Spatial Analysis of Crime in the Evaluation of Public Housing Redevelopment

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Abstract

While previous research has provided law enforcement agencies with trend analysis based on geostatistical models, incident data mapping can also estimate citizen experience of crime. We present a methodology for estimating experience of "signal crimes" based on incident report data. We apply this method to a HOPE VI project in Durham, NC by analyzing crime at public housing complexes to which residences were relocated between 2002 and 2004. Declines in experienced density of shooting from Few Gardens occurred with some increases in experienced murder density. Results indicate that relocated residents experienced improvements in crime levels but serious problems persist.

INTRODUCTION

As geographic information systems (GIS) technology has matured, the mapping of crime has moved from pins in a bulletin board to sophisticated statistical analysis and visualizations of data published on the internet (Ratcliffe, 2002). Despite current applications of spatial crime data to a broad array of problems, the core work of crime mapping remains couched in terms of assisting law enforcement agencies. One of the seminal texts in the contemporary era of GIS-assisted crime mapping, Maltz, Gordon, and Friedman's Mapping Crime in Its Community Setting (1990), makes clear that the impetus behind the research leading to the book was to provide better information to both the police and the community to better respond to, solve, and prevent criminal activity:

> The purpose of the grant was, broadly, to implement a computer-based crime mapping system in a patrol unit and in a detective unit of the CPD and determine its effectiveness as a tool for law enforcement and in enhancing police cooperation and

> communication with community organizations (Maltz et al., 1990, p. 2).

Nine years later, the United States National Criminal Justice Reference Service released an overview of the theory and practice of crime mapping. Again, the emphasis was to empower police departments to better understand crime trends for the benefit of responding to and reducing crime (Harries, 1999). Since then, multiple publications and software packages have emerged to assist police departments and criminologists in predictive mapping and trend analysis (e.g., Boba, 2005; Eck, Chainey, Cameron, Leitner, & Wilson, 2005; Chainey, Tompson, & Uhlig, 2008).

Generally speaking, these efforts at using spatial crime data to improve police effectiveness have borne considerable fruit. However, as Maltz et al. (1990) pointed out over 20 years ago, other members of the community also have considerable interest in the spatial patterning of crime, and not always for the same ends as law enforcement agencies. In particular, geographers and other researchers attempting to evaluate the effectiveness of community development and neighborhood revitalization initiatives may wish to use spatial analysis of data from law enforcement agencies. This observation emerged from efforts to use publicly available crime data to evaluate the effectiveness of a HOPE VI public housing redevelopment project in improving the lives of the former residents.

Because many of these methods for examining spatially explicit incident data were designed to produce predictive and operational improvements in police response, they may not be appropriate for retrospective evaluation of differential experiences of crime by residents. Researchers requiring quantitative spatial analysis techniques are currently presented with a broad array of methods but little guidance for which method is most appropriate, which presents the risk of running analysis which does not answer the relevant research question appropriately. As Lin (2004) notes regarding cluster analysis of infrequent spatial events, "as more and more spatial statistic tests become available, there will be a greater need for selecting an appropriate test method." (Lin, 2004, p. 698) While, as discussed above, much of this work has been done to help law enforcement professionals analyze incident data, those techniques may not be appropriate for evaluating how crime impacts residents, and how that impact changes over time. This use of incident data requires a methodological reconsideration, which, although it may ultimately make use of similar methods of spatial analysis, needs to be theoretically grounded.

HOPE VI

In 1992, the United States Congress appropriated funds to create what would become the HOPE VI program of the federal Department of Housing and Urban Development (HUD), to address “severely distressed public housing” through a comprehensive program of demolishing the worst housing complexes and rebuilding more dispersed, mixed-income units in their places (National Housing Law Project

[NHLP], 2002, p. i). The goals of the project included "changing the physical shape of public housing" and "lessening concentrations of poverty by placing public housing in nonpoverty neighborhoods and promoting mixed-income communities." As of 2002, over 70,000 public housing units had been demolished under the HOPE VI program in over 250 projects around the country (NHLP, 2002, p. 7). Supporters credit the program with helping "transform the physical and social landscape of some of the nation's toughest neighborhoods, creating markets where there were none" (Cisneros & Katz, 2004), while critics charge that it "has been the source of new problems as serious as those it was created to address," including a shortage of public housing and exclusion of input from residents (NHLP, 2002, p. i).

HOPE VI IN DURHAM, NC

Durham, North Carolina is a mid-sized city in the southeastern United States with a population of 228,330 at the 2010 Census. The city was founded shortly after the end of the American Civil War and grew rapidly in the early twentieth century primarily via growth in cigarette and cotton textiles manufacturing. In the second half of the twentieth century, the decline in tobacco manufacturing revenues combined with suburban out-migration produced a familiar pattern of decline of the central city. By 1987, the last tobacco auction warehouses closed, and by 2000 all cigarette manufacturing ceased in Durham. At this point, Duke University and its associated Medical Center had become the largest employer in the city, with rapid employment growth in the Research Triangle Park (RTP) industrial park located directly adjacent to the city as well as in the nearby university town of Chapel Hill (Wise, 2002). While the city as a whole experienced significant in-migration and rising median incomes during this period, much of the new growth before 2000 occurred on the urban periphery, and job creation was largely concentrated in high skill positions requiring advanced education in technology, research, and health fields. By the turn of the millennium, neighborhoods on the east-central side of the city, including both historically white-collar African-American neighborhoods south of the railroad tracks and historically blue-collar white neighborhoods north of the tracks, had lost all but low income black residents, although some in-migration of low income Hispanic residents had begun. As with many other cities experiencing core industrial decline, open drug trade, gangs, and gun violence became endemic to the urban core, including areas around the city's public housing.

In August of 2000, HUD awarded a $35 million grant to the Durham Housing Authority (DHA) for the redevelopment of a 96-block area in northeast-central Durham surrounding and including the 50-year old Few Gardens garden-style public housing complex. The winning grant was celebrated among local politicians as a means for reducing crime in the area (Dainow, 2000). Indeed, much of the local political momentum for the project came from a public reaction to two shooting incidents in the area, one resulting in the death of a two-year old, the other in the paralysis of a five-year old (Wise, 2003). In its marketing materials in 2006, the

Durham HOPE VI project cites "A Safe and Secure Neighborhood" as one of its four major goals for the project (Durham Housing Authority [DHA] HOPE VI website, n.d.). The most dramatic evidence of work on the project took place in July 2003, when DHA demolished the Few Gardens complex, and again local leaders cited the importance the project would have in increasing safety in the neighborhood (Bridges, 2003a, 2003b).

One particular line of criticism against HOPE VI has focused on how the program impacted the residents of the demolished complexes. A 2002 HUD formal tracking study of former residents of eight HOPE VI-targeted public housing complexes found mixed results for former residents. In general, residents were in environments that were improved over their original housing and lived in neighborhoods with lower poverty rates and reported higher satisfaction with their housing. However, many former residents, including those who had moved to the private rental market, with or without vouchers, experienced continued problems with violence (Popkin et al., 2002). A follow-up examination, which included the Durham Few Gardens project, again found some improvements for residents, but still found that many had relocated to other distressed public housing complexes, and that problems with drug activity and lack of safety remained the norm (Buron, 2004).

In an evaluation of neighborhood revitalization projects, which included the Few Gardens complex, Fraser and Kick (2007) focus on the difference between place-based interventions, which were largely successful, and the individual-based interventions for the former residents. At the time of publication, many of the local non-profits which had been included as core parts of the original application had left the program, only 44 percent of relocated households reported working for pay, and administration of DHA had been taken over by the federal HUD due to misappropriation of funds and mismanagement. Further work reviewing the results of many HOPE VI projects nationwide found a systematic failure to address problems and improve the lives of former residents of HOPE VI-targeted projects (Fraser and Nelson, 2008).

DURHAM'S HOPE VI PROJECT AND CRIME

Crime clearly constituted a major local motivation for the project; creating "A Safe and Secure Neighborhood" tops the list of "Revitalization Principles" in the Durham HOPE VI Revitalization Plan (DHA, 2002). However, displacing a large segment of residents who have been victims and potentially perpetrators of crime to other areas of the city which are marginally improved yet still have average incomes below the citywide average may fail to actually improve their experience of crime. A series of previous studies have examined how the spatial pattern of crime has changed surrounding a one particular HOPE VI project. Suresh (2000) used crime victimization data and basic hot spot detection to examine how the spatial patterns of aggravated assault, homicide, and rape changed in the Park Duvalle neighborhood in Louisville, Kentucky following the demolition of a nearby public housing complex

and reconstruction of mixed income housing under the HOPE VI program. While crime in the Park Duvalle neighborhood declined significantly, multiple smaller hot spots of crime sprung up in other parts of the city. Further work suggested that violent crime did not disperse evenly, but accreted to other areas of the city with high concentrations of low income residents (Suresh and Vito, 2007, 2009). This change in patterning does not lead to easy conclusions – on the one hand, a decline of massively concentrated crime within a small area may make the problem significantly more manageable, but on the other hand, it is not the goal of HOPE VI to simply recreate similar problems in other parts of the city. It bears noting that while the Park Duvalle project in Louisville took place much earlier than the Few Gardens project in Durham, the construction and physical development portions of both projects were executed by the same firm, The Community Builders.

THEORETICAL CONSIDERATIONS OF CRIME'S IMPACT ON CITIZENS

Much of the theoretical work that has gone into understanding how crime impacts residents has focused on the fear of crime. Previous work has examined the fear of crime's independence from the actual incidence of crime (Borooah & Carcach, 1997). One of the primary difficulties in examining fear of crime stems from problems in measuring fear of crime. As the theory has matured, literature has focused on breaking the general concept of fear into subcomponents, such as emotional response to danger (including, but not limited to, anxiety), rational evaluation of risk, and examination of environmental factors (Jackson, 2005; Ferraro & LeGrange, 2007). Further work has focused on whether what has been theorized as "fear of crime," considered an unqualified negative, may actually be a functional and pragmatic response (Jackson and Gray, 2010). Research using systematic social observation has also revealed that often times residents' perception of levels of disorder may not correlate at all to actual levels of disorder in an area (Sampson and Raudenbush, 2004).

Further, other work has examined how local residents and other citizens interpret crime beyond simple responses of fear and anxiety, both in alternate emotional responses and in individual interpretations of how crime interacts in a much broader cultural and societal context. In particular, Innes (2004b) builds upon social reaction theories and social semiotics from Goffman and Eco. In Innes' construction, individuals interpret nearby crime by focusing on particularly visible crimes as social signals of larger patterns. This interpretation is not merely based upon either incidents or their products directly experienced by the individual, such as witnessed violence or observed graffiti, but by representations of incidents in the media (Innes, 2004a). In effect, a small subset of crimes, deemed "signal crimes" by Innes, become the primary point of interpretation to the individual.

Following up on this work, Innes (2008) developed a number of typologies for how similar signal incidents may be received very differently based on the context in which they occur. Innes categorizes these along the types of social order

that Hunter (1985) illustrated, breaking transmission of these signals down to these forms of social order: private, parochial, and public, each which comes with its own spatial domain. For instance, Chancer (2005) illustrates that some incidents rise to the level of changing the politics of major US cities, while others barely make the news, while Peelo (2006) goes further to examine how media organizations present "mega" homicides along somewhat predictable narratives and how these reports invite very specific interpretations of events.

In this study, we use this work as a theoretical basis for interpreting spatially explicit crime incident data and how it impacts the lives of individuals. In particular, we focus on two specific signal crimes, murder and firearm assaults, to attempt to create a spatial model of the signal landscape from which residents and other individuals will be constructing their interpretation of crime, risk, and environment. We then apply this model to estimate overall experience of these signal crimes by former residents of the Few Gardens public housing complex in Durham, NC, which was demolished and replaced with mixed income housing by the federal HOPE VI program.

METHODS

CONSTRUCTION OF CRIME EXPERIENCES VIA SIGNAL CRIMES

The critical theoretical decision in this analysis in this case is selecting a methodology with which to model the experience that a group of residents, in this case newly relocated from Few Gardens, have of crime around them. Using the work of Innes (2004a, 2004b), we identify certain, particularly violent crimes as "signal crimes" which, regardless of victimization rates, we theorize will determine how a resident will perceive the levels of crime in the area. This is explicitly a composite measure, which should not only include fear of crime, but also, as Innes explores, anger and frustration stemming from anxiety about victimization of self or family members and from perceptions of incivility and injustice. Additionally, this may include indirect economic and social impacts from non-residents perceiving certain areas to be unsafe or prone to a wide range of crimes. It is, in short, an attempt to use incident data to approximate the social construction of the experience of crime. While there are many other ways in which this construction could be measured, particularly through qualitative or survey instruments, incident data represent a widely available, easily obtained measure. By selecting incident types most likely to act as signal crimes, we hope to be able to model a reasonable approximation.

Naturally, this is exposed to many potential sources of error, not least of which is the decision by the researcher as to what to select as the signal crime, but is also susceptible to error sources familiar to crime mappers such as spatial differences in unreported incidents, ambiguous addresses in the incident reports, and positional error from geocoding. Further, not only may individuals select or interpret signal crimes differentially, but those differences may align along the contours of race,

income, and particularly past experience of the signal crime. Following Innes' (2008) typology, the specifics of the incident will determine along which networks of social order the crime is interpreted. An individual who has lived in areas of high levels of signal crimes may have developed an increased tolerance to them, or alternately, may be traumatized to the point of extra sensitivity.

Because this desired goal of the spatial model of crime differs from the goal of most traditional crime mapping techniques designed to help law enforcement, it requires a different methodology and different theoretical framing. Rather than using the spatial patterning of past crime to try to look for trends still in process that can be addressed and mitigated by law enforcement or understood by community members, we are attempting to reconstruct the experience of crime at a given place and time using historical incident data. Additionally, this framing requires the selection of which crimes to treat as signal crimes; we select murders and shootings. Murders, while comparatively rare events, are often the most widely discussed crime events in news media and in community conversations. Particularly, following all murders and some other publicly visible violent crime, the DPD follows up with its "Community Response to Violent Crime" program, which involves going in person to the residences in the area to provide and solicit information on the incident, and to reassure the community about public safety following the incident. Additionally, we identify aggravated assaults with a firearm (which, by Uniform Crime Report standards, exclude those which result in a homicide) as a particularly strong signal crime, both because of the risk presented by stray bullets to those nearby, and because the noise of the gunshot report is likely to be noticed by a large number of people within earshot. Since not all shootings are assaults with intent to kill, and certainly not all murders are committed with a firearm, we treat these two signal crimes as distinct data sets and analyze them separately.

Perhaps most notably, this analysis requires the selection of a technique to model how these signal crime incidents collectively impact residents in proximate locations, which do not directly experience the crime, but are impacted through the signal mechanism. In conducting this analysis, we initially constructed models based on strong statistical "hot spot" detection techniques such as the various local indicators of spatial autocorrelation (LISA), including the Getis-Ord's *Gi** statistic and the local Moran's I. These techniques provide highly statistically sophisticated maps of where crime may be clustered in a given location relative to the rest of the study area. However, this only illustrates relative level, when what we are concerned with is the actual, absolute individual experience of crime.

By contrast, while kernel density estimation (KDE) is usually considered primarily an interpolation technique or a hot spot detection technique, the method is perhaps even better suited to constructing an estimation of localized experience of signal crime. Fundamentally, a KDE models how the impact of a point event decays over distance in all directions. Most KDE tools provide a range of functions for modeling this decay, including linear, quartic, and negative exponential decays.

Additionally, while KDE requires both the selection of a bandwidth (maximum distance of impact of a given point) and output grid size, in addition to a distance decay model, it can be directly run on point data and therefore avoid the modifiable areal unit problem (see Paez & Scott, 2004), simplifying the decision process for the analyst. As such, KDE provides the primary spatial model for the analyses presented here. For the distance decay model underlying the KDE, we use the negative exponential model, based on an assumption that while signal crimes impact areas over a distance, this impact is dramatically heavier for residents in close proximity versus locations at a greater distance.

Further, because the output of this model is a spatially explicit density estimation, values for two different time periods (provided they are of equal length) can be compared or subtracted to get a measure of the degree of change in the estimation between the two periods. This is particularly useful when the larger spatial trends are relatively constant, but subtle differences have emerged. One final, critical issue in any crime mapping study, often called the "denominator problem," is whether the incident data should be normalized to estimate risk by dividing by some measure of vulnerable population. When analyzing at scales with very coarse grain, such as whole cities, towns, or counties, dividing by the residential population may be appropriate. However, for analysis at scales with very finer grain, this may be wildly inaccurate, as many crimes strike at victims who are far from their residences. In the present conceptualization of experience of signal crime, the proper course of action is ambiguous. On the one hand, the notion of more crimes naturally happening in areas with higher population is obvious and intuitive to many community members who are responding to signal crimes. On the other hand, particularly sensational crimes which happen to a close neighbor are likely to be traumatizing regardless of the population density. As such, citizens may come to perceive high density or high activity areas as more dangerous because of the proximity to signal crimes, even when the actual risk of victimization is no higher.

DATA AND MODEL CONSTRUCTION

To build this model for the analysis of the Durham HOPE VI project, we start by aggregating all crimes in a given year into a single dataset for that year. In the case of the evaluation of the HOPE VI project, given that the bulk of the relocations of former residents and the demolition of the physical plant at Few Gardens happened in the summer of 2003, we compare the aggregate crime from 2002 with that from 2004. Crime data were acquired from and with the cooperation of the Durham Police Department's (DPD) Crime Analysis unit as a spatially explicit ESRI shapefile. The spatial assignment of each incident was performed by DPD's internal crime analysis unit using a mix of geocoding and GPS data; more detailed notes from the process of spatial assignment were not available for this study. For each year, the murder and shooting data were extracted based on the crime type code used to report these to the federal Uniform Crime Report (marked FED_CODE in the data from DPD). The set

of murders included all points scored with a code of 1, while shootings (in UCR terms, "Aggravated Assault—Firearm") included all points scored with a code of 9. To estimate the 2004 addresses of former Few Gardens residents, previous analyses (Bacon, 2006) which used an explicit list of the addresses of residents who were still either in public housing or in Section 8 subsidized housing determined that two-thirds of those residents were living in or within a quarter mile of other public housing complexes in Durham. As such, to simplify this analysis, we use the locations of the still extant conventional public housing complexes to model the spatial experience of these residents. A feature layer representing the public housing complexes was constructed from address data, and corrected based on publicly available aerial photos and ground observation. All analyses used a NAD 1983-based North Carolina State Plane projection.

To produce the spatial model of signal crime experience, we used the CrimeStat v.3.2a software package (Levine, 2009). The models were produced using the kernel density estimation module, with a 1-mile bandwidth and the negative exponential distance decay model. The output was captured on a 250ft by 250ft feature grid, with values recorded as estimated absolute density per square mile. This output grid size was selected to approximate a large city block. While Eck et al. caution that "[b]andwidth is the parameter that will lead to most difference in output when varied," (2005, p. 27) sensitivity analysis done by re-running the computations with bandwidths of .5 and 1.5 miles showed no discernible difference in the spatial patterning or statistical significance of the results, although more rigorous sensitivity analysis was not performed.

Following the production of estimates of murder and shooting for 2002 and 2004 each, a difference surface between the two years was generated for each of the crime types by subtracting the 2002 density estimation from the 2004 density estimation. As such, negative values indicate a decrease in the localized experience of crime, whereas positive values indicate an intensifying localized experience. All of these models were mapped along with the public housing complex layer. Subsequently, spatially-based measurements were taken of all four model estimations and the two difference estimations at the locations of each public housing complex. Z-scores from the difference estimations were then calculated based on the mean and standard deviation for all grid cells to estimate significance of the localized trends. Finally, because the former Few Gardens residents would have relocated from the Few Gardens location to the extant public housing complexes, we calculate the difference between the signal crime density estimate for 2002 at Few Gardens and the 2004 estimate at each of the other public housing complexes, and similarly compute a Z-score against the mean and standard deviation of the fixed location differences for each cell in the study area.

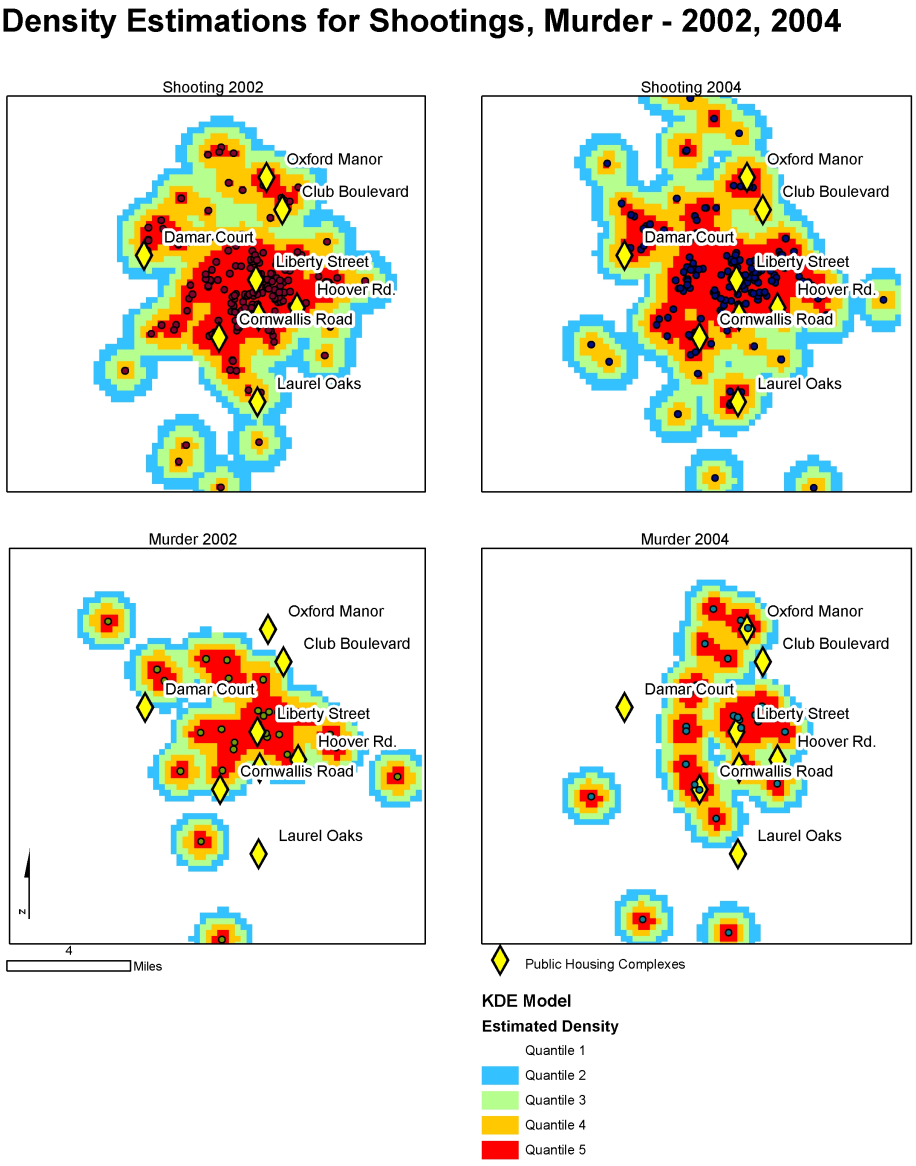

Figure 1. Maps of density estimations for both signal crimes. Symbology is delimited by quintiles.

RESULTS

Figure 1 illustrates the density estimate patterns for the two crime types in the two separate years. As can be expected, the maps produced by the yearly signal crime models indicate that the highest level of experience of signal crime occurred in the center of the city, near the central business district, where population densities, pedestrian activity, and routine activity are highest. Based simply on visual inspection of the maps of the models, little can be discerned in trend.

Figures 2 and 3 show the maps of the change in density estimate for the two signal crimes, and the values for the local density estimates at the public housing complexes are explicitly reported in Tables 1 and 2, for murder and shootings respectively. Z-scores were estimated against mean change in murder density of 0 incidents per square mile with a standard deviation of 0.0199; mean change in shooting density was 0.00761 incident per square mile with a standard deviation of 0.0854. Cornwallis Road, McDougald Terrace, and Oxford Manor all saw statistically significant increases in local murder density estimate, while Liberty St.

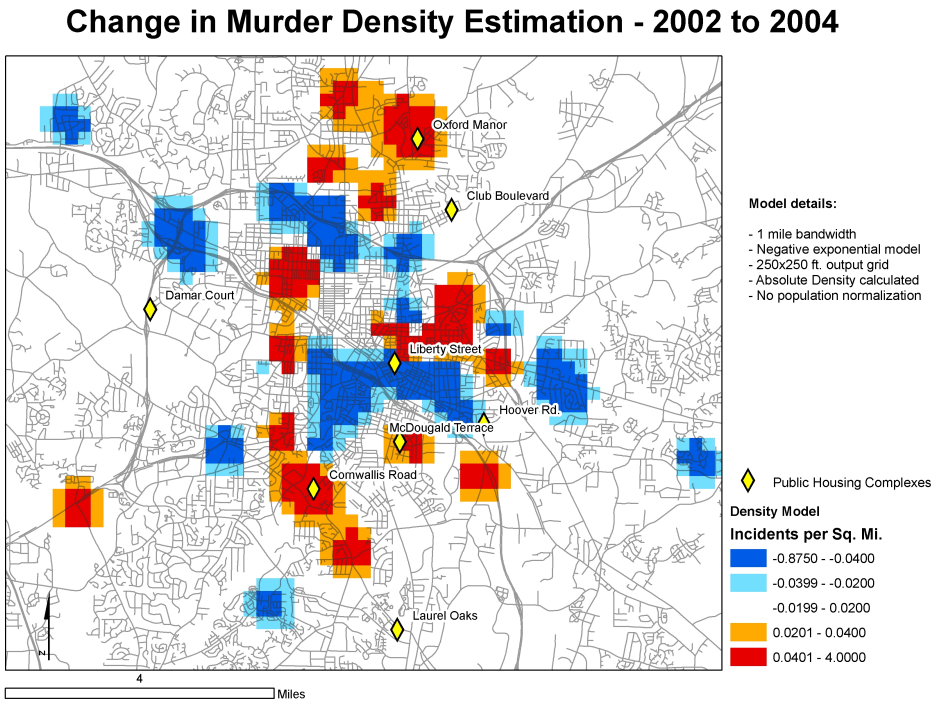

Figure 2. Map of change in murder density estimation.

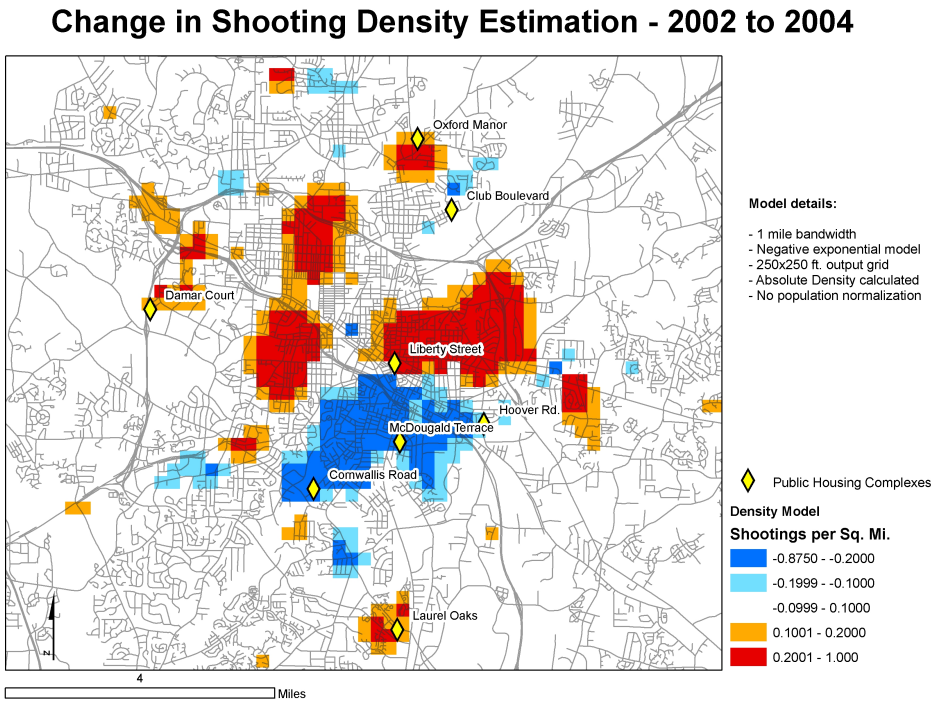

Figure 3. Map of change in shooting density estimation.

Table 1: Murder density estimates by public housing complex, including location of demolished Few Gardens.

Complex	2002	2004	Local Change	Local Z-score	Few Change	Few Z-score
Laurel Oaks	0.000	0.000	0.000	0.000	-0.036	-1.793
Cornwallis Road	0.010	0.158	**0.147**	**7.395**	**0.122**	**6.129**
McDougald Terrace	0.001	0.081	**0.080**	**4.008**	**0.045**	**2.275**
Hoover Road	0.034	0.004	-0.029	-1.481	-0.032	-1.585
Liberty Street	0.163	0.106	**-0.057**	**-2.865**	**0.071**	**3.547**
Damar Court	0.000	0.000	0.000	0.000	-0.036	-1.793
Club Boulevard	0.002	0.000	-0.002	-0.102	-0.036	-1.793
Oxford Manor	0.000	0.141	**0.141**	**7.061**	**0.105**	**5.268**
Few Gardens	0.036	0.018	-0.018	-0.912	-0.018	-0.912

Note: Few Change and Few Z-score represent difference between 2002 Few Gardens rate and 2004 local rate. Significant scores ($p < .05$) show in bold.

saw a significant decrease in the density estimate. Conversely, the only statistically significant movement in shooting density estimates was in the downward direction, in particular at three of the extant housing complexes.

In comparing crime densities at the former Few Gardens complex in 2002 with the other complexes in 2004, there is a rather different picture. Residents who moved to Cornwallis Rd., Oxford Manor, McDougald Terrace, and Liberty St. experienced significant increases in murder densities. However, residents at every complex in the system saw statistically significant, sometimes dramatically large, reductions in shooting densities.

Table 2: Shoot density estimates by public housing complex, including location of demolished Few Gardens.

Complex	2002	2004	Local Change	Local Z-score	Few Change	Few Z-score
Laurel Oaks	0.028	0.129	0.101	0.294	**-0.997**	**-12.561**
Cornwallis Road	0.696	0.231	**-0.465**	**-6.339**	**-0.895**	**-11.373**
McDougald Terrace	0.427	0.188	**-0.239**	**-3.684**	**-0.938**	**-11.869**
Hoover Road	0.556	0.430	**-0.126**	**-2.361**	**-0.696**	**-9.040**
Liberty Street	1.087	1.018	-0.069	-1.703	**-0.108**	**-2.159**
Damar Court	0.102	0.259	0.157	0.945	**-0.867**	**-11.046**
Club Boulevard	0.074	0.125	0.051	-0.289	**-1.001**	**-12.613**
Oxford Manor	0.373	0.528	0.155	0.927	**-0.598**	**-7.888**
Few Gardens	1.126	0.894	**-0.232**	**-3.611**	**-0.232**	**-3.610**

Note: Few Change and Few Z-score represent difference between 2002 Few Gardens rate and 2004 local rate. Significant scores ($p < .05$) show in bold.

DISCUSSION

To a certain extent, this analysis reflects the conclusions of the HOPE VI Resident Tracking Study in verifying that shootings surrounding the new homes of the former Few Gardens Residents are dramatically lower than they were in the old site. However, this pattern is not reflected at all in the murder tracking data. Some of this can be written off to the much lower number of homicides in any given year than aggravated assaults with a firearm, so there is likely to be much more volatility, and the statistical power is likely to be much less. Still, the Z-scores of the increases in murder density both locally and in the experiences of relocated residents are not trivial or marginal. The message of these analyses, which is perhaps clearest is that even two signal crimes which we could expect to be strongly correlated have a very different spatial expression here.

In part, the issue here may very well relate to difference at the old Few Gardens complex. While shooting and murder densities at Few Gardens were among the highest in the city, a greater extreme in the density of shooting than in the density of murder could mean that even comparatively high shooting densities surrounding the other public housing complexes were a significant drop from the astronomical rates at Few Gardens. However, given media reports and crime statistics of the problematic murder rate at Few Gardens, the fact that the murder densities at the new complexes are no lower and sometimes higher should be of clear concern to policy makers.

A detailed history of how public housing in Durham specifically and in the United States in general came to be so distressed is well beyond the scope of this paper. At a rough level Few Gardens suffered from years of institutional neglect, disinvestment, and mismanagement, which very likely contributed to the distressed conditions along with the high concentration of low-income residents. While the neighborhood in northeast-central Durham has experienced a dramatic improvement, the same forces, which created the disastrous conditions at Few Gardens are still at work at complexes elsewhere in the city. As such, the news from the murder density analysis does not portend well for the future. Given that former Few Gardens residents largely were not eligible for HOPE VI housing (Fraser & Kick, 2007), simply reproducing a similar HOPE VI program across the city will not be feasible, as Durham will ultimately run out of conventional public housing to move residents to. In order to avoid these poor economic conditions, future policy makers will need a new strategy for addressing issues with public housing.

To truly investigate resident experiences of crime, any study would need to actually interview or survey residents and survey media coverage of crime. It would also need to survey media penetration in the residents' households and examine differences in how the construction of criminal activity by the residents themselves differed from the construction of criminal activity by those not living there, but whose decisions based on those constructions might impact the lives of residents. The goal of this study has not been to exhaustively or even extensively attempt to validate this construction. Rather, we have attempted to establish a methodology for spatially modeling impact of crime on a particular population through readily available data and established spatial statistics techniques that is not capricious in application of these statistics, but grounded in stronger theory. To draw overly strong conclusions regarding the true impact of crime, any study should include a robust blend of methods; however, spatially explicit crime incident data is widely available in many urban areas, and kernel density estimations are comparatively parsimonious to calculate versus other "hot spot" techniques, requiring only freely downloadable software.

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