



Measuring the effect heterogeneity of police enforcement actions across spatial contexts

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ABSTRACT

Purpose: This study tests whether the effect of police actions is influenced by similar crime generators and attractors (CGAs) that influence crime. Said differently, in recognition that the presence of CGAs presents higher risk of crime at certain places, we test whether CGAs similarly create a situation where specific police enforcement actions are more effective at certain types of places than others.

Methods: Using longitudinal logistic regression models incorporating panel data, we measure the effect of various police enforcement actions on gun violence in Newark, NJ. Risk Terrain Modeling (RTM) was further used to test whether the effect of the enforcement activities vary across spatial contexts.

Results: When considered on their own, police enforcement actions were associated with increased likelihood of gun violence. However, certain types of enforcement actions conducted where CGAs highly co-locate, as identified through RTM, were associated with decreased likelihood of gun violence.

Conclusions: Findings suggest that where officers conduct enforcement activities may be as important as what precise enforcement activities they enact. This has implications for the place-based policing tactics. Understanding the spatial context of high-crime areas can help police design strategies in a manner that maximizes their crime prevention utility.

1. Introduction

Criminology has seen increased interest in the relationship between crime and place over the previous three decades. Perhaps the most replicated finding from this body of literature is that crime does not occur evenly across the urban landscape, but rather clusters within distinct hot spots (Lee, Eck, SooHyun, & Martinez, 2017; Sherman, Gartin, & Buerger, 1989; Weisburd, 2015). The observed concentration of crime has significant implications for police practice, with rigorous quasi-experimental and experimental evaluations consistently finding that hot spots policing generates significant reductions in crime (Braga, Papachristos, & Hureau, 2014; Weisburd & Eck, 2004). Hot spots policing tactics have recently been complimented by a range of analytical techniques broadly referred to as predictive policing (Perry, McInnis, Price, Smith, & Hollywood, 2013). Such predictive methods are assumed to help police in working more proactively with limited resources, specifically by assisting in prioritizing targets for intervention. Many common predictive policing techniques pay particular attention to features of the urban landscape in an attempt to measure how specific environmental features generate crime. One such spatial analysis

technique is Risk Terrain Modeling (RTM), which aims to diagnose the spatial risk factors of criminal behavior, emphasizing micro places where multiple significant risk factors co-locate (Caplan & Kennedy, 2016; Caplan, Kennedy, & Miller, 2011).

The current study seeks to help fill a gap in the literature relating to an important area of overlap between hot spots policing and geospatial predictive policing research. Hot spots policing has taken several forms, involving a range of different police actions (Braga et al., 2014). Thus, it is surprising to note that we do not have a clear idea of what types of police tactics seem to work best within hot spots themselves (Haberman, 2016). In addition, it is still largely unknown whether certain police enforcement actions are influenced by similar crime generators and crime attractors that influence crime itself. In light of the research evidence, it is possible that police actions do not uniformly impact crime at places, but rather exhibit a heterogeneous effect depending on the composition of the surrounding environment. Said differently, if crime generators and attractors present higher risk of crime at certain places within the landscape, they may also create a situation where specific police enforcement actions may be more effective at certain types of places than others.

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The current study emerged from a partnership with the Newark, NJ Police Department (NPD) during a time when dwindling resources led to a reconfiguration of their place-based enforcement strategies and a desire of leadership to better understand the context in which the effect of police activity can be maximized. Building upon the approach of Kennedy, Caplan, and Piza (2011), we began the analysis by using RTM to identify micro-places throughout the city hosting multiple spatial risk factors for gun violence. Following this analysis, we measured the effect of various street-level enforcement activities conducted by NPD officers on the occurrence of gun violence within micro-places. We concluded by statistically measuring whether the effect of the aforementioned police enforcement actions differed across spatial contexts. We found that the effect of specific enforcement actions significantly differed depending upon the level which significant crime generators and attractors co-locate. These results suggest that where enforcement actions occur may be as important to crime reduction as what kind of enforcement actions are enacted.

2. Environmental criminology, crime concentration, and hot spots policing

The geographic concentration of crime, as well as place-based policing strategies, is informed by the Environmental Criminology perspective. Environmental Criminology is a family of theories concerned with criminal events and the immediate circumstances in which they occur (Wortley & Mazerolle, 2008): Routine Activities (Cohen & Felson, 1979), Rational Choice (Cornish & Clarke, 1986), and Crime Pattern Theory (Brantingham & Brantingham, 1993a,b). Routine Activities considers crime as the outcome of the spatial and temporal convergence of a likely offender and a suitable target in the absence of a capable guardian. Rational Choice considers crime as the outcome of an appraisal process in which the potential offender considers the risks and rewards inherent in a given crime opportunity. Crime Pattern Theory is typically credited with connecting the tenets of Routine Activities and Rational Choice, explicitly operationalizing them to space (Andresen, 2014: 8).

Crime Pattern Theory posits that offenders, who are inherently rational actors (see Cornish & Clarke, 1986), will make calculations on when and where to offend based on specific geographic locations, and specific characteristics of suitable targets within those areas. These offenders, then, are not randomly choosing targets in time and space, but rather choose targets within an area's "environmental backcloth" when and where situational factors are conducive to offending (Brantingham & Brantingham, 1993a). Brantingham and Brantingham (1993b) described the environmental backcloth as the physical characteristics of places and their subsequent influence on human behavior within the area. The environmental backcloth is comprised of three types of activity spaces: nodes (places where people spend extended amount of time, such as home, work, and places of recreation), paths (travel routes between nodes), and edges (boundaries between different areas) (Brantingham & Brantingham, 1993b). Activity spaces, and by extension their encompassing environmental backcloth, can be made criminogenic by the presence of crime generators and crime attractors. *Crime generators* are places where large groups of people congregate for reasons unrelated to criminality (Brantingham & Brantingham, 1993a). Generators may become criminogenic because the presence of large groups of people may provide criminal opportunities to would-be offenders (Bernasco & Block, 2011; Brantingham & Brantingham, 1993a, 1995). Conversely, *crime attractors* are places that provide specific opportunities for crime events to occur, bringing together motivated offenders for the express purpose of committing certain types of crimes (Brantingham & Brantingham, 1993a,b). As discussed by Clarke and Eck (2005: step 17), common examples of crime generators include shopping areas, transportation hubs, festivals, and sporting events while crime attractors include places such as prostitution strolls and drug markets. However, Clarke and Eck (2005) additionally note that as

the reputation of a crime generator spreads, increasing numbers of offenders that are drawn to the area, it can transition into a crime attractor. This shows that the relationship between activity spaces and crime is fluid in nature, able to take various forms over time.

As Brantingham and Brantingham (1999) note, the combination of these different layers in the environment overlaid within the environmental backcloth theoretically produces concentration of crime hot spots. While no common definition of hot spots exists (Eck, Chainey, Cameron, Leitner, & Wilson, 2005), the common conceptualization used by researchers and practitioners refer to micro-places located at specific buildings and addresses, street segments, or clusters of street blocks where crime concentrates (Weisburd, 2008). In their seminal piece, Sherman et al. (1989) found that 3.3% of addresses in Minneapolis accounted for just over 50% of calls-for-service over a 12-month period. Subsequent studies have found similar clustering for an array of crime types, as demonstrated in a recent systematic review of crime concentration at places (Lee et al., 2017). Research incorporating longitudinal methods have further demonstrated that hot spots persist over rather extensive time periods. Scholars have observed high levels of crime concentration over a decade or longer in cities such as Seattle (Weisburd, Bushway, Lum, & Yang, 2004; Weisburd, Groff, & Yang, 2012), Boston (Braga, Hureau, & Papachristos, 2011; Braga, Papachristos, & Hureau, 2010), Vancouver (Curman, Andresen, & Brantingham, 2015), Chicago (Schnell, Braga, & Piza, 2016), Albany (Wheeler, Worden, & McLean, 2016), and The Hague (Steenbeek & Weisburd, 2016).

Interest in micro-level opportunity structures and their influence on hot spot formation has also spurred increased attention on how police can effectively control crime at micro places (Braga & Weisburd, 2010). Moving from randomized patrols (Kelling, Pate, Dieckman, & Brown, 1974) to more focused techniques at crime hot spots, police departments have seen success in curbing crime problems in cities (Braga et al., 2014). However, while there is general consensus on the effectiveness of hot spots policing, much less is known regarding the precise actions police officers should take when engaged in such practices (Haberman, 2016). Studies included in Braga et al.'s (2014) systematic review incorporated a diverse set of tactics including situational crime prevention (Braga & Bond, 2008), proactive traffic stops (Sherman & Rogan, 1995a), raids on drug houses (Sherman & Rogan, 1995b), directed motor vehicle patrol (Taylor, Koper, & Woods, 2011), and foot patrol (Ratcliffe, Taniguchi, Groff, & Wood, 2011), among other tactics. In addition, street-level actions enacted by police officers can exhibit a great deal of variability even within single interventions. Enforcement actions are often not situationally dictated, with officers enjoying a great deal of latitude when choosing how to address incidents of concern (Famega, 2005). Hence, a number of appropriate enforcement decisions are available to officers in most instances (Schafer, Carter, Katz-Bannister, & Wells, 2006).

Better understanding the influence of precise police officer actions, and not just overarching strategies (e.g. hot spots policing), can have great benefit in contemporary policing. Despite the emergence of hot spots policing, as well as other evidence-based strategies such as problem-oriented policing, routine patrol remains the primary activity of police (Mastrofski & Willis, 2011). Therefore, even in cities committed to evidence-based strategies, a bulk of patrol officers will be dedicated to the delivery of standard patrol and response services. In light of this fact, understanding the effect of street-level enforcement actions is key, as all patrol officers can engage in such activity, regardless if deployed at hot spots or in a general patrol function.

3. Police enforcement actions, environmental context, and effect heterogeneity

In revisiting the tenets of Environmental Criminology, it is important to acknowledge Brantingham and Brantingham's (1993b) basic description of the environmental backcloth as a dynamic entity in

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