Crime Analyst's Research Digest

International Association of
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General Topics

Table of Contents

Introduction

Dear IACA Members,

Welcome to the second edition of the Crime Analyst's Research Digest! Our hope with this publication is to provide a source of useful information to crime analysts on scholarly research that applies to the field. The general format will feature one-page summaries of research papers reviewed by researchers and practitioners who are knowledgeable in the field. The goal is to provide crime analyst practitioners with a quick glimpse of relevant research articles without having to spend valuable time and effort locating and reviewing them individually.

This issue features a variety of summaries on topics that include environmental criminology, risky facilities, and risk terrain modeling. A sampling of the summaries in this issue includes:

- Applying Risk Terrain Modeling to Predict Shootings
- Community-Level Impacts of Temperature on Urban Street Robbery
- Infectious Burglaries: A Test of the Near Repeat Hypothesis

We hope you enjoy the article reviews and find ways to incorporate them into your work and research. We realize that analysts often do not have access to scholarly journal articles. We encourage you to contact the author or connect with a researcher or instructor at a nearby college or university. That connection can be very valuable for future collaborations and partnerships to reduce crime, prevent crime or evaluate your efforts.

As always, we'd love to get feedback for future digests. If you are interested in serving as a reviewer, have recommendations on relevant articles, or have any comments or suggestions for improvement, please send them to us at publications@iaca.net.

Tom Scholten
Editor, Crime Analyst's Research Digest
IACA Publications Committee

Adding the Temporal and Spatial Aspects of Routine Activities: A Further Test of Routine Activity Theory

Elizabeth R. Groff

Summary by Aisha Javed, Alexandria Police Department, George Mason University

Summary

Routine activity theory is commonly known as the idea that individuals' routine activities play a role in the convergence of three key elements which cause a crime to occur: a motivated offender, a suitable target and the lack of a capable guardian. This study examines routine activity theory using data from Seattle, WA, specifically incorporating time and space as key variables in the convergence of elements that promote or discourage crime. Virtual testing of this theory is applied and the results of this application on potential street robberies are discussed.

Data and Methods

Virtual experiments were conducted using simulations in Agent Analyst, a computer software environment which includes agent-based modeling and GIS. Two hypotheses were presented in this study: (1) the more time individuals spend outside of their homes, the higher the number of overall street robberies; and (2) temporal and spatio-temporal schedules of individuals away from the home have an effect on the number of street robberies that occur. This virtual experiment was conducted in Seattle, Washington. The following Seattle data sets were utilized to determine land use and street networks for the purposes of this experiment:

1. Total population - U.S. Census Bureau (2000)
2. Total employment - U.S. Census Bureau (2002)
3. Total potential activities - ESRI business location data (2003)
4. Streets - ESRI

From these data, it was determined that there are 16,035 nodes, or intersections/locations where a street robbery may occur. Five different conditions were applied to the tests (the amount of time spent away from home measured in ten percent increments, starting with 30). The variable being measured was the number of street robberies. A one-way analysis of variance (ANOVA) test was used to obtain the test results.

Findings

The findings show that the amount of time spent away from the home does, in fact, increase the number of street robberies. Additionally, an individual's spatio-temporal schedule plays an important role in lowering the amount of street robberies despite the amount of time spent outside of the home. The ANOVA tests yielded results that show significant differences between the rates of street robberies for the spatial and temporal models being tested. This study supports the routine activities theory and sheds light on the importance of the convergence of certain elements *(e.g.*, people, location) on the facilitation or hindrance of a crime. One of the biggest limitations to this study is that it is a virtual study and cannot determine if the results would be the same in the real world.

For more information see Groff, E. R. (2008). Adding the temporal and spatial aspects of routine activities: a further test of routine activity theory. *Security Journal*, 21, (1-2), 95-116.

Exploring 'Near': Characterizing the Spatial Extent of Drinking Place Influence on Crime

Elizabeth Groff

Summary by Joseph J. O'Rourke and Elizabeth Groff, Temple University

Summary

In the spatial analysis of facilities and crime, the analyst often examines the effect of facilities on places nearby. This study systematically evaluates two metrics (Euclidean buffer and street distance buffer) and two types of buffer increments (quarter-mile and street block) commonly used when examining the spatial extent of drinking place influence on crime. Recommendations for best practices are made based upon the results of this case study.

Data and Methods

The 157 locations of drinking places in Seattle, WA, are used because they have been established as a criminogenic facility type in the literature. The proximity effect was measured in 14 progressive street block increments of 122 meters and 4 quarter-mile increments of 402 meters. The metrics used were Euclidean distance and street distance buffers. Euclidean buffers measure straight line distance outward in all directions irrespective of surrounding geographies. Street distance buffers, on the other hand, measure from the facility outward along the street network and thus create more compact buffers.

Findings

The zone of influence of drinking places is relatively short (less than 3 blocks) and quarter-mile increments mask it. In addition, street block distances in increments of 122 meters yield greater crime densities in most increments with minor exceptions and provide a more nuanced measure than quarter mile (402 meter) increments. These findings suggest that street distance buffers are more effective than Euclidean buffers because they reveal the micro-level pattern in the geographic extent of 'near'. Because street distance buffers consider the surrounding street network, they more accurately capture the area that is likely to be impacted by the criminogenic effects of the facility.

Implications for Practice

The geographic extent of 'near' for drinking places is relatively short, extending no more than three blocks (366 meters). Practitioners should use street distance buffers to get the resolution needed to detect where facility influence wanes. The relevancy of these findings for other facility types must be tested.

For more information see Groff, E.R. (2011). Exploring 'near': Characterizing the spatial extent of drinking place influence on crime. *Australian and New Zealand Journal of Criminology,* 44(2), 156-179.

Environmental Criminology and Crime Analysis

Edited by Richard Wortley and Lorraine Mazerolle

Summary by Chris Herrmann, John Jay College of Criminal Justice / Berkeley College (White Plains)

Summary

This book provides an overview of environmental criminology, crime analysis, and crime prevention and control concepts. Many of the chapters are written by the authors of the theories, who have developed the foundations of the environmental criminology, crime analysis, and crime prevention/control fields. The book is divided into three sections: (1) understanding the criminal event, (2) analyzing crime patterns, and (3) preventing and controlling crime.

"Part 1: Understanding the Criminal Event" looks at the popular criminological theories that comprise environmental criminology and crime analysis. Reviews include Rational Choice (Cornish and Clarke), Situational Crime Prevention (Richard Wortley), Routine Activity (Marcus Felson), and Crime Pattern Theory (Paul and Patricia Brantingham). Not only are the theories reviewed, but ideas are provided on the future direction of research.

"Part 2: Analysing Crime Patterns" reviews several popular methods of defining crime patterns. Crime mapping and hot spots (Luc Anselin, Elizabeth Griffiths and George Tita), repeat victimization (Graham Farrell and Ken Pease) and geographic profiling (Kim Rossmo and Sacha Rombouts) are described.

"Part 3: Preventing and Controlling Crime" differentiates this book from other environmental criminology and crime analysis books. This section provides an excellent overview of crime prevention through environmental design (Paul Cozens), situational crime prevention (Ron Clarke), designing products against crime (Paul Ekblom), problem-oriented policing and environmental criminology (Michael Scott, John Eck, Johannes Knutsson, and Herman Goldstein), broken windows theory (Michael Wagers, William Sousa and George Kelling) and intelligence-led policing (Jerry Ratcliffe).

Review

This book provides a comprehensive overview of why crime happens (Part 1), how crime patterns are identified (Part 2) and the different methods that analysts can consider for future crime prevention and crime control strategies (Part 3). The introduction to the book, by Richard Wortley and Lorraine Mazerolle, provides the reader with the historical roots of the crime analysis field, as well as the directions in which current research is headed.

For more information see Wortley, R., & Mazerolle, L. G. (Eds.). (2008). *Environmental Criminology and Crime Analysis*. Abingdon, UK: Willan.

Saturation Foot-Patrol in a High-Violence Area: A Quasi-Experimental Evaluation

Eric L. Piza and Brian A. O'Hara

Summary by Joel M. Caplan, Rutgers University

Summary

Recent evaluations of foot-patrols suggest that they may produce crime prevention benefits in certain contexts. This article presents findings from an evaluation of a saturation foot-patrol initiative in Newark, NJ, named Operation Impact. Newark is the largest city in New Jersey, spanning more than 26 square miles with a population of nearly 280,000 persons. On a nightly basis, twelve officers patrolled a ¼ square mile area of the city to deter crime. Proactive enforcement actions by the officers were expected to disrupt violent crimes, street-level disorder and narcotics activity.

Data and Methods

The design and enforcement strategy of Operation Impact has its roots in a New York Police Department strategy of the same name. A group of officers was assigned to Operation Impact upon graduation from the police academy. They remained assigned to the intervention until graduates from the ensuing academy class were selected as successors. Supervisors were selected based on their level of experience managing proactive enforcement units, such as "gangs" or "narcotics." An in-depth analysis of the spatial distribution of street violence from January 1, 2005 through December 31, 2007 was conducted to select the target area. Violent crime incidents were weighted based on their seriousness and the timing of their occurrence, allowing for more recent events to have greater relevance in the creation of target areas while accounting for the longer-term trend. One year of pre- and post-implementation crime data was compiled from the Newark Police Department to empirically evaluate the effect of Operation Impact's spatially-targeted foot patrols. Crime incidents were measured within four areas: the target area, a surrounding catchment area (one block in each direction from the target areas), and two different control areas.

Findings

Operation Impact outperformed the precinct control area on all crime measures. All crime types decreased during operational hours, and reductions were sustained during the nonoperational time period for four of the five crime categories (the exception was robbery). Overall, results of this study provide support for saturation foot-patrol as a violence reduction tool, with the tactic successfully and meaningfully reducing overall incidents of violent crimes as well as the disaggregate categories of murder, shootings, and aggravated assault, each of which decreased over 60 percent relative to the precinct (though not all decreases were statistically significant). These crimes were more effectively addressed in the target areas than within either control area, while showing no evidence of substantial spatial or temporal displacement. Although, the authors warn that displacement remains a real threat to geographically focused police operations; robbery was the lone crime type to experience significant levels of both spatial and temporal displacement.

For more information see Piza, E. L. & O'Hara, B. A. (2012). Saturation foot-patrol in a high-violence area: A quasi-experimental evaluation. *Justice Quarterly*. Doi: 10.1080/07418825.2012.668923.

Risky Facilities: Crime Concentration in Homogeneous Sets of Establishments and Facilities

John E. Eck, Ronald V. Clarke and Rob T. Guerette

Summary by Troy C. Payne, University of Alaska Anchorage

Summary

Crime concentrates at a relatively small number of places within any facility type. This paper presents explanations for this concentration, measurement problems, and strategies for crime prevention at risky facilities.

Risky facilities and their causes

The authors suggest that "for any group of similar facilities (*e.g.*, taverns, parking lots, bus shelters), a small proportion of the group accounts for the majority of crime experienced by the entire group." When counting crime at all bars in a city, for example, only a relative handful of bars will have a disproportionate amount of crime while most bars are crime-free (or nearly so). This is demonstrated with data from four different facility types: bars, motels, apartments and retail stores. Reporting processes could also differ. For example, two retail stores could experience similar shoplifting rates but have very different procedures for calling police. The quantity of targets and offenders could vary within facilities as well. Apartment buildings with more dwelling units have more targets; apartment buildings with lax tenant screening likely attract offenders. Place management could vary by facility as well. Bars, for example, make management decisions that attract a particular type of clientele – dance clubs are very different from neighborhood bars.

Measurement issues

The authors identify measurement issues and provide examples of each. Concentration is more difficult to determine with rare events than common events. Longer spans of time allow for easier identification of concentration. Facility size can be difficult to determine for many facility types but should be accounted for.

Implications for prevention

It is often useful to divide places by facility type and then focus prevention efforts on the most troublesome places. These prevention efforts will often need to involve the owner or manager of the facilities and include studies of the management practices of facilities that are not problematic. It could be that the managers of risky facilities simply are not aware of the extent of the problem or possible solutions. It could also be that owners of risky facilities cannot afford to implement solutions – or owners could be profiting directly or indirectly from crime. Creating a system of accountability that increases the cost of non-compliance through a combination of publicity, sanctions, certification, voluntary codes of practice, or performance standards can help to encourage owners to manage their properties differently.

For more information see Eck, J. E., Clarke, R. V., & Guerette, R. T. (2007), "Risky facilities: Crime concentration in homogeneous sets of establishments and facilities", In G. Farrell, K.J. Bowers, S.D. Johnson, & M. Townsley (Eds.), *Crime Prevention Studies* Vol. 21. Criminal Justice Press, Monsey, NY, pp. 225-264. Available: http://www.popcenter.org/tools/risky_facilities/PDFs/Eck_etal_press.pdf

Community-Level Impacts of Temperature on Urban Street Robbery

Evan T. Sorg and Ralph Taylor

Evan T. Sorg, Temple University

Summary

This research explores whether increases in street robbery were associated with temperature increases during the years 2007-2009 in Philadelphia. In addition, it explores whether there was variation in the impact of temperature across neighborhoods and, specifically, whether locations which are more likely to attract large numbers of people are likely to have lower levels of guardianship, and are therefore subjected to more severe increases in robbery when temperatures were higher.

Data and Methods

Monthly street robbery counts for each year, aggregated to all census tracts in Philadelphia, act as the outcome variable. The monthly average temperature for each month was drawn from an online weather archive. Data from the 2000 U.S. Census were used to create three measures: neighborhood socioeconomic status, neighborhood stability and neighborhood ethnic concentration. Four other census variables were included in the statistical models: (1) the percentage of the population who are African-American, (2) the percent of the properties deemed to be commercial rather than residential, (3) the total population and (4) the percent of land parcels which are vacant per neighborhood. The final variable differentiates between neighborhoods which were within one block of a subway station and those which were not. Data were analyzed with hierarchical growth curve models.

Findings

With every ten degree increase in temperature, robbery increased by an average of about 2 percent. However, there was also a statistically significant difference between neighborhoods. In particular, more affluent neighborhoods were more strongly affected by temperature increases, as were neighborhoods with more commercial land use, and those within one block of a subway station. As predicted by environmental criminological theories, places likely to draw large numbers of people (subway stations and commercial land uses) had higher relative robbery increases when temperatures were higher than those with fewer people. One explanation for the stronger effects in more affluent neighborhoods may be that these individuals are more likely to have resources to travel outside of their neighborhoods to partake in leisure activities during warmer days. In leaving their neighborhoods more often, the level of guardianship is therefore decreased, causing increases in robbery. Although robbery was the only crime category that was tested, the results suggest that it may be beneficial to focus resources at locations with these attributes during the summer months.

For more information see Sorg, E.T. & Taylor, R.B. (2011). Community-level impacts of temperature on urban street robbery. *Journal of Criminal Justice,* 39(6), 463-470.

Applying Risk Terrain Modeling to Predict Shootings

Joel M. Caplan, Leslie W. Kennedy, and Joel Miller

Summary by Greg Jones, U.S. Dept. of Health and Human Services, Office of Inspector General

Summary

Risk terrain modeling (RTM) involves the combination of risk prediction and ecological criminology and provides police departments with a method to maximize the allocation of resources around geographic units of analysis that are typically used at the local and regional level. The first part of this study involved collaboration with the New Jersey State Police and examined the use of RTM on shootings in Irvington, NJ, which is an area that has experienced a large number of shootings and other violent crimes, has a vibrant drug market, and is home to a large number of known gang members. In the second part of the study, the authors compared the RTM methodology with retrospective mapping. The retrospective mapping method involved creating a density map from the locations of shooting incidents from one specific time period (*e.g.*, six months) which was then used to predict the locations of shooting incidents that would occur in a follow-up time period. RTM is a flexible approach that can be potentially utilized for short- and long-term strategic decision-making activities and allows police departments to utilize different characteristics and criminogenic factors that are unique to their jurisdictions.

Data and Methods

This study utilized data on three variables, based on empirical research, including dwellings of known gang members, locations of retail business infrastructure, and locations of drug arrests from January 1, 2007 through June 30, 2008. A raster grid map was created for each variable which assigned values to identically-sized raster class based on the concentration of points near each cell's location. Next, each map was standardized using four groups (*i.e.*, 0 = lowest risk to 3 = highest risk) based on the risk level identified from the raster cells created in the previous step. The map layers of all three variables were summed together using the Raster Calculator Tool included in the extension. The data was then divided into three six-month time periods.

Findings

The study results indicated that when comparing the RTM method with the retrospective mapping method, approximately 21% more shootings occurred in high-risk cells predicted by the RTM technique than the latter. In addition, the RTM approach doubled the number of shooting incident locations that were correctly predicted compared to the retrospective approach. From using the Average Nearest Neighbor tool in ArcGIS, the authors found that RTM maps can also provide information that can be easily operationalized by police administrators with respect to tactical and strategic policing. Lastly, from a fiscal standpoint, the RTM approach requires minimal investment in hardware or software, which is another incentive for police executives and crime analysts.

For more information see Caplan, J., Kennedy, L., & Miller, J. (2010). Risk terrain modeling: Brokering criminological justice theory and GIS methods for forecasting. *Justice Quarterly*, 28(2), 360-381.

Infectious Burglaries: A Test of the Near Repeat Hypothesis

Michael Townsley, Ross Homel and Janet Chaseling

Summary by Tom Scholten, City of Madison (WI) Police Department

Summary

This paper examines the near repeat hypothesis for burglary offenses in neighborhoods in Brisbane, Australia, that contain varying degrees of housing homogeneity and heterogeneity. A major point of the research is the near repeat hypothesis as one aspect of the geo-spatial distribution of burglary offenses. The near repeat hypothesis explains that there is an increased risk of burglary victimization the closer dwellings are to others that have been previously burglarized. The research tested the hypothesis that locations closer to a location that had been burglarized stand a greater chance of being burglarized, particularly in areas where housing is similar.

Data and Methods

The authors explain that the near repeat hypothesis functions on two core ideas. The first idea considers homogenous areas of housing development, which means that areas with similar housing types are likely to experience a greater likelihood of victimization compared to areas with dissimilar housing types. The second idea is that of target vulnerability, which the authors operationalized as a combination of burglary rates and demographic indicators. Factors such as unemployment, public housing and low-income households were used to estimate the offender population for each of the five areas.

The data used were based on a police division in southeast Queensland, Australia. Demographic data showed the research area to have residents of low socio-economic status, relatively high levels of unemployment, public housing, poverty, and crime. The police data covered a time span of thirty-four months of recorded burglary addresses, dates and times. The data were geocoded using MapInfo. The geo-coded incidents were examined and eighty-five percent occurred in five suburbs. Areas with large-scale land development were identified as the model for housing homogeneity because these areas often had similar housing and land packages.

Findings

The research found that near repeats depended on homogenous housing and also target vulnerability, although housing diversity was a more powerful predictor. An additional finding was that limited variation in the types of construction features and lot size can restrict or limit the distribution of the repeat victimization. Ultimately, areas where housing is similar and target vulnerability is high are at greatest risk for near-repeat victimization. The implications of the research suggest that the diversity of housing development can be a factor in analyzing the distribution of crime, an important factor in the field of environmental criminology. Because areas with similar types of housing stock are more susceptible to repeat victimization, homeowner associations or individual homeowners should considering increasing guardianship and crime prevention methods.

For more information see Townsley, M. (2003). Infection burglaries: A test of the near repeat hypothesis. *British Journal of Criminology*, 43(3), 615-633.

Proactive Policing Effects on Repeat and Near-Repeat Shootings in Houston

William Wells and Ling Wu

Summary by Greg Jones, U.S. Dept. of Health and Human Services, Office of Inspector General

Summary

This pre/post study examined the impact of a crime reduction unit (CRU) on repeat and near-repeat gun assaults and gun homicides in Houston, Texas. The CRU, which consisted of 65 officers, 6 sergeants, and 1 lieutenant, was deployed 7 days per week to specific locations and then rotated to other locations every 2 to 4 weeks. The pre/post study design incorporated a 10-month period before the CRU deployment and a 10-month deployment period. The impact of the CRU was examined citywide and across 20 police districts. The authors found that the CRU deployment initiative was not focused specifically on identifying and responding to repeat and near-repeat shootings, but more generally on responding to a variety of significant crime problems. Furthermore, the CRU initiative did not have a significant impact on reducing repeat or near-repeat shooting citywide or within the police districts.

Data and Methods

This study utilized a pre/post design that examined 5,717 events which included gun assaults and shootings that occurred between January 2007 and August 2008. The pre-study period consisted of a 10-month period before the CRU deployment and the post study period consisted of a 10-month deployment period. A near-repeat calculator, which uses both spatial and temporal bands, was used to assess if significant repeat and near-repeat patterns existed before and during the intervention. In addition, two types of analysis were conducted: (1) citywide and (2) within and across 23 police districts (3 were excluded). The authors acknowledged that comparison districts were not picked randomly and is a weakness of the design; however, they suggest that their study represents a "live" or naturally (*i.e.*, police-generated) created intervention in a large city which could be considered, by some, as more generalizable to other departments if significant evidence was found supporting the impact of this initiative.

Findings

The study results indicated that the CRU deployment did not have a significant impact on effectively reducing repeat and near-repeat shootings. The authors concluded that there were other likely factors, besides the CRU, that probably explain the changes observed over time in the study. Approaches that incorporate more focused responses are more likely to be effective than those that are more general such as the CRU initiative. More research is needed to understand the mechanisms that drive repeat and near-repeat incidents.

For more information see Wells, W. & Wu, L. (2011). Proactive policing effects on repeat and near-repeat shootings in Houston. *Police Quarterly, 12*(3), 298-319.