear to be related to target suitability and, therefore, opportunity.
Conclusions: The crime drop for auto theft in Vancouver has occurred in particular places. This provides support for the implementation of situational prevention efforts.

Introduction

Crime occurs more in some places and not in others (Eck & Weisburd, 1995). By identifying where crime is clustering and why, prevention efforts can be targeted to these places. Crime is on the decline in Canada and determining where and why specifically it is declining is imperative to investing in what works. Limited funds are available for prevention efforts (Waller, 2006). Thus, what funding is available should be used for strategies that work in the micro-places that need it most. Micro-level studies of crime and place address how the local structure and character of places can lead to crime. Much of this research has addressed 'crime' in general, rather than particular types of crime (for an exception see Braga, Hureau, & Papachristos, 2010, 2011). However, one could assume that different types of crime, which have different causes, should be spatially concentrated in different ways.

The rate of auto theft specifically in British Columbia (BC) and in Canada dropped substantially over the past several years. Auto theft counts have dropped by more than 67% in Canada since 2003 (Statistics Canada, 2013). However, the theory and policy explanations for this striking decline are highly contentious (Farrell & Brantingham, 2014). A key theoretical and related policy question is whether the same explanation is true for all these types of crime declines or whether separate explanations or policies are required by crime type. This study examines how the concentration of spatially clustered and declining auto theft events in Vancouver occurred between the years of 2003 to 2013.

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Literature review

The international crime drop and Canada

According to the International Crime Victims Survey (ICVS) data, crime rates almost universally peaked in the 1990s, but then began to steadily decline (van Dijk, van Kesteren, & Smit, 2007). The decline was first observed in the United States (Blumstein & Wallman, 2006; Zimring, 2007). Similar declines soon followed in several other countries in Europe, as well as Australia, New Zealand and other developed countries (Farrell, Tilley, Tseloni & Mailley, 2011; Tonry, 2005; van Dijk et al., 2007). Several theorists in the United States attributed this decline to an improvement in policing and increase in imprisonment,[2] while other claimed that the positive effects of welfare-state programs on 'high risk for crime' families were responsible (review see: Levitt, 2004; Knepper, 2009, 2012; Farrell, 2013). However, improved policing and increased imprisonment were applicable primarily to the United States. In many of the declining crime rate countries, there were substantial differences in such areas.

Others have attributed the crime drop in Canada, and internationally, to an improvement in security technologies (Farrell & Brantingham, 2014; Farrell, Tseloni & Tilley, 2011). Specifically, home and vehicle security improvements would have reduced opportunities for crime, particularly property crime, that sustained the largest decline (Farrell, Tilley, et al., 2011; Tseloni, Mailley, Farrell, & Tilley, 2010; van Dijk, 2008). Beginning in the late 1970s and early 1980s, security-focused situational approaches to crime prevention were popularized by opportunity theorists. By the 1990s these prevention approaches were introduced widely into national crime prevention policies (Knepper, 2009). This is the only international policy trend that coincides with

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the decline in crime. Thus, no other criminological theory has been able to effectively explain the significant and almost universal decline in crime in the last twenty years (Farrell, Tilley, & Tseloni, 2014; Tseloni et al., 2010).

The rise and decline in auto theft

In order to analyze the decline and spatial distribution in auto theft, it is important to understand why it was a problem in the first place. In 1962, auto theft occurred at a rate of 200 per 100,000 persons in Canada (Pottie-Bunge, Johnson, & Baldé, 2005). By 1996, auto theft peaked at a rate of almost 600 per 100,000 persons. However, after 1996, the rate of auto theft began to decline, albeit slowly (Pottie- Bunge et al., 2005). This pattern is consistent with other countries (Brown & Thomas, 2003; Clarke & Harris, 1992; Fujita & Maxfield, 2012). Several authors argue that the observed increase in auto-theft can be explained by an increase in the number of automobiles available and, thus, the opportunities for auto theft (Farrell, Tseloni, et al., 2011; Mayhew, 1990; Wilkens, 1964). This perspective is consistent with routine activities theory.

A change in the routine activities of North American's led to a rise in auto theft. The routine activities of North Americans required more mobility. Consequently, there was an increase in the production and consumption of automobiles (Farrell, Tilley, et al., 2011). Areas with greater road density are subject to more traffic and particularly more street parking and have been shown to have high rates of auto theft (Copes, 1999). Furthermore, there was an increase in the population living outside of the city and commuting to work. This led to improvements in public transportation (Barclay, Buckley, Brantingham, Brantingham, & Whinn-Yates, 1996; Davis, 2006). However, many commuters still needed to drive to public transportation hubs and, in turn, park-and-ride parking lots were created. These parking lots were unguarded for several hours of the day, becoming excellent targets for motivated offenders (Barclay et al., 1996). An increase in suitable targets, combined with a lack in capable guardianship, increased the opportunities for auto theft.

But now auto theft is on the decline, as with other crime types around the world. As discussed below, there is no exception in Vancouver with a drop in auto theft of 84%, 2003 to 2013. Because auto theft is reliably reported (for insurance purposes) with reporting rates as high as 95% (Wallace, 2003), very little data are expected to be missing from any given analysis. Thus, analyzing the spatial trends in auto theft over time, in a large urban center, may help address crime decline hypotheses without the data limitations of other less reported crime types.

Crime and place

As with any form of analysis, one of the first choices to make is in regard to the unit of analysis. Recent research in the crime and place literature has consistently shown the importance of considering the micro-place because of spatial heterogeneity within larger spatial units (Weisburd, Bruinsma, & Bernasco, 2009): crime has been found to cluster at certain places or 'hot spots' (Sherman, Gartin, & Buerger, 1989), certain crimes cluster at particular places (Weisburd & Green, 1994), and crime hot spot trajectories can vary from block to block (Groff, Weisburd, & Yang, 2010). Moreover, the identification of hot spots has led to targeted crime prevention (Sherman & Weisburd, 1995). For example, target hardening, surveillance, increased community police presence and the implementation of legitimate activity generators have been shown to reduce crime in micro-places (Budd, 1999; Casteel & Peek-Asa, 2000; Eck, 1997, 2002; Feins, Epstein, & Widom, 1997; Kelling & Sousa, 2001; Knights & Pascoe, 2000; Lester, 2001; Poyner, 1993; Saville, 2009; Sherman et al., 1989; Skogan, 2006; Sorensen, 2003; Tseloni, Wittebrood, Farrell, & Pease, 2004).

Crime and place researchers have since demonstrated the consistency of high crime or high victimization areas over time (Braga et al., 2010, 2011; Curman, Andresen, & Brantingham, 2015; Ignatans & Pease, 2014; Weisburd, Bushway, Lum, & Yang, 2004). Similar to Sherman et al. (1989), Weisburd et al. (2004) found that very few street segments in Seattle (around 5%) accounted for 50% of crime; this pattern has been replicated in many cities across the United States and around the world (Andresen & Linning, 2012; Melo, Matias, & Andresen, 2015; Weisburd, 2015; Weisburd & Amram, 2014). More importantly this literature has demonstrated the stability of crime in these micro-places over time. Curman et al. (2015) replicated Weisburd et al. (2004) and found that in the city of Vancouver most street segments experienced stable crime trends over time. Ignatans and Pease (2014) looked at the distribution of victimization of households across time in Britain. They found that while the most victimized households benefited from the overall decline in crime over time—in that these houses experienced less victimization in general—the proportion of total victimization for these houses was increasing. These authors contributed spatial and temporal quantitative analysis to the field of crime and place. However, different types of crime over time still have yet to be examined.

The current study uses open-source property crime data from the Vancouver Police Department to address how has the concentration of spatially clustered and declining auto theft events in Vancouver occurred between the years of 2003–2013. As mentioned above, auto theft is of particular interest because it is one of the most commonly reported crimes (Wallace, 2003). No other crime, with the exception of homicide, has such a high level of reporting and, thus, the findings should be representative of the actual phenomena. In the case of auto-theft, reporting rates are extremely high because a report must be made in order to collect insurance monies. Theft from auto will also be considered as some have claimed a partial displacement from theft of auto to theft from auto may have occurred in recent years as a result of security (Brown, 2015).

Table 1
Descriptive statistics

Year	Auto theft count	Year	Auto theft count
2003	6337	2009	1886
2004	6084	2010	1467
2005	5035	2011	1100
2006	3689	2012	1152
2007	3330	2013	1000
2008	2416		

Data and methodology

Data

The city of Vancouver is the eighth largest municipality in Canada with a population just over 600,000 people. The data for this study are from open source police incident data from the Vancouver police department. These data span the years 2003 to 2013, inclusive. The types of property crime coded in this data set include: theft of a motor vehicle over $5000 and theft of a motor vehicle under $5000. Motor vehicle theft is an indictable offense and can be defined as depriving an owner, temporarily or permanently, of his or her property — in this case a motor vehicle (*Criminal Code*, 1985, RSC, s. 322 (1); 333.1(1)). Theft of auto, both under and over $5000, are combined to understand patterns in auto theft in general. The figures in Table 1 show that auto theft has declined in Vancouver from 6337 events in 2003 to 1000 events in 2013 a decline of 84.22%.

These data are at the 100-block level for privacy reasons. However, in order to geocode the data, exact addresses on these street segments were produced using a random number generator.[3] The vast majority of street segments in Vancouver fall upon the traditional grid network meaning that most street segments are relatively short and somewhat equal in size. There are a total of 11,730 street segments. Each segment