

Crime Hot Spots: Proposing a new model for appropriate identification of crime hot spots

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ABSTRACT This research focuses on two fundamental aspects of hot spot policing that have been widely neglected by previous scholarly research. These aspects include the adequate concentration of crime at a smaller geographical unit to be considered a crime hot spot, and the cost-benefit implication of focusing limited police resources on such a smaller place in an effort to prevent criminal activities. Substantial limitations in call-to-service data from police departments raises concern on the purported concentration of crime at places that warrant such strategy in the first place. We will analyze data from the Cincinnati Police Department by first Geocoding the data, and then exporting the data to be analyzed in SPSS. We will conclude by proposing new model that will not only rely on numbers, but will take into consideration the weaknesses of the data, time intervals and cost-benefit.

Additional Key Words and Phrases: Hot Spot Policing, Crime concentration

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1 INTRODUCTION

Hot spot policing or place-based policing, is a term used to refer to policing strategies that focuses police resources on smaller places with high crime concentration. The strategy has enjoyed tremendous support and adoption among academics and Police practitioners. This is largely due to its portrayal as an evidence-based practice by researchers. Present studies on the strategy however, mostly narrow the framework for assessing its effectiveness. These studies largely preoccupy themselves with what works and narrowly define success as crime reduction [Rinehart Kochel 2011] at the targeted areas.

The issue of over-reporting and under-reporting of crimes challenges the notion of adequate crime concentration at a particular place. Present studies either deliberately or as a result of an oversight, completely ignore to assess the cost-benefit analysis in their studies. [Braga et al. 2014] were surprised to find none of the 19 studies they examined did a cost-benefit analysis. They also assert that the impact of this strategy will be emboldened if the evaluations show monetary savings in addition to crime control gains. Finally, there is the need "to know more about whether often costly new technologies can enhance the ability of police to address high-crime places" [Weisburd and Telep 2014].

This research focuses on an area that may be considered as the crux of hot spot policing: the adequate concentration of crime at places. We look beyond simply acknowledging the concentration of crimes at places, and focus on the key question of "how much" or prevalence of crimes makes a

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place a hot spot. We critically consider time intervals in our data and make a case of cost-benefit analysis in the implementation of the strategy.

2 BACKGROUND

Over the past few decades, a growing number of research by crime scholars suggest police will be more effective in addressing criminal activities and disorder when they focus in on small micro places where crime is concentrated [Weisburd et al. 2017], as opposed to spreading police resources broadly across beats, cities, and precincts. This shift became necessary as crime researchers suggest that crime is not evenly distributed across urban areas, but rather it is concentrated in very small places [Braga 2007]. According to [Braga et al. 2014], the appeal of focusing the limited police resources on a small number of high-activity crime places is straightforward. If we can prevent crime at these hot spots, then we might be able to successfully reduce total crime. While police have never ignored places of geography entirely [Weisburd and Telep 2014], it is important to note the point of hot spot policing is not simply that places should be considered in policing, but that they should become a key component of the databases that police use [Weisburd 2008]. Places in this context refer to very small micro-units of analysis including buildings or addresses, block faces, street segments or clusters of addresses, and street segments [Weisburd 2008].

These crime concentrated places are referred to as hot spots or crime hot spots, and the strategy and tactics that are focused on these places are termed hot spot policing or place-based policing [Weisburd 2008]. The strategy relies on an innovative technique called crime mapping. This technique uses computer technology to disseminate and illustrate statistical trends in criminal data [Battin 2009]. While the idea behind hot spot policing is straightforward, the same cannot be said about its implementation. This is because what police do to address crime within the targeted area under the rubric of hot spots policing varies [Rinehart Kochel 2011]. [Weisburd and Telep 2014] stipulates that hot spot policing covers a range of Police responses that all share in common a focus of resources on the locations where crime is highly concentrated, or hot spots. Hot spot policing has enjoyed steadied rise across the globe in general, and more particularly in the USA. This is largely due to the growing consensus among crime scholars on the effectiveness of the strategy.

2.1 Effects of Hot Spots Policing on crime

There have been rigorous studies by several crime scholars to, as it were, determine the effectiveness of hot spot policing as a tool for crime prevention. Majority of the studies have reported significant reduction in crime related activities at the targeted sites during the experiment period. Some studies also show some evidence of diffusion effects at places immediately surrounding the targeted sites. [Weisburd et al. 2004] in their quasi-experiment in Jersey City found a significant 45% drop in prostitution in the targeted area. In the same study, a 58% decline in drug crimes was discovered.

Other studies have also shown a significant decline in criminal activities during hot spot intervention periods on crimes such as firearm violence, street violence, auto theft and some gun-related violence [Braga et al. 2014]. Furthermore, [Braga et al. 2014] in their systematic review found moderate to significant crime reduction in all but one of the 19 studies they reviewed. They also found no evidence of any immediate spatial displacement of crime to areas immediately surrounding the targeted areas. These findings have led to unanimity among most crime scholars such as [Weisburd and Telep 2014] to boldly claim that it is no longer something new that hot spots policing is an effective policing strategy.

2.2 Weaknesses in Data

Present studies mostly rely heavily on call to service data in their implementations and assessments. Unfortunately, this data is possesses some weaknesses that ought to be critically considered.

According to [Sherman et al. 1989] “only police crime reports provide exact descriptions of the location of occurrence, and even they are rarely programmed to be sorted by address”. The integrity of the data is also questioned due to overreporting, underreporting and mirroring. Overreporting occurs when a single crime is reported more than once, resulting in duplication of the same criminal activity in the police database. Mirroring occurs when additional updated information is recorded as a separate call, rather than updating the existing record in the database. Furthermore, relying on data that is collected over a lengthy period of time may not necessarily portray a true reflection of crime concentration at a particular place. [Sherman et al. 1989] in their experiment found all addresses that were included in their crime concentrated hot spots, generated at least a meagre one call over the course of the year, with about half of those addresses producing not more than a single call.

3 PROBLEM STATEMENT

Hot Spot policing is regarded as an ideal and effective innovative strategy that helps in crime prevention. However, limiting the discussion on its effectiveness to simply assessing the reduction of calls to service is a little problematic. The questions surrounding the integrity of data used for the mapping, coupled with the complete disregard of cost-benefit analysis, calls for further interrogation when discussing the effectiveness of the strategy.

3.1 Research question

From this, we generate the following research questions

- (1) Does crime adequately concentrate on the street segments as the past studies suggest?
- (2) What data mining strategy can best identify crime hot spot
- (3) Does the cost outweighs the benefit in hot spot policing implementation?

4 METHODOLOGY

4.1 Data

The sample data to be used in this study will be retrieved from Cincinnati Open Data Portal. This is an open online government data that is provided by the city of Cincinnati to improve service delivery, promote transparency, and to help deliver creative problem solving solutions. In conformity with past studies, we will rely on call to service data retrieved from the Cincinnati Police Department database offered by Cincinnati Open Data Portal. The time period for the data is from January 1, 2015 to December 31, 2019. By employing multi-year data, we will analyze whether crime concentration stays relatively similar from one year to another.

4.2 Dependent Variable

The frequency of crime concentration at the blocks (called as street segments in hot spots literature) will serve as the dependent variable of the study.

4.3 Independent Variables

Crime Types: We will classify the data into violent and property crimes in order to see whether the presumptions of hot spot policing apply to the both crime types.

Time: We will consider the time intervals of calls in the data as a variable when assessing the frequency of calls from a particular location

Risky Places: Crime prevention theory suggests that type of places (e.g., shopping malls, parks, schools, liquor stores) may attract criminals to commit crimes because these places generate high

level of crime opportunities. For this reason, we will control these places in order to see to what extent risky places affect crime concentration from one year to another.

4.4 Analytical Strategy

First, the data will be cleaned using Excel or Python to remove the duplication. This step will help us address the issue of overreporting and make our data more succinct for analysis. Using ArcGIS software, we will then geocode the cleaned Cincinnati Police Department data in order to include geographic based variables to the data such as parks, schools, and liquor stores. Following this data enrichment process, we will export the data to CSV format in order to prepare the data for SPSS analysis. Next, we will transfer the data to SPSS to analyze the following research questions: (1) whether crime really concentrate on certain places, (2) what percent of overall crime does fall to the know hot spot places? (3) what is the probability of preventing a crime if hot spot policing strategy is applied to these places?, and (4) what is the expected benefit (cost-effect) of implementing hot spot policing to these areas?

5 SIGNIFICANCE

The main significance of this research is to further contribute towards the application of Information technology in Criminal Justice, by better and accurately designating places as “hot spots”. The new model to be proposed by this study will to make hot spot policing a more effective tool in crime prevention. Presently, the absence of a threshold for categorizing hot spots may have consequences to both the strategy and resource deployment in tackling crimes at different places. With regards to the cost-benefit analysis, this research will provide insights into how police administration can assess the associated benefits and their costs in hot spot policing, so that the scarce resource of tackling crimes could be used judiciously. Put together, the proposed model should help to prevent the over concentration of resources at places that may not necessarily be yielding the expected results in the fight against crimes.

6 CONCLUSION

There can be no doubt that targeting crime hot spots is extremely important in the prevention of crime. However, what is more important is accuracy is determining these hot spots, as well as proper cost-benefit analysis. The discrepancies in the data used in present models brings into question the accuracy of designating places as hot spots. This research will propose a new model that addresses these possible inaccuracies, while providing value for money in addition.

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