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PLACE-BASED RISK FACTORS FOR AGGRAVATED ASSAULT ACROSS POLICE DIVISIONS IN LITTLE ROCK, ARKANSAS
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Full Article:

Introduction

Risk terrain modeling (RTM) is a spatial diagnostic technique often utilized to construct a risk assessment to understand what features of the built environment influence crime outcomes. However, because most risk assessments are "global," or designed to assess features' influences across entire cities or jurisdictions, the nuanced relationships within smaller, localized areas such as police divisions goes undetected. The goal of the current study is to extend existing applications of RTM by comparing the results of a city-wide risk terrain model for aggravated assault to the results of risk terrain models for each police division in Little Rock, Arkansas. The RTM analyses based on police divisions provide more localized risk assessments, and more meaningful and actionable output to improve allocation of resources and responsiveness of interventions.

Study Settings

This study focuses on Little Rock, Arkansas, a city with approximately 200,000 residents who live within a geographic area of about 121 square miles. Little Rock has consistently ranked high for violent crime for cities with greater than 100,000 residents. The Little Rock Police Department (LRPD) operates within three police divisions: Downtown (31 sqmi), Southwest (40sqmi), and Northwest (48sqmi). The LRPD assigns crime analyst(s) per division and weekly CompStat meetings are based on division-specific assessments. An overall city-wide meeting is held every four weeks; thus, Little Rock and the three LRPD divisions represent meaningful, actionable, and practitioner-friendly study settings to examine the spatial dynamics of crime.

Data & Methodology

Calendar year 2013 aggravated assault incidents were obtained from the LRPD, along with police division boundaries. There were a total of 1,124 aggravated assaults in Little Rock; 464 occurred in the Downtown division, 269 in the Northwest division, and 391 in the Southwest division. Our analyses examined place features, such as bars, hotels, and public transportation stops, that could potentially increase the risk for aggravated assault. Place feature data were obtained from various municipal

agencies, such as the Little Rock Treasury Department, Little Rock School District, Arkansas Scholarship Lottery, Arkansas Beverage Control, and MetroPlan to form a list of 14 potential risk factors.

RTMDx was utilized to execute each RTM analysis. The results of each model allowed us to compare the risk factors for aggravated assault across the three LRPD division and the overall City-wide RTM. All parameters were consistent across models, with the exceptions of study area and corresponding aggravated assaults incidents. For units of analysis, we used half the average block length (216ft); the spatial influence of risk factors was operationalized and tested as a function of both proximity and density (with the exception of four features that did not exhibit clustering and were tested as proximity only), at half block increments, to a maximum extent of four blocks.

Results

Table 1 provides an overview of the four aggravated assault risk terrain models. Of the 14 potential risk factors for aggravated assault, the models identified 4 factors in the Downtown division, 7 in the Northwest, 7 in the Southwest, and 8 across Little Rock. However, no two models exhibited the same set of risk factors. The bolded and italicized operationalization and spatial influence represent the risk factor in each study setting with the greatest relative risk value (i.e., weight of influence on aggravated assault). Across divisions, the most problematic risk factors varied. In addition, the risk factor's spatial influences varied across divisions. For example, whereas proximity to any liquor store was associated with higher risk in the Downtown and Northwest divisions, only places where liquor stores clustered were higher risk in the Southwest division. Moreover, while the spatial influence of public high schools extended to four blocks in the Southwest division, it reached just half a block in the Northwest division. Notably, the risk factors varied by division specific RTM and no risk factor was found to have the same OP and SI across all RTMs.

Discussion

There is a growing body of literature demonstrating the utility of RTM for building spatial risk assessments as actionable intelligence to inform police operations. However, most applications of RTM employ global, or city-wide, analyses, which overlook the relationship between place features and crime within smaller areas of a jurisdiction. This would be like studying census data at only the city level instead of tracts, for instance. The current study explored this proposition and found support for creating more localized risk assessments by building risk terrain models for aggravated assault based on the LRPD's three police divisions and Little Rock overall. In particular, we found that risk factors and their spatial influences differed across divisions and with the city as a whole. These findings suggest the importance of building risk assessments for smaller, but meaningful and actionable, study settings within jurisdictions. By doing so, police agencies can more precisely identify high risk places for crime throughout operational areas within their jurisdiction to better allocate resources. In addition, the most relevant risk factors for crime can be identified within these areas so that interventions can be directly tailored to address their spatial influences. Such approaches should allow police to be more responsive to the particular environmental contexts for crime throughout their jurisdictions, allowing for more effective and sustainable crime prevention.

It has become clear, from this and other recent related studies, that spatial patterns of crime have nuances that do not fit the molds of traditional manners of sampling or analysis because the micro-ecology within cities varies as much as environments can vary between cities[1]. Risk factors and crimes are both not equally distributed in space, and so, crime analysts should expect variation in risk terrain models by the study areas selected, especially when controlling for police activities within divisions, districts, precincts or other aerial units.

Similar to other lines of neighborhood-level research, aggregate study areas fall susceptible to overlooking micro-level variation. A census tract might be labeled as highly-disadvantaged in a citywide analyses, suggesting that crime is expected to occur there. But block-level analysis within said tract would indicate that the entire tract is not homogenously disadvantaged or equally 'at-risk' for crime, accordingly. We would not expect any two census tracts to be identical, so we should not expect police divisions/districts/precincts to be either. Crime and place research indicates that not every landscape feature is risky, so more localized analyses could start to distinguish riskier ones. With localized examinations, tailoring of prevention strategies could be more effective at high-risk places that might be missed in citywide analysis.

Table 1. Aggravated Assault General Comparison across RTMs in Little Rock, Arkansas

Risk Factors	City-wide		Downtown		Northwest		Southwest	
	OP	SI	OP	SI	OP	SI	OP	SI
Banks	-	-	-	-	-	-	-	-
Big Box Retail	-	-	-	-	-	-	-	-
Bus Stop	Proximity	1728	Proximity	1296	Proximity	1728	Proximity	1512
Check Cashing	-	-	-	-	-	-	-	-
Convenience Mart	Density	216	-	-	Proximity	648	Density	216
Fast-Food	Density	216	-	-	Density	216	Density	216
Grocery Stores	Proximity	1728	Density	1728	-	-	Proximity	1728
Hotel/Motels	Density	216	-	-	Density	216	*Density*	*216*
Liquor Stores	Proximity	864	Proximity	1296	Proximity	1728	Density	216
Lottery Retailers	Density	216	*Proximity*	*216*	Density	216	-	-
Pawn Shops	-	-	-	-	-	-	-	-
Public High Schools	*Proximity*	*216*	-	-	*Proximity*	*216*	Proximity	1728
Restaurants/Bars	-	-	-	-	-	-	-	-
Tattoo Shops	-	-	-	-	-	-	-	-
Abbreviations:								
OP: Operationalization (Proximity or Density)								
SI: Extent of Spatial Influence (1 block = 432 ft; maximum extent: 4 blocks=1728)								
Bold and italics denote risk factor with highest relative risk value								

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[1] For instance, see i.e., http://www.rutgerscps.org/uploads/2/7/3/7/27370595/crimekaleidoscope_brief_barnum2017.pdf