



Crime seasonality and the micro-spatial patterns of property crime in Vancouver, BC and Ottawa, ON



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ABSTRACT

Purpose: Early criminological research has found that the frequency of crime is not consistent throughout the year and that crime often peaks in the summer months. What has gone largely understudied, however, is how the respective spatial patterns are impacted over time. This study investigates whether seasonal variation exists temporally across different property crime types and whether these same offences possess micro-spatial patterns that vary substantially over the calendar year.

Methods: A series of Andresen's (2009) spatial point pattern tests were employed using police report data to examine the seasonal spatial patterns of crime in two Canadian cities with differing climates, namely Vancouver, BC and Ottawa, ON.

Results: Overall, results suggest that: (a) property crimes exhibit distinct temporal peaks in humid continental climates (i.e. Ottawa) and not in temperate ones (i.e. Vancouver); and (b) regardless of climate, micro-spatial patterns of property crime remain relatively constant throughout the year.

Conclusions: The findings indicate that both the temporal and spatial components of crime seasonality should be considered whenever possible in order to better understand when and where to implement crime prevention programs.

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Introduction

The study of crime seasonality has many functions in the criminological literature. Given some of the widely accepted environmental criminology theories, the knowledge of when and where crimes occur has become increasingly important to criminologists (Andresen & Malleson, 2013). Although much of the early seasonality literature applied temperature aggression theory, the notion that higher temperatures in summer months lead to increased aggression/frustration and often violent crime (Anderson & Anderson, 1984; Baron & Bell, 1976), more recent research has since found that seasonal peaks exist for other crime types, such as property offences that were not expected to have similar relationships with temperature (Cohn & Rotton, 2000; Hipp, Bauer, Curran, & Bollen, 2004). As such, researchers are more frequently utilizing an alternative theoretical perspective, namely Cohen and Felson's (1979) routine activities theory, as a means to account for seasonal fluctuations in crime. This perspective contends that when the routine activities of people change, so do crime patterns. More specifically, the summer months are often characterized by warmer temperatures, vacations from work and school, as well as more planned entertainment events such as concerts, festivals and fairs. These events compel many individuals to leave their homes in

order to participate in the festivities and in turn increase their likelihood of victimization due to the high convergence of people at public places while simultaneously leaving their homes unguarded for motivated offenders (Andresen & Malleson, 2013; Cohen & Felson, 1979). As such, seasonal increases in both violent and property offences are often accounted for using this theoretical framework.

When assessing the annual fluctuations in crime, particularly property offences, the concept of crime generators and attractors (Brantingham & Brantingham, 1995) should also be considered. Crime generators refer to locations that attract large numbers of people for purposes other than criminal activity. Such places can include shopping malls, entertainment complexes and sports stadiums. While these particular places may not be criminogenic in themselves, they create situations in which motivated offenders can act simply due to the presence of opportunity (Brantingham & Brantingham, 1995, p.7). On the other hand, crime attractors refer to the particular places that possess criminally favorable characteristics that increase opportunity for motivated offenders. These locations are often conducive to crime in that they present a reduced likelihood of detection. Such locations can include "bar districts; prostitution areas; drug markets...[and] large insecure parking lots in business or commercial areas" (Brantingham & Brantingham, 1995, p.8). Because these places are so crime-friendly, the authors posit that offenders will take the time and effort to go out of their way to travel to such places in order to carry out their crimes (Brantingham & Brantingham, 1995, p.8; see also Ratcliffe, 2011).

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Therefore, in the context of crime seasonality, it is likely that annual variations in the locations of crime will depend on the routine activities of people and the physical locations of such generators and attractors. For instance, the convergence of individuals at places such as stadiums and arenas will be largely dependent on the sports teams' schedules (Brantingham & Brantingham, 1995). This in turn can drastically increase the volume of people in very concentrated areas simply due to their shared routine activities at certain times of the year. Moreover, empirical research has shown that other crime generators such as transit stops/stations particularly near commercial areas can exhibit seasonal increases in offences such as robbery due to "increased summer foot traffic...and high volumes [of] out of town visitors" (Sorg & Taylor, 2011, p.467). These annual variations can be attributed to an increased number of targets that move through such locations.

If changes in crime patterns throughout the year are dependent on the routine activities of people, the proper understanding of why seasonal fluctuations in a particular jurisdiction do (or do not) occur is crucial. Moreover, it is in the best interest of policy makers to understand not only which crime prevention methods are most effective, but where they are appropriate to use (Andresen & Malleon, 2013). Furthermore, it is crucial to know when certain initiatives are supposed to impact crime, emphasizing the importance of knowing when to evaluate the effectiveness of a crime prevention method (Andresen & Malleon, 2013, p. 32; see also Block, 1983). While the majority of crime seasonality literature has focused on patterns of assault, other literature has begun to emerge more recently assessing temporal fluctuations of other crime types. What has gone largely understudied, however, is how the respective spatial patterns are impacted over time (Andresen & Malleon, 2013, p.25; Brunson, Corcoran, Higgs, & Ware, 2009, p.906). Such information may prove helpful in contributing to more crime-specific prevention models (see Clarke, 1980). As such, this study attempts to address these concepts by investigating the following research questions: (1) does seasonal variation exist across property crime types? (2) do micro-spatial patterns of property crime change with the seasons?; and (3) should crime data be disaggregated in the study of crime seasonality? These questions are consistent with the principles of routine activities theory and should provide a greater understanding of concepts that have emerged in the field of environmental criminology.

The Empirical Literature on the Spatial Aspect of Crime Seasonality

Crime peaks, particularly in the summer months, have been demonstrated many times in the literature. However, there is continued debate over which specific crime types experience such trends and when (McDowall, Loftin, & Pate, 2012, p.407; Uittenbogaard & Ceccato, 2012, p.150). Far less attention has been paid to the corresponding spatial patterns that exist (Brunson et al., 2009, p.906). Given the framework of routine activities theory and the spatio-temporal convergence of offenders and targets, it is clear that inquiry into the accompanying spatial trends is warranted. Of the limited research that exists, however, focus has been placed more prominently on identifying chronic locations at particular times (see Breetzke & Cohn, 2013; Ceccato, 2005). Moreover, most of the analyses examine neighborhood contexts and their varying seasonal trends (Harries, Stadler, & Zdorkowski, 1984).

At a county-wide¹ level, Quetelet (1842) conducted some of the first seasonal analyses and subsequent mapping of the spatial distribution of crime in France. At a temporal level, he found that while violent crime occurred more frequently in the summer, property crimes tended to peak in the winter. The spatial data revealed that crimes against persons were disproportionately higher in the south of France, more specifically, Corsica, Languedoc and Provence (Quetelet, 1842, p.40). These results, while relatively preliminary, provided some of the first empirical evidence that crime is not spatially distributed in a uniform manner (see Sherman, Gartin, & Buerger, 1989). It was not until the 1970s that scholars such as Lewis and Alford (1975) revisited the concepts initiated

by Quetelet (1842). Their findings indicated that assaults could not be directly attributed to ambient temperatures. They concluded that while more southern cities have relatively stable climates, namely that even the cold months are relatively warm and, thus, conducive to outdoor activities, their assault rates still fluctuated (Lewis & Alford, 1975, p.215). As such, the early literature indicates that people's routine activities more strongly predict the annual temporal fluctuations of crime than weather patterns themselves.

Almost a decade later, Harries et al. (1984) used the Lewis and Alford (1975) findings to assist in the design of a neighborhood-level study of seasonality and assault. When considering the spatial context across neighborhoods, they discovered that low-status neighborhoods,² "showed a more distinct summer peak of assaults than did other neighborhoods" (Harries et al., 1984, p.601). Furthermore, it was found that assaults were even more prevalent in the streets and/or within apartment buildings within the lower status neighborhoods (Harries et al., 1984, p.599). The authors concluded that their findings provided further support for the consideration of physical and social environments in the understanding of crime patterns (Harries et al., 1984, p.603). Interestingly, however, a more recent study conducted similar analyses of robberies in Philadelphia and found a contradicting result, namely that seasonal increases in robberies were more prominent in higher socioeconomic status communities (Sorg & Taylor, 2011, p.467). Moreover, other research in the United Kingdom has since found that because robberies frequently take place outdoors, the winter months experience higher occurrences of robbery due to the increased hours of darkness that reduce capable guardianship (Tompson & Bowers, 2013). This indicates that different crime types likely possess unique spatial patterns and should therefore be studied individually.

Using a similar framework as Harries et al. (1984), Breetzke and Cohn (2012) set out to investigate seasonal fluctuations in assaults in South Africa across neighborhoods (see also Breetzke, 2015). Their analyses confirmed both of their hypotheses, namely that assaults did in fact peak during the summer months and dropped off in the winter (Breetzke & Cohn, 2012, p.650) and that a portion of seasonal differences could be attributed to neighborhood deprivation. More specifically, neighborhoods characterized by higher deprivation³ experienced disproportionately higher levels of assault. However, while the highly deprived neighborhoods had the highest assault rates in the summer, assault rates were more evenly distributed across all neighborhood types in the winter months (Breetzke & Cohn, 2012, p.653). Other work, such as Brunson et al. (2009), has observed a direct relationship with temperature and the spatial occurrence of crime. Their study in the United Kingdom found that as temperatures rose, crimes began to cluster more prominently outside of the city center (Brunson et al., 2009, p.919). Nevertheless, data from cities on different continents have simultaneously demonstrated a lack of uniformity in the spatial occurrence of crime.

In addition to exploring seasonality and weather variables that might affect the occurrence of crime, Ceccato (2005) explored the changing geographic patterns of homicide in São Paulo, Brazil. While a distinct summer peak existed in the temporal dimension, the results of the spatial Kulldorf scan test revealed that homicides tended to cluster in more disadvantaged areas of the city "regardless of the time of the year" (Ceccato, 2005, p.317). Furthermore, she found that homicides tended to cluster towards the south of the city in the summer months whereas they became more prominent in the "eastern, southern and city core" in the winter and spring (Ceccato, 2005, p.317). Not surprisingly, these groupings of homicide locations also coincided with various crime generators such as "commercial areas, places of entertainment and drug related markets that attract economically motivated crime" (Ceccato, 2005, p.317). Using the same Kulldorf scan test of space-time crime clusters on smaller spatial units of analysis,⁴ Uittenbogaard and Ceccato (2012) examined the geographic patterns of violent and property crime in Stockholm, Sweden. Overall, the authors found that the city center was host to violent crimes in the winter and property crime in

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