Parks as crime inhibitors or generators:

Examining parks and the role of their nearby context

Adam Boessen*
Department of Criminology and Criminal Justice
University of Missouri – St. Louis

John R. Hipp
Department of Criminology, Law and Society
University of California - Irvine

June 8th, 2018

Post-print. Published in Social Science Research 2018 76(1): 186-201

Running Head: "Parks and crime"

Word Count (without references): 9,006

* Address correspondence to Adam Boessen, Department of Criminology and Criminal Justice, University of Missouri – St. Louis, 531 Lucas Hall, One University Blvd., St. Louis, MO 63121. Email: boessena@umsl.edu . This research is supported in part by the Metropolitan Futures Initiative (MFI).

Parks as crime inhibitors or generators:
Examining parks and the role of their nearby context

Abstract

Although neighborhood studies often focus on the presence of some particular entity and its consequences for a variety of local processes, a frequent limitation is the failure to account more broadly for the local context. This paper therefore examines the role of parks for community crime, but contributes to the literature by testing whether the context of land use and demographics nearby parks moderate the parks and crime relationship. A key feature of our approach is that we also test how these characteristics explain crime in the park, nearby the park, and in other neighborhoods in the city with data from nine cities across the United States (N= 109,808 blocks). We use multilevel Poisson and negative binomial regressions to test our ideas for six types of street crime. Our findings show that nearby land uses and socio-demographic characteristics are a key driver of crime being located within the park or nearby the park. Our results also show a clear distance decay pattern for the impact of various land uses and socio-demographics nearby parks. The results emphasize a need for research to consider the broader socio-spatial context in which crime generators/inhibitors are embedded.

Keywords: neighborhoods and crime; parks; crime generators; spatial effects

Bio

Adam Boessen is an Assistant Professor in the department of Criminology and Criminal Justice at the University of Missouri, St. Louis. His primary research interests include the neighborhoods and crime, geography and space, and social networks.

John R. Hipp is a Professor in the department of Criminology, Law and Society, and Sociology, at the University of California Irvine. His research interests focus on how neighborhoods change over time, how that change both affects and is affected by neighborhood crime, and the role networks and institutions play in that change. He approaches these questions using quantitative methods as well as social network analysis. He has published substantive work in such journals as *American Sociological Review, Criminology, Social Forces, Social Problems, Mobilization, City & Community, Urban Studies* and *Journal of Urban Affairs*. He has published methodological work in such journals as *Sociological Methodology, Psychological Methods*, and *Structural Equation Modeling*.

Parks as crime inhibitors or generators:

Examining parks and the role of their nearby context

Although scholars have speculated that parks within neighborhoods have an impact on crime (Jacobs 1961; LaGrange 1999), there is surprisingly little empirical evidence addressing this question. Particularly challenging is that there are theoretical reasons suggesting that parks will have either a positive or a negative relationship with neighborhood crime. For instance, parks may have a protective effect for crime by providing spaces for cohesion and maintaining ties between residents. Yet, parks might be associated with more crime since they may serve as a hangout for unsupervised youth. Thus, the role of parks in neighborhood crime are unclear, and both viewpoints highlight the need to consider the neighborhood context in which a park is situated.

One approach in the literature for explaining how parks are associated with crime focuses on the characteristics of parks themselves and their role in the concentration of activity patterns (Groff & McCord 2011; McCord & Houser 2015). The results of this approach have been relatively modest with few key characteristics of parks showing an association with crime, along with the considerable measurement challenges of this approach. In this paper, we adopt a different strategy by examining the broader context surrounding parks and its consequences for crime.

Communities and crime research often focuses on the *existence* of a particular type of entity within an area, but there is a growing awareness of a need to understand the *context nearby these entities*. This distinction is crucial for many neighborhood processes because it highlights that explanations are impacted by the broader spatial context in addition to simply the local opportunity. This distinction is also consonant with work in recent decades highlighting that the

everyday locations of people imply a much broader spatial process than simply a person's residential location. In the specific case of parks, we posit that nearby land uses and sociodemographic characteristics moderate the relationship between parks and crime. First, the land uses surrounding parks provide insight into the spatial distribution of social ties that can be useful for different neighborhood and park social processes. Second, the demographic composition and social ties of the neighborhood surrounding the park has consequences for the level of crime in the park and nearby the park. To test these ideas, we examine parks' role in neighborhood crime using data from several cities for a variety of crimes. One key feature of our approach is that we examine how these characteristics affect the location of crime in parks, in the nearby area surrounding parks, and more generally in all other neighborhoods in the city. While neighborhoods and parks are often constitutive of each other, this methodological approach allows us to tease apart the relationship between parks and their nearby area that may be of interest to other researchers.

Parks and the Community Context of Crime

Shaw and McKay's (1942) social disorganization theory posits that neighborhoods with more residential instability and ethnic heterogeneity impede informal social controls in the neighborhood. Building on their ideas, Bursik and Grasmick (1993) developed the systemic model where crime is controlled in part by the ties among people in the neighborhood. As a space of social interaction, parks serve as a place where neighborhood ties are strengthened through "unplanned" interaction (Lund 2003), suggesting that when people use a park they are more likely to interact with neighbors. Parks are potentially a space where ties are strengthened in the community. Nonetheless, the interaction between people need not necessarily be unplanned, and people in the local community may meet up for different activities in the park

(Oldenburg 1999). Thus, parks are not necessarily spaces where residents form new ties, but where existing ties are strengthened through both planned and unplanned interaction.

Recent scholarship has argued that beyond the importance of social ties, it is the perception of local residents through the collective efficacy of the neighborhood that matters for crime (Sampson, Raudenbush, & Earls 1997). Research has found a positive relationship between parks and collective efficacy in neighborhoods – residents' perception of mutual support and shared expectations for behavior (Cohen, Inagami, & Finch 2008). The implication is that parks strengthen the collective efficacy of the neighborhood, perhaps due to people's experiences walking about in the park as well as through their interactions, resulting in less crime.

Drawing from the environmental criminology and crime pattern literature, an alternative perspective argues that parks matter for crime due to the internal characteristics of the park (i.e., sports fields) and their attraction for people (Groff & McCord 2011; McCord & Houser 2015). Parks can be an attractor for drugs, gangs, homeless, and disorder, and thus they are, or at least can be perceived as, crime hot spots (Stodolska, Acevedo, & Shinew 2009), although some research has not found this effect (Tower & Groff 2016). Parks can also be crime generators as parks attract large numbers of people, some of whom may engage in illegal activities (Groff & McCord 2011, see also Hipp 2016). Nonetheless, these people may also unintentionally reduce crime by providing additional "eyes on the street" (Jacobs 1961), which is akin to the guardianship process implied by routine activities theory (Cohen and Felson 1979).

When considering this alternative approach, the process of interest for crime generators often focuses on the concentration, convergence, and composition of some 'types of people' at a particular location and how this increases the risk for crime in the park. In this paper, we shed doubt on this argument by discussing four alternative possibilities for why parks may be

associated with more crime in parks, all of which suggest a need to consider the broader area beyond the park border.

First, parks can create a physical barrier between residents, and thus the geography of parks and the area nearby them (not simply the park itself) may hinder the formation of local social ties by creating 'social wedges' (Corcoran et al. 2017; Hipp et al. 2014). Accordingly, even if a park may help to strengthen ties among some residents due to their ability to provide a space for interaction (i.e., what Hipp and colleagues term 'social conduits'), they can simultaneously hinder the formation of local ties to other residents beyond the local area.

A second possibility is that parks create 'social holes' where parks hinder the process associated with forming new ties due to their lack of population (Corcoran et al. 2017; Hipp et al. 2014). When examining aerial maps of cities, it is evident that parks and green spaces provide gaps in the socio-spatial structure of the city (i.e., a break in the population density of the area). Rather than act as a barrier, this pattern indicates a lack of opportunity for forming ties, suggesting a possibility for more crime.

A third possibility stems from a recent paper showing the effect of parks on people's social networks (Boessen et al. 2016). In this case, the presence of a park did not affect the local or nearby neighborhood ties but resulted in fewer long range social ties. This finding suggests that a park may actually diminish the local neighborhood's ability to link with other neighborhoods outside the local area, resulting in less social control (Hunter 1985).

A fourth possibility is that parks may have the perception of being an unsafe place and lead to fear among local residents. If a park is perceived as being a dangerous place, regardless whether it actually is, residents will be less likely to participate in informal social control either explicitly by not intervening to stop a criminal act or implicitly by avoiding going to a park

(Skogan 1986; Stodolska, et al. 2009), both implying that parks will have more crime.[1] How people's activity patterns impact fear of crime may also depend on the extent of social integration in the neighborhood (Hunter & Baumer 1982). Neighborhoods with stronger social ties between residents may also be better at spreading fearful information, and recent work suggests that this perception is developed in part through ties beyond the neighborhood (Boessen et al. 2017), implying a need to consider the broader area in which a park is embedded.

Although we do not actually measure and distinguish between these mechanisms in the current project, they are important in that they imply certain relationships that we should observe between parks and crime, and we are aware of no work explicitly recognizing these alternative explanations. The present study is therefore a necessary first step to assess whether such relationships exist, which would operate as a first step to be followed by studies that measure these mechanisms. The prior discussion also highlights a need to consider not just factors associated within a park but the broader context in which it is embedded.

Parks and the Moderating Role of their Nearby Community Context

Parks often attract people from the nearby area, and thus social processes from the park and nearby area carry over between one another. There is ample research showing that the nearby area matters more generally (e.g., see Boessen and Chamberlain 2016; Taniguchi et al. 2009), and we have already noted that social ties are one approach for why this can occur (see also work on the journey to crime and other activitity patterns). An implication is that exclusively focusing on the park misses important characteristics of how the area surrounding parks matters for crime patterns (Groff & McCord 2011; Crewe 2001). In the current project, we

[1] A reviewer suggested that this fear of the park could be affected by the characteristics of the park as well as characteristics of the nearby area (including the spatial morphology, as well as the socio-demographics). We agree, and we consider this as an interesting possibility for future research.

consider whether the crime is occurring in the park, in the blocks nearby the park, or in blocks in other areas of the city, as well as considering the nearby demographics and land uses.

Blocks adjacent to parks

The consequences for crime in blocks adjacent to parks are unclear. One possibility is that adjacent blocks will have more crime. This builds on the environmental criminology literature and the notion of *edges* - the areas on the outskirts of various entities that experience more crime events (Brantingham & Brantingham 1995). The area on the outskirts of the park serves as an edge in part because this area between the neighborhood and the park represents a distinct break in the urban backcloth of the city. This would not imply more crime within the park necessarily (LaGrange 1999), but rather in the blocks nearby the park, as found in a study of Southern California (Kim and Hipp 2017).

A counter-possibility is that blocks adjacent to parks will have less crime than other blocks. As we noted earlier this may be due to the collective efficacy or social ties associated with parks. This could also occur because residents who live near a park have a bigger investment and pride in their community in part because prior research has shown that residents are willing to pay more money to live closer to parks than farther away (Crompton 2001). Given this investment, these residents would be more willing to provide guardianship and participate in collective action within the park and in the nearby area. A consequence would be less crime in these adjacent blocks. An implication is that we would expect to observe a distance decay pattern in which blocks closer to the park have less crime given residents' greater investment in the area, whereas residents living farther away are not as directly invested in the local community park. Of course, at some point blocks that are located far enough away from the park have few

consequences for crime. Thus, blocks quite close to the park have less crime, whereas blocks slightly farther away have no effect or potentially more crime.

These considerations imply that the context nearby crime generators – not just the crime generators themselves – has implications for community crime patterns. The crime generator in concert with the characteristics of the nearby area may provide intensified protective or criminogenic effects for community crime, thus implying possible moderating relationships. This implies a need to better understand the context of crime generators. We propose that at least two broad categories of characteristics are crucial when considering this context: 1.) the socio-demographics of nearby residents and 2.) the land uses nearby parks. We now discuss each of these characteristics.

Nearby Demographics as Moderators

A large body of neighborhoods and crime literature has found that the social context of the local area is crucial for understanding the level of crime in the area. We argue here that these socio-demographic characteristics may serve as moderators of the parks and crime relationship given that residents are not just restricted to their own local block and social ties can often extend outside of the local neighborhood. Based on the insights of social disorganization theory and routine activity theory, we propose testing interactions with the following socio-demographic measures: concentrated disadvantage, homeowners, Latinos, and young people.

Neighborhoods with more concentrated disadvantage likely have more 'social disorder', and the implication of this disorder is that parks in such communities will have more crime. Parks in disadvantaged communities often receive fewer resources from the larger community (Wolch, Wilson, & Fehrenbach 2005). As a consequence they may be more likely to experience more disorder and hence higher rates of crime and fear, although some research has not found

this disorder effect (Tower & Groff 2016). At the same time, if residents from disadvantaged neighborhoods have less access to parks (Estabrooks, Lee, & Gyurcsik 2003; Moore et al. 2008), this may reduce the availability of informal social control in such settings. Both possibilities posit that parks in and nearby disadvantaged neighborhoods should have more crime.

We expect that the benefits from homeownership, such as social ties and residential stability, will carry over into the park as well as the broader nearby neighborhood. One study from Seattle finds that parks have an interactive effect with residential stability and are problematic when in *unstable* neighborhoods with high residential turnover (Wilcox et al. 2004). Given that longer residence in the neighborhood as well as homeownership leads to greater attachment to the neighborhood in general (Bolan 1997; Kasarda & Janowitz 1974), this should also translate into a stronger sense of attachment to the park. Finally, parks increase housing values (Crompton 2001), and therefore homeowners have a greater investment in maintaining their community in general, and a park might intensify their willingness to engage in crime reducing behavior. A consequence would be less crime in such parks, and in the adjacent blocks.

Many youth hangout in areas outside their residential neighborhood (Wikström et al. 2012), and parks serve as hangout spaces for youth – delinquent or not- to socialize without supervision (Osgood & Anderson 2004). Parks also provide a public location to settle disputes and can represent spatial boundaries between rival gangs. If this is the case, parks with more young people nearby would have on average more crime. We expect that this would also translate into more crime in the blocks adjacent to a park due to this travel behavior.

An important characteristic that would affect the level of crime in parks is simply the degree to which it is used. This is an opportunity argument (Cohen and Felson, 1979). Prior work indicates that Latinos quite frequently use parks (Loukaitou-Sideris and Sideris 2009;

Stodolska, Shinew, Acevedo, Carlos 2011), and thus this group would experience more crime based on the presence of more targets. Nonetheless, the increased use, may also create the possibility for more guardianship, and these neighborhoods may not be associated with increases in crime within or nearby the park. To the extent that these Latino neighborhoods are associated with immigration, we suspect that parks are a space were social capital might be developed between residents (Martinez, Stowell and Lee 2010), implying less crime in neighborhoods and parks with more Latino residents.

Nearby Land Uses

The land uses nearby a park likely have consequences for the crime within and nearby the park, but studies rarely test this possibility. Land uses may provide a moderating effect on crime through the activity patterns of residents or through their role in personal networks (Boessen et al. 2016). Stucky and Ottensmann's (2009) study examined a variety of land uses (including parks) in 1000 foot grid cells (approximately the size of a couple of blocks). This study found little evidence that parks impacted violent crime; however, they did not test any property crime models. Boessen and Hipp (2015) also found strong effects for a variety of land uses for six types of crime, but did not examine parks or the context nearby parks.

The presence of retail, office, and industrial land uses can result in higher levels of crime when they are located near parks. Parks near retail spaces have higher concentrations of people who are unfamiliar with each other, more daily population turnover, and overall less familiarity with others in the area, which results in more criminal opportunity (Crewe 2001). Parks that are surrounded by offices or industrial land uses operate similarly to retail spaces and other non-residential land uses with these spaces likely being vacant for the vast majority of time, implying a lack of guardians and hence the potential for more crime.

Whereas nearby office, industrial, and retail land uses might result in more crime for parks, residential land uses nearby parks will result in less crime because residents are more familiar with each other and these areas may have stronger personal networks. This familiarity can develop from residents repeatedly interacting in the public space (e.g., parents chatting when children use the park), and thus many users of the park become familiar with other residents (Curley 2010). This familiarity increases residents' willingness to intervene to stop a criminal event compared to a setting with unfamiliar strangers committing a crime (Hunter & Baumer 1982; Taylor 1997; see also Pattillo 1998).

Almost no studies have examined the land uses nearby parks and their impact on crime within and nearby parks. One exception was a study by Groff and McCord (2011) that assessed the relationship between the land uses in the nearby area and crime inside parks. Using parks and the nearby area as the units of analysis, this study found that parks with residential land uses nearby had more disorder (but not necessarily property or violent crime) when compared to other types of land uses. Although this study provided important insights, the results were relatively modest with few significant effects with mostly sports fields in the park being associated with less crime in the park. Also, the study design only compared blocks containing parks (or greenspaces), and thus this strategy cannot rule out the possibility that neighborhoods with certain characteristics have more crime regardless whether or not there is a park present. Thus, without including non-park blocks in the study design, it is unclear whether higher levels of crime is due to the park or due to characteristics of the neighborhood.[2] Furthermore, this study did not consider any other characteristics beyond categories of land uses and only focused on one

[2] Houser and McCord (2015) did compare park environs with other random locations (e.g., intersections) throughout their two cities, and they found that crime was higher in park environs. Nevertheless, this approach still cannot rule out the possibility that this relationship could be driven by the characteristics of the neighborhoods, which we test in the current study.

city. In the present study, we include a range of demographic characteristics and lands uses surrounding parks and explicitly test whether the consequences for crime are due to the neighborhood or the presence of the park.

More recently, Kimpton et al. (2016) used greenspaces as a unit of analysis, and they found that the timing, type of greenspace, and nearby characteristics (e.g., disadvantage and schools) all matter for crime occurring in greenspaces. While this study did incorporate features of the park context (e.g., sociodemographic characteristics, presence of schools and bars) into their approach, it also only focused on crime in parks (greenspaces), and thus there is a need to consider crime occurring in the park, nearby the park, or the city more generally. We also build on this work by testing our approach across nine cities and incorporating other land uses.

Data and Methods

We use data from several sources. We utilize crime event data from nine cities around the year 2000: 1) Chicago; 2) Cleveland; 3) Columbus; 4) Dallas; 5) Los Angeles; 6) Milwaukee; 7) Oakland; 8) San Francisco; 9) Tucson. These cities were not selected randomly, but rather are a convenience sample of cities with available crime and land use data at point locations. The crime data were obtained directly from the police departments, and therefore suffer from the same limitations of all sources of official crime data given that not all crimes are reported, and not all are recorded (Lynch & Addington 2007; MacDonald 2001). Nonetheless, we have no reason to suspect that these data are any less valid than other official crime data sources, and Baumer (2002) found that underreporting of crimes is not systematically related to structural characteristics of neighborhoods.

The parks data were obtained from the Environmental Systems Research Institute (ESRI). These national data are collected as a part of their 2010 StreetMap Data, and similar to other

studies (e.g., McCord and Houser 2015) we focus on local city parks. The land use data were obtained from city and county planning, government, and assessor departments around the year 2000.[3] All other data is from the U.S. Census for 2000 (see Appendix A for years of data used in our analyses).

Given that many social interactions occur in micro units (Festinger, Schachter, & Back 1950; Grannis 2009; Taylor 1997), and that crime tends to cluster at small units (Weisburd, Groff, & Yang 2012), the proposed study uses census blocks as the unit of analysis (N=109,808).

Dependent Variables

The dependent variables are from the crime reports officially coded and reported by the police departments in each of the nine cities. Given that we have point data, we geocoded these events to latitude-longitude point locations, and then aggregated them to census blocks. We classified crime events into six Uniform Crime Report (UCR) crime types: aggravated assault, robbery, homicide, burglary, motor vehicle theft, and larceny. We focus on these crimes because they are some of the most serious street crimes, and better recorded and reported than other crimes.[4] We summed these measures over three years to minimize yearly fluctuations.

Independent variables

We used the spatial data regarding parks to create several measures. First, we overlaid the park polygons with Census blocks to compute the proportion of the block area containing parkland: if at least 30% of the block contained a park we coded it as a block with a park as a 0/1

[3] The Chicago land use data is from the Chicago Metropolitan Agency for Planning, and it is based on aerial photographs. All other land use data was in parcels: Cleveland (City Planning Commission); Columbus (Franklin County Assessor); Dallas (North Central Texas Council of Governments); Los Angeles (Southern California Association of Governments); Milwaukee (City of Milwaukee Geographic Information Systems), Oakland (Alameda County Assessor), San Francisco (City Planning Department); and Tucson (Pima County Assessor).
[4] We do not focus on crimes such as sexual assault or rape given their well-known issues with reporting (Baumer and Lauritsen 2010).

measure.[5] Second, we created a measure of the *size of the park* that overlaps with a block (with a value of 0 if no park overlaps).[6] Third, we created buffers around each park polygon and determined which blocks were within this buffer. Based on this information, we created a measure for each block of the number of parks within three rings (note that 400 feet is approximately one block): 1) 0-400 feet; 2) 400-800 feet; 3) 800-1200 feet. Fourth, we created a measure of the *size of the park* within each of the three sized buffers (0 if no park was present within the buffer).

We also computed three sets of land use measures. First, for each land use type, we computed the proportion of the block area classified into various land uses: 1) residential; 2) retail; 3) industrial; 4) office space; 5) other (includes parking, churches, libraries, cemeteries, transportation, public buildings, open land, etc). The second set of land use measures captures a larger area by also computing similar measures for the proportion of land use in the block group. The third set of land use measures utilized the three sized buffers we drew around parks, and classified the land use within each buffer based on these same 5 categories.

As discussed earlier, we assess the possible moderating role of four socio-demographic characteristics of block groups surrounding parks. First, the *concentrated disadvantage* measure combines four variables in a factor analysis and computes factor scores: 1) average income, 2) average home values, 3) percent in poverty, 4) percent single parent households. The average

[5] Many blocks either do or do not contain a park for the entire block. As a result, this threshold does not make much of a substantive difference for the analysis. We also estimated the same models using a cutoff of 10%, and the results were the essentially the same. We also highlight that we control for the size of the park in the analyses.

[6] A challenge when studying parks is that whereas most scholarship on crime generators focuses on relatively small units (e.g., liquor stores, bars, vacant units), a distinctive feature of parks is that they sometimes are quite large and therefore span multiple blocks (Groff and Lockwood 2014). The varying *size of parks* makes them a challenge to study. Furthermore, this varying size may have theoretical implications, as the size of the park will likely impact the accessibility and attractiveness of the park to people (Cohen et al. 2010; Loukaitou-Sideris and Sideris 2009). If this is the case, the size of the park may help in distinguishing which parks are crime generators and which are protective of crime. One empirical study found that larger parks in Philadelphia were associated with less violent, property, and disorder crimes (Groff and McCord 2011). Thus, we account for the size of the park in our models.

income measure is constructed by first assigning household incomes to the midpoint of their reported range (given that the Census only reports household incomes in particular ranges), and then computing the average income for residents in the block group from this information. Second, we construct a measure of *percent homeowners*. Third, we created a measure of *percent Latino*. Fourth, we created a measure of *percent aged 16 to 29*.

To minimize the possibility of obtaining spurious effects, we included a number of control variables at three units of analysis: blocks, block groups, and the surrounding 2.5 mile area.[7] Our neighborhood structural characteristics are from 2000 U.S. Census data. Several measures were included at all three levels: percent vacant units, percent African American, population density, and a distributional measure of racial/ethnic heterogeneity as a Herfindahl index (Gibbs & Martin 1962: p. 670) of five racial/ethnic groupings (the groups are white, African-American, Latino, Asian, and other races). We also measured the percent homeowners, percent Latino, concentrated disadvantage, and percent aged 16-29 in the block and the surrounding 2.5 mile area. At the block level, we captured concentrated disadvantage with the only measure available at this level: percent single parent households. We measure economic inequality in the block group by computing the standard deviation of the logged household income. For this measure, we again compute the midpoints of the income bins, log these values, multiply them by the number of observations in each bin to get the incomes of these households, compute the mean logged income, and then compute the standard deviation of the incomes based on these values. The summary statistics for the variables used in the analyses are presented in Table 1.

<<<Table 1 about here>>>

[7] We also tested models with a 5 mile distance decay, which is the average distance traveled by people to commit crimes (Ackerman and Rossmo 2015), and the results were substantively similar.

Methods

Given that our outcomes are the counts of six types of crimes in blocks, we estimated Poisson models. To account for the clustering of blocks in block groups, we estimated multilevel negative binomial regression models for outcomes that exhibited overdispersion (using the menbreg command in Stata, with robust standard errors). We included the population, logged, within the block to capture exposure effects. This effectively estimates the outcome measure as a crime rate, but allows the coefficient to differ from 1. Our models assess whether blocks in or near parks have more/less of six types of crimes, and thus, a prototypical model is:

$$(1) \quad y_{ij} = \beta_1 \text{parkspace}_{ij} + \beta_2 \text{parksize}_{ij} + \beta_3 \text{park400}_{ij} + \beta_4 \text{park800}_{ij} + \beta_5 \text{park1200}_{ij} + \beta_6 \text{parksize1200}_{ij} + \beta_7 \text{LU}(k)_{ij} + \beta_8 \text{LU400}(k)_b + \beta_9 \text{LU800}(k)_b + \beta_{10} \text{LU1200}(k)_b + \beta_{11} \text{LU}(k)_j + \beta_{12} X_{ij} + \beta_{13} X_j + \beta_{14} WX_j + \beta_{15} C_{jj}$$

where y_{ij} is the number of crime events in block i in block group j, parkspace_{ij} is the proportion of block space that is park, parksize_{ij} is the size of the park that overlaps with the block, park400_{ij}, park800_{ij}, park1200_{ij} are indicators for whether a park is within 400 feet of the block, 400-800 feet, or 800-1200 feet, respectively (if the block is not in a park), parksize1200_{ij} is the size of the park within 1200 feet of the block,[8] $\text{LU}(k)_{ij}$ is the proportion of the block that is composed of land use k (of K-1 land use types of those defined earlier), $\text{LU400}(k)_b$, $\text{LU800}(k)_b$, and $\text{LU1200}(k)_b$ are the proportion of the rings of various sizes around a park that are constituted by a particular land use k, $\text{LU}(k)_j$ is the proportion of the block group j that is composed of land use k, X_{ij} is a vector of demographic measures of the block, X_j is a vector of demographic measures of the block group, WX_j is a series of spatial lag socio-demographic variables surrounding the block group calculated using an inverse distance decay function of 2.5 miles,

[8] We also constructed measures of the size of the park within 400 feet or within 800 feet, and the results were very similar regardless of which measure we used.

and C is a vector of city-level fixed effects that condition out all unchanging differences between cities. Thus, the β_1 parameter captures crime that occurs in a park, whereas the β_3 - β_5 parameters capture crime that occurs nearby parks.

Whereas equation 1 represents the set of main effects models, we also estimated a second series of models that included interactions with the land use characteristics in the nearby blocks surrounding parks to assess their impact on crime rates. We estimated a third series of models with interactions between our park buffers and various sociodemographic characteristics in the block group to test how the social context impacts the amount of crime in blocks *nearby* parks. We estimated a fourth series of models with interactions between the presence of a park and various sociodemographic characteristics in the block group to assess how crime *in the park* itself is impacted by the nearby sociodemographic context.[9]

Our approach of creating interactions of the nearby context with the presence of a park in the full sample is preferable to an alternative approach that only studies blocks containing parks and asks if parks surrounded by certain socio-demographic characteristics have more or less crime. A limitation of this alternative approach is that if all blocks in certain neighborhoods—including blocks with a park—have higher levels of crime, this approach would capture a neighborhood-level effect and not a park-specific effect. Our interactions allow us to distinguish between socio-demographic effects that occur for blocks without parks and those with parks.

There was no evidence of outliers or collinearity problems in the models we estimated, as all variance inflation factor values were below 15. Given our large sample size, we are less

[9] Given these are cross-level interactions, some researchers have suggested a need to incorporate a random slope into our models. While we agree that this approach can be reasonable for some research questions, Snijders and Bosker (1999) note a random slope is not necessary for a cross level interaction that is hypothesized in advance (p 74-75). This is because the statistical power when testing the specific interaction is much higher than the statistical power of the random coefficient (Snijders and Bosker 1999: p. 96). We highlight that we specify our models based on theory, and thus we are not inductively exploring the data with our models.

concerned with the relatively high VIFS (O'Brien 2007). The highest VIF was for the parks within 800 to 1200 feet variable, which had a value near 15 in the full models with over 100,000 observations. Using the approach of O'Brien (2007), the standard error of this variable is just 1/25 the size of that for a model with just a single variable and a sample size of 200, which is typically considered reasonable statistical power. We also tested our residuals for spatial autocorrelation using a Moran's I, and we did not find any issues.[10]

Results

We begin with the question of whether blocks that are in parks have higher rates of our six street crimes than other blocks. As seen in Table 2, there are few differences in the amount of our six crime types for blocks with parks compared to other blocks. There is only modest evidence that blocks with parks have higher aggravated assault rates than other blocks: a block with a park has 15.6% (exp(.1451) = 1.156) more aggravated assaults, controlling for the other variables in this model. And the impact of parks does not differ based on the size of the park. Figure 1 plots the odds ratios for parks and certain land use types, compared to "other" land use, and demonstrates that whereas parks have more of each of the six types of crime than residential areas (anywhere from 85% to 350% percent more depending on the type of crime), they have about 1/3 to half as much crime as commercial areas and about half as much crime (except for homicide) compared to office buildings in these models. Parks also have less property crime than industrial areas, although violent crime is somewhat higher.

<<<Table 2 about here>>>

<<<Figure 1 about here>>>

Crime near parks

[10] We computed this Moran's I by subtracting the predicted count from the actual crime count. The averaged Moran's I over cities was low (assault = .04, robbery = .05, homicide = .006, larceny = .04, burglary .06, motor theft = .04), which suggests that our models accounted for nearly all of the spatial autocorrelation.

We next assessed whether blocks *nearby* parks have more of our six street crime types. In fact, blocks that are very close to parks (within 400 feet) generally have lower street crime rates than other blocks, controlling for the variables in the model. A block that is within 400 feet of a park has a 6.1% lower robbery rate than other blocks (exp(-.0627) = .939). Such a block also has 11.1% fewer homicides, 7.2% fewer motor vehicle thefts, and 5.4% fewer larcenies. The reduction in robberies is modestly accentuated as the size of the park increases. Motor vehicle thefts also show a spatial decay as distance from the park increases in that motor vehicle thefts are 7.2% lower within 400 feet, 4.2% from 400 to 800 feet, and 2.5% lower from 800 to 1200 feet from a park.

We next tested whether the land uses in the area affect the amount of street crime for blocks nearby parks by including interactions between the land use measures and the indicators of whether the block is within the various buffers of a park (see Table 3). There is no evidence that blocks with many commercial buildings within 400 feet of a park have any more or less of the six types of crime than other blocks with commercial buildings. Note that the main effect for blocks with commercial buildings shows that such blocks on average have much higher crime rates. A block with all commercial buildings will have 700% more robberies than blocks with "other" land use (exp(2.0793) = 7.99). Nonetheless, we have no evidence that these elevated six crime types are any different if the block is located near a park (given the nonsignificant interaction effects). This non-finding occurs regardless of the size of the buffer of the park.

<<<Table 3 about here>>>

Likewise, blocks with many industrial buildings or office buildings are generally not impacted by being near a park. Whereas blocks with all industrial buildings have higher property crime rates (50% more larcenies and more than twice as many burglaries or motor vehicle

thefts), this association is not changed if the block is near a park for all street crimes except burglary (burglaries are somewhat lower in industrial areas that are 400-800 feet from a park compared to other industrial areas). Likewise, blocks with all office buildings have higher rates of all six types of crime, but this is not impacted if they are near a park.

On the other hand, whereas residential areas in general have much lower street crime rates, residential block crime is elevated if it is close to a park. Thus, on average, blocks with all residential units have 50% fewer homicides, 70% fewer aggravated assaults, and 80% fewer robberies compared to blocks with other land uses. And such blocks, on average, have between 50% and 80% fewer property crimes. However, that advantage for such blocks is reduced somewhat if they are near a park. A residential block within 400 feet of a park has a 23% more aggravated assaults and 64% more robberies than a residential block that is *not* near a park. Residential blocks near a park also have 23% more burglaries, 31% more motor vehicle thefts, and 41% more larcenies than residential blocks not near a park. There is a spatial decay effect, as residential blocks between 400 and 800 feet of a park have 28% more robberies, 25% more burglaries, and 19% more motor vehicle thefts than residential blocks not near parks. By the time we get to 800-1200 feet from a park, such blocks have 16% more burglaries than other residential blocks, but do not significantly differ for other crime types.

Crime near parks based on demographics of the nearby area

We next tested whether the amount of our six street crimes in blocks near parks is impacted by the social context of the surrounding neighborhood (measured as the block group). We assessed this by creating interaction variables between the distance a block is from a park and four key socio-demographic characteristics of the block group: concentrated disadvantage, percent homeowners, percent aged 16 to 29, and percent Latinos. First, blocks near parks and

located in block groups with more Latinos tended to have higher aggravated assault, burglary, and motor vehicle theft rates than those with fewer Latinos. This effect is plotted in Figure 2 for the aggravated assault model, and as seen there whereas the aggravated assault rate is higher as the percent Latino in the block group increases (the x axis) the slope is steeper if the block is within 400 feet of a park. Thus, whereas blocks not near parks have about 20% more aggravated assaults than blocks near parks when there are no Latinos in the surrounding block group (the left side of the figure) this gap falls to 8% when there are 100 percent Latinos in the block group (the right side of the figure). Although not shown, the plot for motor vehicle theft was similar. Overall, rather than a park exacerbating the six crime types, the majority of evidence suggests there are few negative consequences for Latino neighborhoods for the presence of a park for robberies, homicides, burglaries, or larcenies.

<<<Figure 2 about here>>>

The second notable pattern was that blocks near parks have more violence (aggravated assault and robbery) than other blocks when they are located in block groups with higher levels of those aged 16 to 29. We plot this effect for the aggravated assault model in Figure 3, which demonstrates that whereas blocks not near parks in neighborhoods with no persons aged 16 to 29 have 27% higher aggravated assault rates compared to blocks near parks (the left side of the figure), this difference evaporates in block groups with a very high composition of adolescents and young adults (60% aged 16 to 29, on the right side of the figure). The pattern was similar for the robbery model (not shown). Finally, there were few interaction effects for percent owners. There was only a modest protective effect in which blocks near parks had even lower larceny rates when they were in neighborhoods with higher levels of home owners. This pattern

indicates that more young people are associated with more assaults and robberies, and the crime reducing effects of homeowners does not appear to be altered by the presence of the park.

<<<Figure 3 about here>>>

Crime inside parks based on characteristics of the nearby area

We next ask whether the social composition of a block group surrounding a park affects the level of crime *inside* the park. There were three notable patterns we detected in these models. The first particularly notable pattern was that there were very few significant effects. Thus, it appears that the level of crime in parks is frequently not any different compared to other blocks in the neighborhood. Second, whereas high concentrated disadvantage neighborhoods have more aggravated assault, this is not the case for parks in such neighborhoods. Plotting this relationship in Figure 4, we see that blocks without a park have higher rates of aggravated assault as the level of concentrated disadvantage in the surrounding block group increases, the relationship between concentrated disadvantage and aggravated assault is nearly flat for blocks with a park. Thus, whereas a block with a park in a low disadvantage neighborhood has 59% more aggravated assaults than a block without a park, a block with a park in a high disadvantage neighborhood has about 20% fewer aggravated assaults than a block without a park.

<<<Figure 4 about here>>>

The third notable pattern is that the robbery rate is higher in blocks with parks when they are surrounded by neighborhoods with higher percentages of Latinos. Whereas the robbery rate only increases modestly for blocks in block groups as the percentage Latino increases, this relationship is much steeper for these blocks if they have a park; blocks with a park in a highly Latino neighborhood have 200% more robberies than blocks without a park. We did not find this relationship for any of the five other crime types, suggesting that the acquisitive crime of

robberies inside parks may be distinct from the other crime types and locations of crime, given evidence from prior research that Latinos are more likely to be targets of this type of crime (Hipp, Tita, & Boggess 2009).

We also briefly mention that the control variables typically had expected relationships with crime. Blocks with more vacant units, percent Black, percent aged 16 to 29, percent renters, and racial/ethnic heterogeneity had higher levels of most crime types. Block groups with a higher percent Black, percent Latino, racial/ethnic heterogeneity, economic inequality, and percent aged 16 to 29 typically had higher levels of most crime types. Block groups with higher levels of concentrated disadvantage had higher violent crime rates. And neighborhoods surrounded by more concentrated disadvantage typically had higher levels of crime.

Discussion

Researchers have long posited that parks play an important role for communities and crime (Jacobs 1961; LaGrange 1999; Groff & McCord 2011; McCord & Houser 2015), but there has been a dearth of empirical research on their consequences for crime patterns. At the same time, research on crime generators/attractors has most often only focused on the existence of a particular entity, and thus scholars have paid less attention to the social and spatial context with which these entities are embedded. This distinction is crucial because urban planners, police, and local residents may be attributing crime to a particular entity when it is actually being driven by the broader area. Using data from nine cities, our findings show that blocks nearby parks generally have less crime than other blocks in cities. But, this relationship is contextualized by the nearby demographics and land uses. Parks are protective for communities by building community capacity for social control, social ties, and collective efficacy. We also find that the land uses and socio-demographic context nearby parks is quite important for understanding the

location of crime in the city, nearby the park, and within the park. Accordingly our methodological approach may be useful for other researchers who are interested in understanding the interdependence between different community entities and their nearby area.

The results for land uses were quite striking. There appears to be a clear spatial distinction in how different land uses matter when considering their relationship to the park and crime in the city more generally. Consistent with prior research, we find that more commercial, industrial, and office areas are associated with more crime in neighborhoods on average, while residential areas have consistently lower levels of crime (Boessen & Hipp 2015). But, when explicitly considering the land uses next to the park, we find few consequences for commercial, industrial, and office land uses. However, residential land uses nearby parks are now actually associated with *more* crime compared to residential land use not near a park. Whereas the majority of research focuses on shifts in crime patterns across neighborhoods, one key takeaway from our project is that if sociologists, criminologists, police, and urban planners only focused on the initial results that considered the relationship between land uses and crime on average in the city, this pattern would show a protective effect for residential land uses. But, by explicitly capturing the social context around the park, we see that residential land uses are actually problematic when nearby parks.

Residential land use exhibited a distance decay pattern with the strongest increases in crime occurring between the park and residential neighborhood boundary. This change in land use between the park and the residential neighborhood is consistent with Brantingham & Brantingham's (1995) notion of edges. These edge areas likely have less private and parochial social control in part because these locations represent areas with spatially diminished resources. Edge locations are spatially disadvantaged in their ability for private and parochial social

controls, and these locations might exclusively rely upon public social control to address crime (Rengert, Lockwood, & McCord 2012), and be ecologically advantegous to those who commit crimes (St. Jean 2007). Note also that this association is not simply an opportunity mechanism but due to the interdependence of the park with the nearby area. Future research will want to more explicitly unpack different land uses to better understand their consequences for neighborhood crime patterns.

When considering the results of the socio-demographic characteristics, parks in neighborhoods with higher concentrations of Latinos experienced more robberies inside the park, but not any of the other five crime types. While Latino neighborhoods were generally associated with increased crime, parks were shown to weaken this relationship, except for robberies in the park. One explanation for this finding is that different racial/ethnic groups use parks for different purposes and with different frequency. Latino children use parks more frequently than other groups (Loukaitou-Sideris & Sideris 2009), and these differences in routine activities appears to impact park crime patterns. The activities that take place within parks are likely different among racial groups in part because of differences in the accessibility of these spaces and needs for these spaces (Moore et al. 2008). In Latino neighborhoods, there were more robberies inside the park, but fewer robberies in the nearby blocks, which may indicate that the park users are being victimized. Research in Chicago on park use among Latino residents also shows that people will avoid parks due to their fear of crime associated with Latino gangs (Stodolska, Acevedo, & Shinew 2009), and thus more robberies are possible in parks even though parks were generally protective.

This Latino finding also reminds us to consider where crime is happening – inside or nearby the park. In this study, we were able to test how the area nearby the park impacted our

six types of crime in this nearby area as well as in the park itself. Our strategy allowed us to tease apart whether the park was influencing the nearby area or whether the nearby area was influencing the park. We had modest support that the nearby area affected crime in the park, but stronger evidence that the park impacts the nearby area. This finding emphasizes a need for future research to consider how different entities are affected by the nearby area, but also their role in affecting nearby areas. Future research might move beyond a model that only considers how entities attract people through their activity patterns, and instead consider how these entities engender social activities that impact the neighborhood, even beyond the situational dynamics of activity patterns. In other words, most research assumes a symmetric socio-spatial process, and a challenge for future research is to examine the directionality in how different entities matter for neighborhoods. This finding also highlights a need to consider the broader context of different entities. A practical implication is that while many police departments are focusing on crime hot spots, one well-known issue with this approach is crime displacement, and our findings demonstrate that the nearby area plays a role in the nature of displacement. An implication is that crime is not simply a function of a crime hot spot but in fact a part of a broader area process.

A few of the other findings in regards to socio-demographics are of note. First, neighborhoods with high concentrations of young people are associated with higher crime nearby the park, which is not necessarily surprising given that these areas are hangout spaces for youth (Osgood & Anderson 2004). But, in neighborhoods with few young people, blocks near parks are actually associated with less crime. Future research might explore this finding further by understanding the activities and programs associated with youth in parks. Second, whereas parks in low disadvantage neighborhoods have more aggravated assault than other blocks, parks in high disadvantage neighborhoods actually have *less* aggravated assault than other blocks. Future

research might want to explore the role of park placement, park use and the accessibility of parks, and how this helps to extinguish some of the stresses associated with disadvantaged neighborhoods. Finally, while many of our findings were similar among the different crime types, some of the interactions and findings were only evident for a few types of crime. For example, we only found a protective effect for homeowners for the minor crime of larcenies in blocks near parks but no other crime types. The monitoring capabilities of homeowners may be most effective for a minor crime that happens more frequently such as larcenies, although more research is needed to understand how such guardianship operates near parks (Reynald 2010). Given that different crime types are a consequence of various social and spatial processes, the results show that crime generators operate differently for different crime types (Hipp & Steenbeek 2015).

Like all studies, this one has some limitations. First, whereas we examined the land uses around parks, it is also be important to examine the facilities, uses, and characteristics within parks (Groff & McCord 2011; Kimpton et al. 2016; McCord & Houser 2015). We point out that nearly all existing research on features of place and facilities does not include information on the characteristics of the particular place. Further, as we noted earlier when considering parks, the evidence for the facilities, uses, characteristics within parks has been relatively modest, suggesting little impact on our results but future research will need to test this possibility. Second, our measures of parks are from 2010, while our other measures are from the earlier half of the decade. We use these park data because they are consistently measured over the nine cities. Also, there is likely very high stability of parks over time and therefore no temporal problems using these data, but future research might explore this pattern further with longitudinal data. Another possibility is that the different years of data run the risk of ignoring the broader

historical context of the different cities. Nonetheless, we only have cross sectional data for each city, and we do include fixed effects for each city. Thus we are only comparing crime within cities within one historical context. Third, we use crime data that is officially coded and reported by the police. Importantly, these reporting practices have been shown to not vary systematically by neighborhood in prior research (Baumer 2002). Fourth, while we did examine nine cities, it is unclear whether our findings will generalize to other cities. Finally, parks can be a response to crime within a neighborhood (e.g., cleaning up disorder). While these parks are likely to be on a smaller scale, this suggests that the uses of parks change over time, along with the possibility that crime leads to a park being placed into a neighborhood. Future research can examine these issues by longitudinally examining crime and parks.

Parks are often considered one form of community investment, and many people posit that neighborhoods will prosper if there is more investment in their communities (Krivo 2014). Indeed, parks help communities to prosper, and this in fact was one of the initial ideas from the Chicago Area Projects. The present study suggests that investment needs to be considered in tandem with the spatial context of parks and the area nearby the park. We have argued a need to consider processes beyond simply the activity patterns of people using the park to also incorporate the socio-spatial dynamics of the park and broader area. Rather than seeing parks and crime generators as only entities that concentrate people and create more risk for crime, these spaces may actually be useful for developing and strengthening communities. The findings also remind us the challenge for evaluative work in neighborhoods in that the socio-spatial dynamics between different areas make it difficult to isolate treatment effects to one particular entity. Our findings also reinforce the point that other agencies besides law enforcement—including urban

planners—play a role in explaining crime patterns even though they are not directly related to crime policy.

References

Ackerman, J., & Rossmo, D. K. (2015). How Far to Travel? A Multilevel Analysis of the Residence-to-Crime Distance. *Journal of Quantitative Criminology, 31*(2), 237-262.

Baumer, E. P. (2002). Neighborhood Disadvantage and Police Notification by Victims of Violence. *Criminology, 40*(3), 579-616.

Baumer, E., & Lauritsen, J. L. (2010). Reporting Crime to the Police, 1973–2005: A Multivariate Analysis of Long-Term Trends in the National Crime Survey (NCS) and National Crime Victimization Survey (NCVS). *Criminology, 48*(1), 131-185.

Bellair, P. E. (1997). Social Interaction and Community Crime: Examining the Importance of Neighbor Networks. *Criminology, 35*(4), 677-703.

Boessen, A., & Hipp, J. R. (2015). Close-ups and the scale of ecology: Land uses and the geography of social context and crime. *Criminology, 53*(3), 399-426.

Boessen, A., & Chamberlain, A. W. (2017). Neighborhood crime, the housing crisis, and geographic space: Disentangling the consequences of foreclosure and vacancy. *Journal of Urban Affairs, 39, 1122-1137.*

Boessen, A., Hipp, J., Butts, C., Nagle, N., & Smith, E. J. (2018). The built environment, spatial scale, and social networks: Do land uses matter for personal network structure? *Environment and Planning B: Urban Analytics and City Science, 45, 400-416.*

Boessen, A., Hipp, J., Butts, C., Nagle, N., & Smith, E. J. (2017). Social fabric and fear of crime: Considering spatial location and time of day. *Social Networks, 51*, 60-72.

Bolan, M. (1997). The Mobility Experience and Neighborhood Attachment. *Demography, 34*(2), 225-237.

Brantingham, P., & Brantingham, P. (1995). Criminality of place. *European Journal on Criminal Policy and Research, 3*(3), 5-26.

Brantingham, P. J., & Brantingham, P. L. (1981). *Environmental criminology*: Sage Publications Beverly Hills, CA.

Bursik, R. J., & Grasmick, H. G. (1993). *Neighborhoods and Crime*. New York: Lexington.

Cohen, D. A., Inagami, S., & Finch, B. (2008). The Built Environment and Collective Efficacy. *Health & Place, 14*(2), 198-208.

Cohen, D. A., et al. (2010). Parks and physical activity: why are some parks used more than others? *Preventive Medicine, 50*, S9-S12.

Cohen, L. E., & Felson, M. (1979). Social Change and Crime Rate Trends: A Routine Activity Approach. *American Sociological Review, 44*(4), 588-608.

Corcoran, J., Zahnow, R., Wickes, R., & Hipp, J. Neighbourhood land use features, collective efficacy and local civic actions. *Urban Studies,* doi:10.1177/0042098017717212

Crewe, K. (2001). Linear parks and urban neighbourhoods: a study of the crime impact of the Boston south-west corridor. *Journal of Urban Design, 6*(3), 245-264.

Crompton, J. L. (2001). The impact of parks on property values: A review of the empirical evidence. *Journal of leisure research, 33*(1), 1.

Curley, A. M. (2010). Neighborhood Institutions, Facilities, and Public Space: A Missing Link for HOPE VI Residents' Development of Social Capital? *Cityscape, 12*(1).

Felson, M. (2002). *Crime and Everyday Life* (Third Edition ed.). Thousand Oaks, CA: Sage.

Festinger, L., Schachter, S., & Back, K. (1950). *Social Pressures in Informal Groups*. Stanford, CA: Stanford University Press.

Grannis, R. (2009). *From the Ground Up: Translating Geography into Community through Neighbor Networks*. Princeton: Princeton.

Groff, E., & Lockwood, B. (2014). Criminogenic facilities and crime across street segements in Philadelphia: Uncovering evidence about the spatial extent of facility influence. *Journal of Research in Crime and Delinquency, 5*(3), 277-314.

Groff, E., & McCord, E. S. (2011). The Role of Neighborhood Parks as Crime Generators. *Security Journal*, 1-24.

Hipp, J. R. (2016). General Theory of Spatial Crime Patterns. *Criminology, 54*(4), 653-679.

Hipp, J. R., Corcoran, J., Wickes, R., & Li, T. (2014). Examining the social porosity of environmental features on neighborhood sociability and attachment. *PLOS: One, 9*, 1-13.

Hipp, J. R., & Steenbeek, W. (2015). Types of Crime and Types of Mechanisms What Are the Consequences for Neighborhoods Over Time? *Crime & Delinquency*, doi: 011128715604168.

Hipp, J. R., Tita, G. E., & Boggess, L. N. (2009). Inter- and Intra-group violence: Is violent crime an expression of group conflict or social disorganization? *Criminology, 47*(2), 521-564.

Hunter, A. (1985). Private, Parochial and Public Social Orders: The Problem of Crime and Incivility in Urban Communities. In P. Kasinitz (Ed.), *Metropolis: Center and Symbol of Our Times* (pp. 204-225). New York: New York University.

Hunter, A., & Baumer, T. L. (1982). Street Traffic, Social Integration, and Fear of Crime*. *Sociological Inquiry, 52*(2), 122-131.

Jacobs, J. (1961). *The Death and Life of Great American Cities*. New York: Random House.

Kasarda, J. D., & Janowitz, M. (1974). Community Attachment in Mass Society. *American Sociological Review, 39*(3), 328-339.

Kim, Young-an and John R. Hipp. 2017. "Physical boundaries and City boundaries: Consequences for Crime Patterns on Street Segments?" *Crime & Delinquency* 64:227-254.

Kimpton, A., Corcoran, J., & Wickes, R. (2016). Greenspace and Crime: An Analysis of Greenspace Types, Neighboring Composition, and the Temporal Dimensions of Crime. *Journal of Research in Crime and Delinquency*. doi:10.1177/0022427816666309

Krivo, L. J. (2014). Reducing Crime Through Community Investment. *Criminology & Public Policy, 13*(2), 189-192.

LaGrange, T. C. (1999). The Impact of Neighborhoods, Schools, and Malls on the Spatial Distribution of Property Damage. *Journal of Research in Crime and Delinquency, 36*(4), 393-422.

Loukaitou-Sideris, A., & Sideris, A. (2009). What brings children to the park? Analysis and measurement of the variables affecting children's use of parks. *Journal of the American Planning Association, 76*(1), 89-107.

Lund, H. (2003). Testing the claims of new urbanism: Local access, pedestrian travel, and neighboring behaviors. *Journal of the American Planning Association, 69*(4), 414-429.

Martinez, R., Stowell, J. I., & Lee, M. T. (2010). Immigration and Crime in an Era of Transformation: A Longitudinal Analysis of Homicides in San Diego Neighborhoods, 1980–2000*. *Criminology, 48*(3), 797-829.

McCord, E. S., & Houser, K. A. (2015). Neighborhood parks, evidence of guardianship, and crime in two diverse US cities. *Security Journal*. doi:10.1057/sj.2015.11

Moore, L. V., et al. (2008). Availability of Recreational Resources in Minority and Low Socioeconomic Status Areas. *American Journal of Preventive Medicine, 34*(1), 16-22.

O'Brien, R. M. (2007). A Caution Regarding Rules of Thumb for Variance Inflation Factors. *Quality & Quantity, 41*(5), 673-690.

Oldenburg, R. (1999). *The Great Good Place: Cafes, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community*. New York: Marlowe & Company.

Osgood, D. W., & Anderson, A. L. (2004). Unstructured Socializing and Rates of Delinquency. *Criminology, 42*(3), 519-550.

Pattillo, M. E. (1998). Sweet mothers and gangbangers: Managing crime in a black middle-class neighborhood. *Social Forces, 76*(3), 747-774.

Rengert, G. F., Lockwood, B., & McCord, E. S. (2012). The edge of the community: Drug dealing in a segregated environment. In M. A. Andresen & J. B. Kinney (Eds.), Patterns, Prevention, and Geometry of Crime: Routledge.

Reynald, D. M. (2010). Guardians on Guardianship: Factors Affecting the Willingness to Supervise, the Ability to Detect Potential Offenders, and the Willingness to Intervene. *Journal of Research in Crime and Delinquency, 47*(3), 358-390.

Rorie, M., Gottfredson, D. C., Cross, A., Wilson, D., & Connell, N. M. (2011). Structure and deviancy training in after-school programs. *Journal of adolescence, 34*(1), 105-117.

Sampson, R. J., Raudenbush, S. W., & Earls, F. (1997). Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy. *Science, 277*(August 15), 918-924.

Schafer, W. E. (1969). Participation in Interscholastic Athletics and Delinquency: A Preliminary Study. *Social Problems, 17*(1), 40-47.

Shaw, C., & McKay, H. D. (1942). *Juvenile Delinquency and Urban Areas*. U. of Chicago.

Sherman, L. W., Gartin, P. R., & Buerger, M. E. (1989). Hot Spots of Predatory Crime: Routine Activities and the Criminology of Place. *Criminology, 27*(1), 27-55.

Skogan, W. G. (1986). Fear of Crime and Neighborhood Change. In A. J. Reiss & M. Tonry (Eds.), *Communities and Crime* (Vol. 8, pp. 203-229). Chicago: University of Chicago.

Snijders, T. A. B., & Bosker, R. (1999). *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*. Thousand Oaks: Sage.

St. Jean, P. K. B. (2007). *Pockets of crime: Broken windows, collective efficacy, and the criminal point of view*. Chicago: Univ. of Chicago.

Stodolska, M., Acevedo, J. C., & Shinew, K. J. (2009). Gangs of Chicago: Perceptions of crime and its effect on the recreation behavior of Latino residents in urban communities. *Leisure Sciences, 31*(5), 466-482.

Stucky, T. D., & Ottensmann, J. R. (2009). Land Use and Violent Crime. *Criminology, 47*(4), 1223-1264.

Taniguchi, T. A., Rengert, G. F., & McCord, E. S. (2009). Where size matters: Agglomeration economies of illegal drug markets in Philadelphia. *Justice Quarterly, 26*(4), 670-694.

Taylor, R. B. (1997). Social Order and Disorder of Street Blocks and Neighborhoods: Ecology, Microecology, and the Systemic Model of Social Disorganization. *Journal of Research in Crime and Delinquency, 34*(1), 113-155.

Taylor, R. B., & Harrell, A. (1996). *Physical environment and crime*: US Department of Justice, Office of Justice Programs, National Institute of Justice.

Tower, S. M., & Groff, E. (2016). Examining the disorder–crime connection in Philadelphia parks. *Security Journal, 29*(3), 520-537.

Walker, J. R., & Crompton, J. L. (2012). The relationship of household proximity to park use. *Journal of park and Recreation Administration, 30*(3), 52-63.

Weisburd, D., Groff, E., & Yang, S.-M. (2012). *The Criminology of Place*. New York: Oxford.

Wikström, P.-O. H., Oberwittler, D., Treiber, K., & Hardie, B. (2012). *Breaking rules: The social and situational dynamics of young people's urban crime*: Oxford University Press.

Wilcox, P., Quisenberry, N., Cabrera, D., & Jones, S. (2004). Busy places and broken windows? Towards defining the role of physical structure and process in community crime models. *The Sociological Quarterly, 45*(2), 185-220.

Wolch, J., Wilson, J. P., & Fehrenbach, J. (2005). Parks and Park Funding in Los Angeles: An Equity-Mapping Analysis. *Urban Geography, 26*(1), 4-35.

Tables and Figures

Table 1. Summary statistics for variables used in the analyses

	Block			Block group			Spatial lag	
	Mean	SD		Mean	SD		Mean	SD
Crime counts								
Aggravated assault	2.43	7.13						
Robbery	1.53	3.89						
Homicide	0.05	0.33						
Burglary	2.97	5.66						
Motor vehicle theft	2.82	6.32						
Larceny	8.51	29.05						
Parks								
Block with park	0.02	0.15					0.40	0.49
Size of park	0.08	0.83					1.14	3.68
Socio-demographics								
Logged population	3.44	2.02						
Population density				10.84	10.52		13.18	7.02
Percent vacant units	6.72	11.70		6.87	7.46		6.31	3.29
Percent owners	57.87	33.03		51.25	28.18		49.20	14.25
Percent black	25.95	36.33		26.49	34.72		26.37	25.46
Percent Latino	22.88	29.12		23.77	27.82		24.77	19.88
Racial/ethnic heterogeneity	32.77	21.99		37.69	20.59		36.94	12.01
Concentrated disadvantage				0.00	1.00		0.00	1.00
Percent single parent households	15.12	15.72						
Percent aged 16 to 29	16.81	13.92		22.24	10.46			
Economic inequality				0.86	0.16			
Land use								
Proportion commercial buildings	0.06	0.17		0.06	0.09			
Proportion industrial buildings	0.06	0.20		0.07	0.16			
Proportion office buildings	0.01	0.09		0.01	0.06			
Proportion residential units	0.60	0.40		0.55	0.31			

Table 2. Multilevel negative binomial regression models for six types of crime; including block, block group, and spatially lagged measures of demographics, and block and block group measures of land use variables

	(1)		(2)		(3)		(4)		(5)		(6)	
	Ag. Assault		**Robbery**		**Homicide**		**Burglary**		**Motor Theft**		**Larceny**	
	Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)	
Block has a park	0.145	*	0.073		0.273		-0.090		0.013		-0.069	
	(2.10)		(1.05)		(1.57)		(-1.91)		(0.24)		(-1.22)	
Size of park in block	-0.001		-0.014		-0.019		0.012		-0.011		-0.003	
	(-0.12)		(-0.94)		(-0.38)		(1.51)		(-1.38)		(-0.38)	
Block is within 400 ft of park	-0.019		-0.063	**	-0.118	*	-0.013		-0.075	**	-0.056	**
	(-1.09)		(-2.73)		(-1.97)		(-0.92)		(-4.81)		(-3.57)	
Block is within 400-800 ft of park	0.015		-0.028		-0.019		0.009		-0.043	**	-0.008	
	(0.89)		(-1.37)		(-0.34)		(0.67)		(-3.07)		(-0.53)	
Block is within 800-1200 ft of park	0.008		-0.001		-0.043		0.000		-0.025		-0.020	
	(0.54)		(-0.07)		(-0.84)		(0.03)		(-1.95)		(-1.59)	
Size of park within 1200 ft of block	-0.003		-0.004		-0.001		0.000		0.002		0.003	
	(-1.61)		(-1.80)		(-0.28)		(0.00)		(1.26)		(1.65)	
Block land use characteristics												
Proportion commercial buildings	0.728	**	2.086	**	1.078	**	1.115	**	1.043	**	1.477	**
	(12.14)		(30.66)		(6.76)		(20.04)		(17.87)		(22.29)	
Proportion industrial buildings	-0.252	**	-0.043		0.039		0.535	**	0.603	**	0.304	**
	(-3.38)		(-0.52)		(0.21)		(8.51)		(9.43)		(4.47)	
Proportion office buildings	0.550	**	0.765	**	0.055		0.997	**	0.693	**	1.032	**
	(3.60)		(4.27)		(0.13)		(6.75)		(5.27)		(7.91)	
Proportion residential units	-1.111	**	-1.446	**	-0.666	**	-0.703	**	-0.810	**	-1.476	**
	(-31.44)		(-38.72)		(-7.21)		(-24.93)		(-29.05)		(-47.56)	
Block socio-demographic characteristics												
Logged population	0.633	**	0.578	**	0.650	**	0.657	**	0.647	**	0.644	**
	(71.85)		(58.96)		(24.31)		(85.67)		(75.84)		(80.99)	
Percent vacant units	0.009	**	0.008	**	0.014	**	0.009	**	0.005	**	0.006	**
	(10.72)		(9.55)		(6.95)		(13.98)		(6.52)		(8.11)	

Parks and crime															
Percent owners	-0.006	**		-0.005	**		-0.003	*		-0.002	**		-0.005	**		-0.004	**
	(-16.78)			(-13.56)			(-2.50)			(-8.00)			(-14.70)			(-13.18)	
Percent black	0.008	**		0.003	**		0.007	**		0.000			0.003	**		0.001	
	(11.76)			(4.12)			(2.85)			(0.03)			(4.39)			(0.77)	
Percent Latino	0.004	**		0.001			0.004	*		-0.004	**		0.000			-0.003	**
	(7.59)			(0.99)			(1.97)			(-8.14)			(-0.32)			(-6.44)	
Racial/ethnic heterogeneity	0.176	**		0.221	**		0.167			0.201	**		0.158	**		0.146	**
	(3.78)			(4.15)			(0.97)			(5.63)			(4.03)			(3.78)	
Percent single parent households	0.004	**		0.001			0.004	*		0.001	*		0.000			-0.001	
	(6.73)			(1.67)			(2.27)			(2.43)			(-0.56)			(-1.92)	
Percent aged 16 to 29	0.002			0.002			0.005			0.001			0.003	**		0.002	**
	(1.96)			(1.92)			(1.69)			(1.28)			(4.20)			(2.81)	
Block group socio-demographic characteristics																	
Percent vacant units	0.007	**		0.002			0.008	*		0.005	**		-0.003			0.001	
	(4.14)			(0.94)			(2.25)			(3.61)			(-1.85)			(0.55)	
Percent owners	0.001			-0.003	**		0.001			-0.002	**		-0.004	**		-0.002	**
	(1.13)			(-4.52)			(0.80)			(-3.63)			(-7.29)			(-3.50)	
Percent black	0.006	**		0.007	**		0.016	**		0.001	*		0.003	**		0.001	
	(7.70)			(6.92)			(5.24)			(2.12)			(4.12)			(1.10)	
Percent Latino	0.006	**		0.005	**		0.014	**		0.001			0.003	**		-0.001	
	(7.83)			(5.65)			(5.45)			(1.54)			(3.85)			(-1.90)	
Racial/ethnic heterogeneity	0.003	**		0.004	**		0.003			0.002	**		0.004	**		0.002	**
	(4.35)			(4.95)			(1.39)			(3.76)			(7.62)			(3.32)	
Concentrated disadvantage	0.198	**		0.068	**		0.251	**		-0.026			-0.005			-0.038	*
	(11.07)			(2.97)			(4.99)			(-1.78)			(-0.34)			(-2.50)	
Population density	0.004	**		0.002			0.000			-0.007	**		-0.004	**		-0.001	
	(3.60)			(1.46)			(0.03)			(-7.70)			(-5.05)			(-0.69)	
Percent aged 16 to 29	-0.001			0.004	**		-0.002			0.004	**		0.003	**		0.006	**
	(-0.80)			(3.06)			(-0.64)			(3.83)			(2.91)			(6.15)	
Economic inequality	0.158	**		0.221	**		-0.083			0.134	**		-0.027			0.113	*
	(2.60)			(2.89)			(-0.51)			(2.72)			(-0.52)			(2.07)	

Spatial lag socio-demographic characteristics																
Percent black	-0.007	**		0.007	**		-0.005			0.006	**		0.006	**		0.004	**
	(-5.89)			(4.54)			(-1.26)			(6.30)			(5.16)			(3.98)	
Percent Latino	-0.010	**		-0.003			-0.004			0.000			0.003	**		-0.001	
	(-7.59)			(-1.89)			(-0.96)			(-0.36)			(2.95)			(-0.60)	
Racial/ethnic heterogeneity	0.000			0.004	*		0.002			0.008	**		0.002			0.002	
	(0.25)			(2.04)			(0.44)			(6.93)			(1.88)			(1.67)	
Percent occupied units	-0.002			0.032	**		0.017			-0.009			0.050	**		0.011	*
	(-0.26)			(4.43)			(1.01)			(-1.80)			(9.60)			(2.19)	
Percent owners	0.015	**		-0.002			0.005			0.003	*		-0.004	**		-0.005	**
	(10.43)			(-1.21)			(1.12)			(2.05)			(-2.73)			(-3.54)	
Concentrated disadvantage	0.384	**		0.203	**		0.315	**		0.066	**		0.140	**		0.063	**
	(10.56)			(4.86)			(2.72)			(2.72)			(5.21)			(2.66)	
Population density	0.013	**		0.024	**		0.015			0.020	**		-0.011	**		0.010	**
	(3.93)			(5.39)			(1.66)			(6.70)			(-3.77)			(2.97)	
Block group land use characteristics																
Proportion commercial buildings	0.210	*		0.556	**		-0.913	**		-0.052			0.151			0.030	
	(2.20)			(4.10)			(-2.98)			(-0.57)			(1.49)			(0.31)	
Proportion industrial buildings	0.270	**		0.200	*		0.199			0.267	**		0.243	**		0.011	
	(3.57)			(2.13)			(0.98)			(3.97)			(3.62)			(0.16)	
Proportion office buildings	0.511			0.251			-0.029			0.568	*		0.224			1.003	**
	(1.84)			(0.83)			(-0.04)			(2.44)			(1.10)			(4.23)	
Proportion residential units	0.152	**		0.443	**		0.028			0.429	**		0.211	**		0.045	
	(3.31)			(7.50)			(0.20)			(11.10)			(5.18)			(1.11)	
Intercept	-3.749	**		-6.047	**		-9.973	**		-1.856	**		-6.798	**		-1.177	**
	(-6.80)			(-9.19)			(-6.53)			(-4.16)			(-14.65)			(-2.66)	

*Note: ** p < .01; * p < .05. T-values are in parentheses underneath the unstandardized coefficients. N = 109,808 blocks across nine cities (Chicago; Cleveland; Columbus; Dallas; Los Angeles; Milwaukee; Oakland; San Francisco; Tucson)*

Table 3. Multilevel negative binomial regression models for six types of crime; testing interactions of parks and land use

	(1)		(2)		(3)		(4)		(5)		(6)	
	Ag. Assault		**Robbery**		**Homicide**		**Burglary**		**Motor Theft**		**Larceny**	
	Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)		Unstd. Coef. (T-Value)	
Block has a park	0.182	**	0.152	*	0.298		-0.064		0.053		-0.015	
	(2.60)		(2.12)		(1.65)		(-1.33)		(0.97)		(-0.26)	
Size of park in block	-0.002		-0.014		-0.020		0.012		-0.011		-0.003	
	(-0.15)		(-0.95)		(-0.40)		(1.58)		(-1.37)		(-0.34)	
Block is within 400 ft of park	-0.174	*	-0.417	**	-0.262		-0.164	**	-0.262	**	-0.308	**
	(-2.47)		(-5.84)		(-1.38)		(-2.92)		(-4.94)		(-5.17)	
Block is within 400-800 ft of park	-0.052		-0.187	*	-0.223		-0.150	**	-0.162	**	-0.040	
	(-0.66)		(-2.57)		(-1.22)		(-2.81)		(-2.75)		(-0.59)	
Block is within 800-1200 ft of park	0.017		-0.027		-0.106		-0.107	*	-0.078		-0.065	
	(0.25)		(-0.39)		(-0.63)		(-2.04)		(-1.35)		(-1.08)	
Size of park within 400 ft of block	-0.003		-0.004		-0.001		0.000		0.002		0.003	
	(-1.60)		(-1.91)		(-0.28)		(-0.05)		(1.15)		(1.58)	
Characteristic of block within 400 feet of a park												
Proportion commercial buildings	-0.047		0.101		0.181		0.087		-0.178		0.047	
	(-0.29)		(0.48)		(0.45)		(0.55)		(-1.16)		(0.24)	
Proportion industrial buildings	0.306		0.015		0.469		-0.194		-0.086		-0.106	
	(1.42)		(0.07)		(0.90)		(-1.14)		(-0.48)		(-0.65)	
Proportion office buildings	-0.134		-0.336		-2.997		-0.330		-0.246		0.288	
	(-0.33)		(-0.74)		(-1.27)		(-0.93)		(-0.90)		(0.87)	
Proportion residential units	0.206	**	0.494	**	0.184		0.208	**	0.269	**	0.341	**
	(2.59)		(5.95)		(0.82)		(3.22)		(4.47)		(5.03)	
Characteristic of block within 400-800 feet of a park												
Proportion commercial buildings	-0.134		-0.219		0.164		0.087		-0.049		-0.201	
	(-0.81)		(-1.20)		(0.39)		(0.56)		(-0.30)		(-1.17)	
Proportion industrial buildings	-0.090		-0.083		-0.848		-0.396	*	-0.334		-0.221	
	(-0.45)		(-0.36)		(-1.47)		(-2.47)		(-1.91)		(-0.95)	

Proportion office buildings	0.108			-0.159			0.279			0.077			0.070			0.191	
	(0.30)			(-0.33)			(0.25)			(0.21)			(0.20)			(0.58)	
Proportion residential units	0.099			0.247	**		0.287			0.219	**		0.176	**		0.062	
	(1.12)			(2.97)			(1.35)			(3.62)			(2.66)			(0.83)	
Characteristic of block within 800-1200 feet of a park																	
Proportion commercial buildings	0.179			-0.125			0.245			0.100			0.144			-0.127	
	(1.20)			(-0.85)			(0.67)			(0.81)			(1.00)			(-0.85)	
Proportion industrial buildings	-0.145			-0.137			-0.998			-0.186			-0.111			-0.253	
	(-0.75)			(-0.74)			(-1.64)			(-1.21)			(-0.78)			(-1.51)	
Proportion office buildings	0.455			0.473			0.811			-0.313			0.020			0.202	
	(1.09)			(0.93)			(0.64)			(-1.21)			(0.07)			(0.68)	
Proportion residential units	-0.023			0.052			0.092			0.148	*		0.069			0.079	
	(-0.29)			(0.65)			(0.46)			(2.48)			(1.06)			(1.18)	
Block land use characteristics																	
Proportion commercial buildings	0.704	**		2.079	**		0.991	**		1.062	**		1.016	**		1.489	**
	(9.96)			(25.83)			(5.36)			(15.61)			(14.47)			(18.14)	
Proportion industrial buildings	-0.257	**		-0.052			0.186			0.596	**		0.637	**		0.344	**
	(-2.93)			(-0.52)			(0.89)			(7.87)			(8.36)			(4.43)	
Proportion office buildings	0.453	**		0.733	**		0.086			1.067	**		0.707	**		0.936	**
	(2.95)			(3.64)			(0.17)			(5.24)			(4.07)			(5.89)	
Proportion residential units	-1.154	**		-1.564	**		-0.757	**		-0.788	**		-0.889	**		-1.545	**
	(-27.65)			(-33.14)			(-6.23)			(-22.05)			(-24.74)			(-38.67)	

*Note: ** p < .01; * p < .05. T-values are in parentheses underneath the unstandardized coefficients. Block group demographics, block group land uses, block demographics, and spatial lags are included in the models but omitted from the table to save space. N = 109,808 blocks across nine cities (Chicago; Cleveland; Columbus; Dallas; Los Angeles; Milwaukee; Oakland; San Francisco; Tucson)*

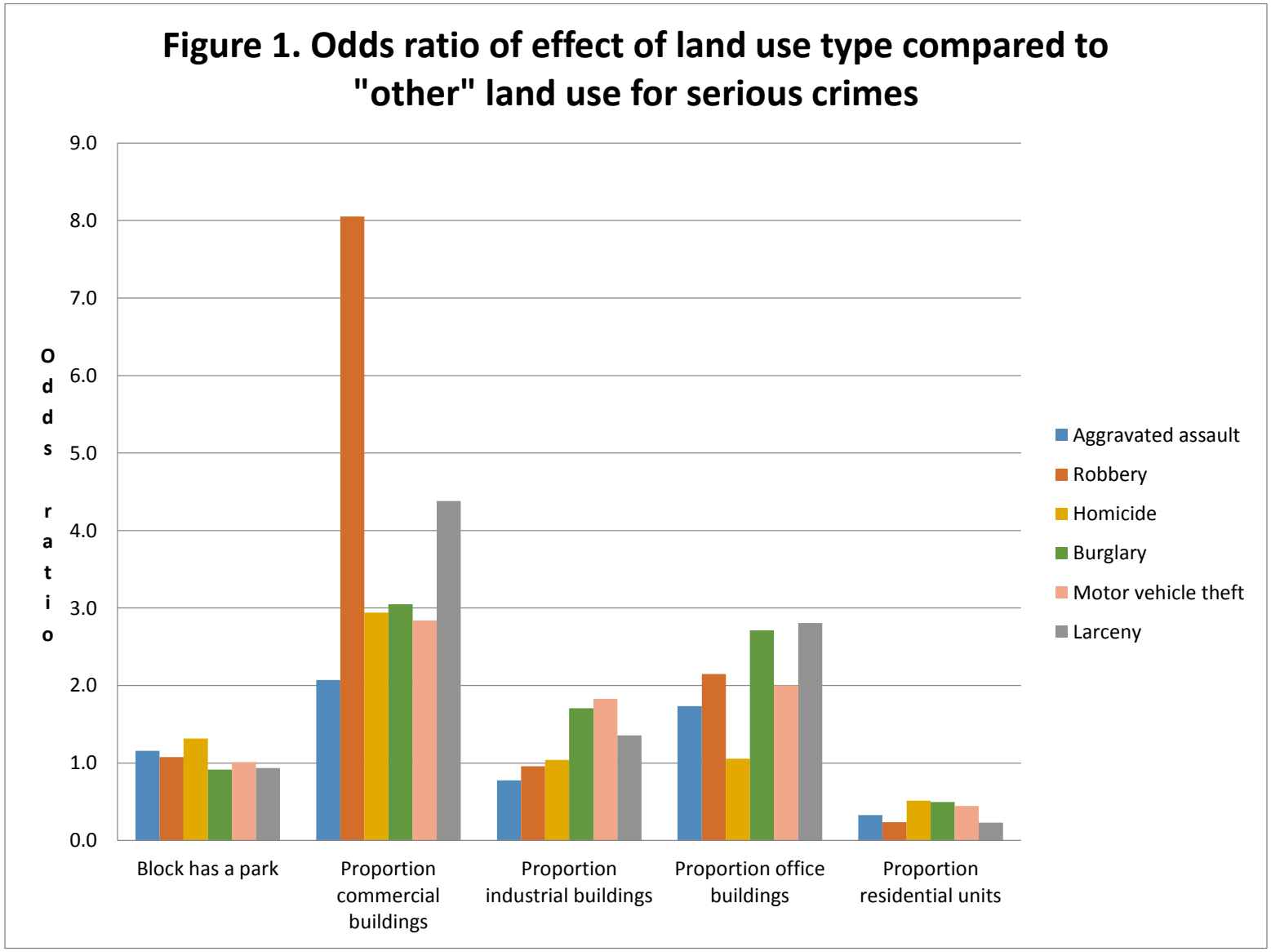
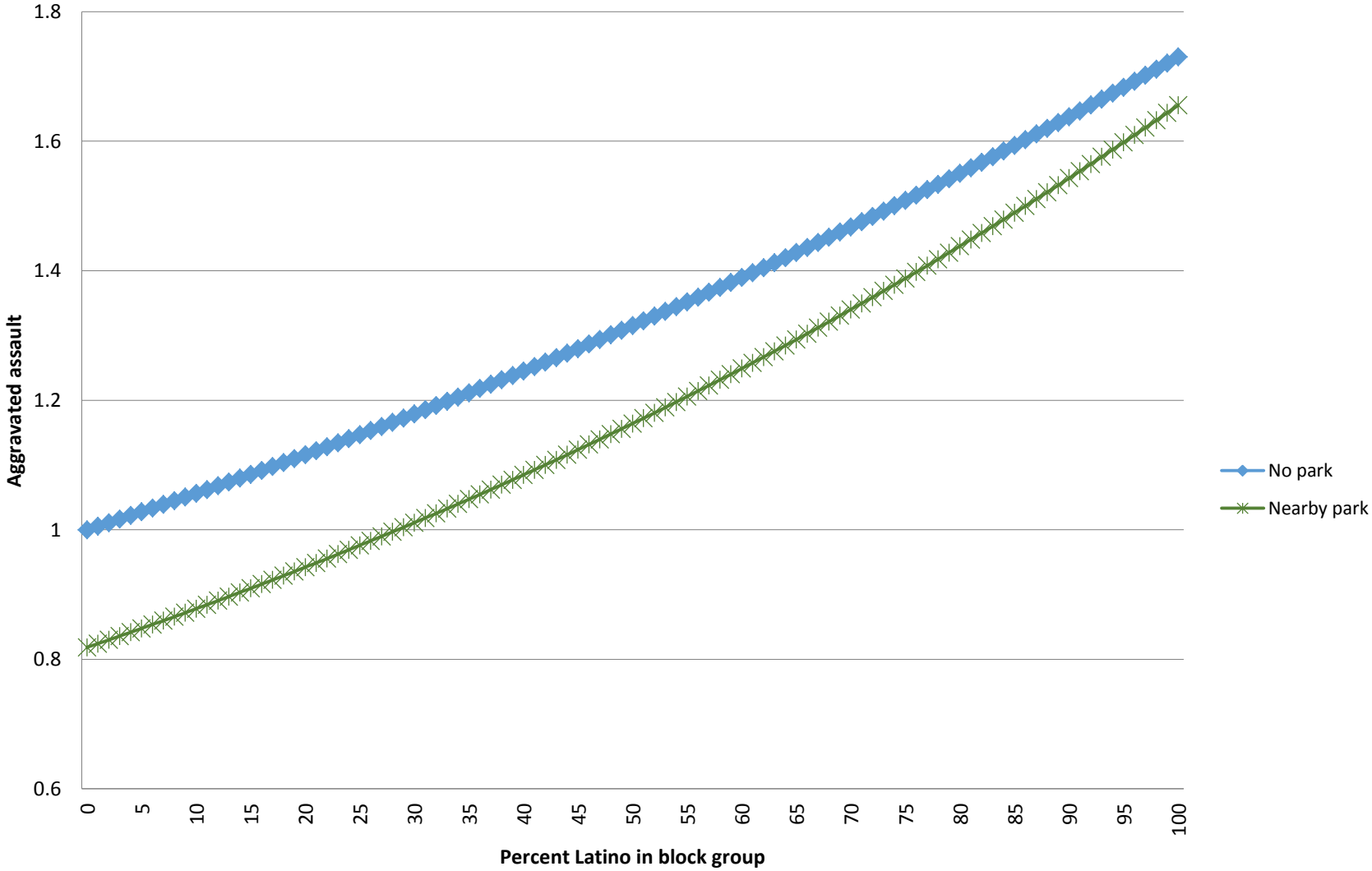


Figure 1. Odds ratio of effect of land use type compared to "other" land use for serious crimes
Odds ratio
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Block has a park
Proportion commercial buildings
Proportion industrial buildings
Proportion office buildings
Proportion residential units
Aggravated assault
Robbery
Homicide
Burglary
Motor vehicle theft
Larceny

Figure 2. Aggravated assault and neighborhood percent Latino for blocks near parks



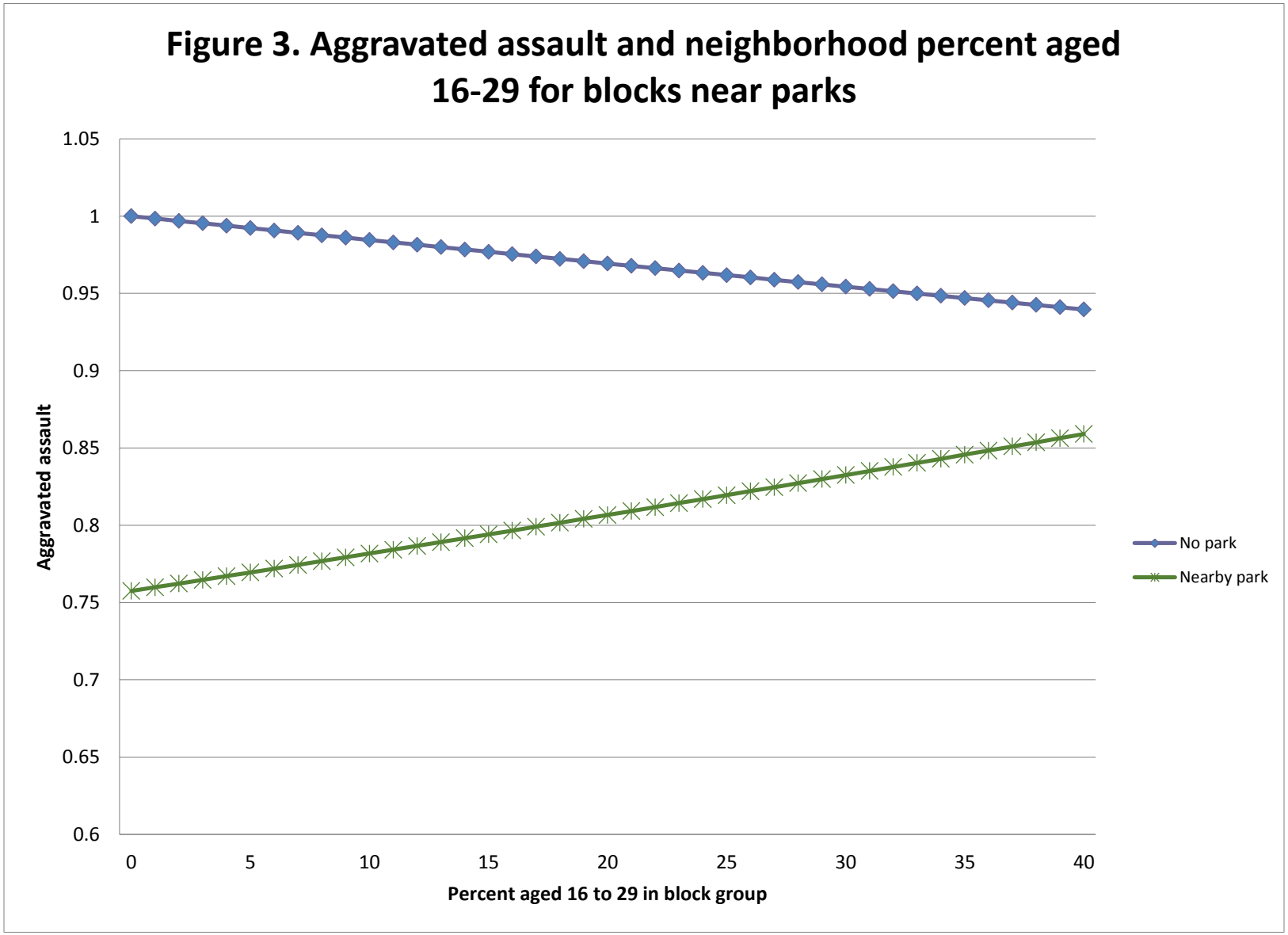


Figure 3. Aggravated assault and neighborhood percent aged 16-29 for blocks near parks
1.05
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
Aggravated assault
0
5
10
15
20
25
30
35
40
Percent aged 16 to 29 in block group
No park
Nearby park

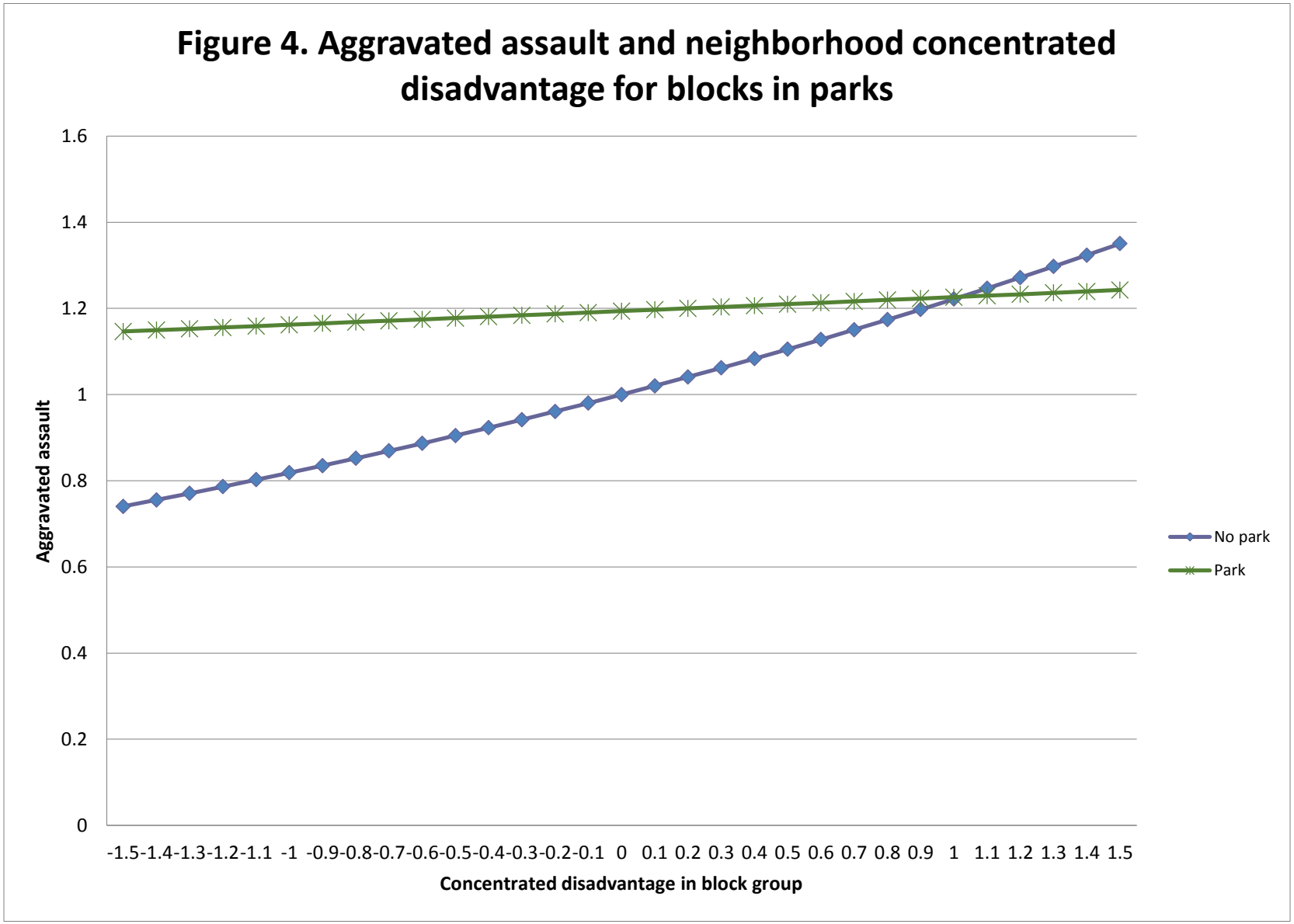


Figure 4. Aggravated assault and neighborhood concentrated disadvantage for blocks in parks
Aggravated assault
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1.5 -1.4 -1.3 -1.2 -1.1 -1 -0.9 -0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5
Concentrated disadvantage in block group
No park
Park

Appendix A: Years of data used in analyses.

City	Data Type	Year											
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Chicago	Crime		X	X	X								
	Land Use		X										
Cleveland	Crime					X	X	X					
	Land Use					X							
Columbus	Crime	X	X	X									
	Land Use			X									
Dallas	Crime	X	X	X									
	Land Use	X											
Los Angeles	Crime	X	X	X									
	Land Use		X										
Milwaukee	Crime										X	X	X
	Land Use											X	
Oakland	Crime									X	X	X	
	Land Use										X		
San Francisco	Crime				X	X	X						
	Land Use					X							
Tucson	Crime				X	X	X						
	Land Use						X						

Note: Census data is from 2000 and the parks data from ESRI is from 2010.