

Original Article

The role of neighborhood parks as crime generators

Elizabeth Groff^{a,*} and Eric S. McCord^b

^aDepartment of Criminal Justice, Temple University, 550 Gladfelter Hall, 1115 W. Berks Street, Philadelphia, Pennsylvania 19122, USA.

E-mail: groff@temple.edu

^bDepartment of Justice Administration, University of Louisville, 215 Brigman Hall, Louisville, KY 40292, USA.

*Corresponding author.

Abstract Neighborhood parks in urban areas have long been seen as contested spaces. Because they are publically owned, they are at the same time everyone's and no one's. As public resources they have little intrinsic guardianship and thus are susceptible to being taken over for undesirable activities (that is, living spaces for the homeless, markets for drug dealers and delinquent behavior magnets for juveniles). While much has been written about parks and crime, little research exists which empirically examines the topic. The current research examines neighborhood parks in Philadelphia, PA as they relate to crime and disorder that occurs outdoors. We use primary data collection to quantify the number of potential activity generators (recreation centers, pools, playground, night lighting, and so on) and other park characteristics. Land use on adjacent streets is also collected. Our analysis finds that neighborhood parks are associated with increased levels of crime in the surrounding area. However, specific characteristics of parks are associated with lower crime levels. *Security Journal* (2012) **25**, 1–24. doi:10.1057/sj.2011.1; published online 7 March 2011

Keywords: parks; proximity; crime generators; land use; crime

Introduction

Since the urban revolution, city parks have been both praised and vilified. On the positive end of that dichotomy, there has been much written about the benefits of neighborhood parks in urban areas. Some of this work has emphasized the increased property value associated with parks (Crompton, 2001; Espey and Owusu-Edusei, 2001; Lutzenhiser and Netusil, 2001; New Yorkers for Parks and Ernst & Young, 2003; Troy and Grove, 2008; Voicu and Been, 2008). Other studies have focused more on the non-monetary benefits of greenery and open space such as public access to recreation, relaxation, and a respite from the asphalt and concrete of the city environment (Burgess *et al*, 1988). Proponents of parks view them as neighborhood amenities (Brower, 1980; Burgess *et al*, 1988; Hayward, 1989; Parkes *et al*, 2002; Chiesura, 2004). Specifically, parks provide a community back yard for apartment dwellers with no outdoor space they can call their own (Jacobs, 1961; Dehring and Dunse, 2006) as well as a setting where community members from various economic and social classes can interact and through this interaction promote the development of social cohesion and the formation of 'strong community identities' (Reeves, 2000, p. 159).



An opposing view of parks holds they are dangerous places. Because parks are public rather than private spaces, they are often viewed as places easily taken over for undesirable activities (that is, living spaces for the homeless, markets for drug dealers and delinquent behavior magnets for juveniles) (Knutsson, 1997). In these situations, parks produce fear among potential legitimate users. While much has been written about parks and fear of crime (Westover, 1985), little research directly and empirically examines the relationship between parks and crime.

As public spaces, owned by all but controlled by none, parks will to some extent be 'contested space[s]' (Burgess *et al.*, 1988; Hilborn, 2009, p. 13). Even legitimate park users have a variety of goals some of which are in opposition to one another (for example, those who want peace and quiet in a natural environment versus parents who want their children to burn off excess energy at the playground). Despite potential conflicts, both groups look positively at the presence of a park especially if it is conveniently located near them.

Still others view parks as essentially neutral spaces; the design and the setting of the park determines whether it is a well-used, dynamic space or one that is neglected and dangerous. Well-used parks have enough legitimate users to monitor what goes on in them (Jacobs, 1961, Whyte, 1980). Under this view well-designed parks are essentially blank slates. Whether they are amenities or nuisances depends upon their design and on the urban backcloth in which they are situated (Jacobs, 1961).

The current research is exploratory and seeks the answer to two primary questions. First, what is the impact of parks on crime in the areas adjacent to them? Second, what specific characteristics of parks are related to crime levels in their immediate areas? Our study undertakes primary data collection to answer these questions. It identifies park characteristics and combines them with official crime data to empirically describe the relationship between park characteristics and neighborhood crime. We use primary data collection to quantify the number and type of activity generators (recreation centers, pools, playground, and so on) at the park and type of land use on the streets surrounding the parks.

The next section describes the general theoretical background to our study. From there we summarize previous research that includes parks in their study of crime patterns. Next, we talk about the details of our study and our analytic strategy. Finally, we describe the findings and discuss their implications for our understanding of parks and crime.

Background Theory

Theories falling under the rubric of environmental criminology provide the basis for our interest in examining the relationship between park environmental factors and crime (Brantingham and Brantingham, 1991 [1981]). Specifically, crime pattern theory (Brantingham and Brantingham, 1993), Jane Jacobs' (1961) observations regarding 'eyes on the street' and situational crime prevention (Clarke, 1983). Each of these theories informs a different aspect of our understanding of how parks might be related to the crime that occurs in and around them.

Crime pattern theory's notion of crime generators and crime attractors (Brantingham and Brantingham, 1995a) is a logical foundation for our inquiry. The concept of crime generators was created to describe non-residential locations in which a large number of offenders or potential offenders are routinely found even though the location itself is not



criminogenic (Roncek and Lobosco, 1983; Roncek and Faggiani, 1985; LaGrange, 1999; Smith *et al.*, 2000). In other words some places, such as shopping malls and schools, which attract many people will by definition attract a certain proportion of users who are motivated offenders. The more people attracted, the greater the number of potential targets and offenders. In this way, neighborhood parks meet the criteria for being crime generators; they act as general gathering places for people who would probably not congregate in the neighborhood if the park was not there and who subsequently end up being involved in crimes at or near the park. This effect is amplified when the people attracted are also part of an age group (that is, juveniles) which is more likely to be involved in delinquent or criminal behavior.

Alternatively, crime attractors are non-residential locations with a reputation for crime-related opportunities. This reputation increases the number of potential offenders drawn to them. Examples include bars and taverns, pawn shops, large non-secure parking lots, red-light districts and illicit drug markets (Brantingham and Brantingham, 1995a; McCord and Ratcliffe, 2007). In the case of neighborhood parks, offenders may be attracted because parks are large public areas with little formal or informal control, where dense foliage and poor lighting may reduce natural surveillance. The mugger may find a neighborhood park a good location to find a lone victim during the day or late evening when most people are at work or school, or have gone home. Drug dealers and drug users may find them good locations to ply their trade or to get 'high' away from concerned business owners, family members and neighbors. Young 'Johnny' may be followed to a neighborhood park after school and assaulted due to being away from the quick response and punishment of school officials, as well as the guardianship of parents.

Of course the number and type of individuals attracted to a neighborhood park is a direct function of the type and uniqueness of the facilities available. Active recreation facilities such as basketball courts and baseball, football and soccer fields tend to attract a younger crowd but may also include organized sports activities with coaches and parents acting as guardians. Parks with paths and park benches tend to attract more individuals interested in more passive pursuits while parks with playgrounds attract families or parents with younger children. In this way, park amenities/facilities influence the type of people who use the park and thus factor into the degree of crime generation that occurs.

It is also theoretically possible that neighborhood parks serve as places of reduced crime; ones that may actually increase the safety of the surrounding area. Jane Jacobs (1961) identifies parks as being within a set of land uses that draw more conventional users to an area, forming denser informal control networks and adding 'eyes on the street'. It is conceivable then that neighborhood parks may attract mainly families and others only interested in recreation and relaxation pursuits. This increase in people due to the presence of the park may help keep both the park and surrounding neighborhood safer due to added informal control and surveillance. Many legitimate urban park users walk to their neighborhood parks. As they make their journey, they provide increased levels of guardianship along their route. Parks with facilities such as children's playgrounds, fields for organized sports and nighttime lighting should be particularly attractive to conventional users, and thus contribute the most to an increase in overall safety.

As Jacobs (1961) also points out parks can be amenities or nuisances depending upon their design and on the urban backcloth in which they are situated. In particular, she emphasizes how the surrounding land use is an important factor. Places with mixed land use tend to draw more 'eyes on the street' because they draw a combination of visitors and residents



who are on the street at different time periods during the day. The overall effect achieves a more consistent stream of 'eyes on the street'.

Situational crime prevention (Clarke, 1983, 1997, 2008) provides a wealth of evidence about how characteristics of the built environment influence offender decision making and the amount of crime in an area. The latest version of the crime prevention matrix (Clarke, 2008) contains 25 techniques which include the following five main strategies to prevent crime: increase the effort, increase the risks, reduce the rewards, reduce provocations and remove excuses. These strategies can easily be applied to parks. Security fencing may assist with controlling access to the park during after-hours reducing chances of it becoming a late night hang-out for trouble makers. Both decorative and security fencing may serve as a territorial marker clearly delineating sidewalk space and activity from park space (Jeffery, 1971; Newman, 1972; Taylor and Harrell, 1996). Park lighting of fields and walkways can increase the ability for natural surveillance (thereby increasing the risks to potential offenders) by both park users and those immediately outside the park. Evidence of park adoption by the neighborhood may lead offenders to perceive they might be challenged because residents know who belongs and who does not. Finally, the posting of park hours and park rules may make it harder for offenders to rationalize behavior in contrast to those rules and thus removes excuses about their behavior in a particular situation.

The current exploration of parks is firmly grounded in environmental theories of crime that explain why crime occurs where it does. Specifically, we draw from crime pattern theory's notion of crime generators and attractors, situational crime prevention, and Jacobs' (1961) work emphasizing the importance of 'eyes on the street' in understanding why crime occurs in some places and not others. The next section discusses previous studies that have been conducted related to parks and crime.

Parks and crime

Anecdotal evidence links parks and crime, usually through the perception that parks are unsafe (Schroeder and Anderson, 1984; Westover, 1985). As a group, these studies focus on two perspectives: (1) how potential users view a park (Schroeder and Anderson, 1984; Westover, 1985; Hilborn, 2009); and (2) how potential offenders view a park (Michael *et al*, 2001). However, most of these studies do not test whether the perceived relationship between parks and safety is confirmed by official crime or police calls-for-service data. Two exceptions are Swedish studies that examined drug arrests for narcotics use and sales in parks (Kühlhorn, 1978; Knutsson, 1997). In the same vein, a number of mostly qualitative observations of problem-oriented policing strategies and their outcomes as applied to specific troublesome parks have been conducted (Pendleton, 1998; Pendleton and Thompson, 2000; Hilborn, 2009).¹

Parks are also mentioned in a series of studies attempting to explain burglary rates based on physical and social attributes of the areas in which they occur. Those studies find a significant relationship between adjacency to open or recreational space and increased risk of victimization. This relationship was found across both residential (Herbert, 1982; Maguire, 1982; Evans and Oulds, 1984; Rengert and Wasilchick, 1985; Crewe, 2001; Lockwood, 2007) and commercial burglary (Hakim and Shachamurove, 1996). Another study examined linear parks and found increased crime and police calls-for-service at the homes adjacent to the parks (Crewe, 2001).



A final set of studies related to parks and crime are those that included parks and/or play grounds in multivariate examinations of neighborhoods (Perkins *et al*, 1993; Wilcox *et al*, 2004; Lockwood, 2007). Because parks are not a specific focus of these studies, they are often lumped into larger categories of nonresidential land use (for example, restaurants, retail stores, office, and so on) which makes it difficult to separate the specific effects of parks on crime (Miethe and McDowall, 1993; Kurtz *et al*, 1998). Attempting to remedy this issue, later researchers (1) created a category of land use that included only non-business, resident-oriented public land use, and (2) split out parks, playgrounds and schools to examine as individual variables (Wilcox *et al*, 2004). They found that the park's positive association with violence was moderated by neighborhood instability. Contrary to expectation, parks in unstable neighborhoods were related to decreased violent crime. However, the presence of parks was positively associated with burglary in both types of neighborhoods.

We could identify no studies which used reported crime data and examined the impact of parks on the immediately adjacent areas. We did find two that used official crime data to quantify the amount and distribution of crime at parks. One study focused on the relationship between parks, crime and property values (Troy and Grove, 2008). The authors restricted their analysis to parks which were at least 50 per cent vegetation and at least 2 hectare acres (4.9 acres) in size. Park crime rates were assigned via block group level data. The crime measure was calculated as an average of rape and robbery which was then converted to an index representing the percentage of the national average. An examination of the spatial distribution of parks by level of crime found relative dispersion; parks of similar crime levels (high, medium and low) were not clustered in the same area of the city. In addition, the level of crime was not associated with either the size or shape (roughly square versus linear) of the park. The second study focused on the relationship between alcohol usage and crime risk in the 28 parks in Chula Vista, CA (J. Stedman, Public Safety Analyst, personal communication by email to E. Groff). The author only included parks that were over two acres in size and found clear evidence that violent and disorder calls were concentrated in a subset of parks while most parks had relatively little crime (Hilborn, 2009).

Research questions

Given the current anemic state of the literature regarding the relationship of parks to elevated crime rates, our primary aim is to answer the basic question of whether parks are associated with higher crime levels in adjacent areas. In general, we hypothesize neighborhood parks will be crime generators and thus have significantly more crime in their vicinity. Further, we posit that crime will decrease as distance from the park increases. Our second hypothesis is that there is a positive relationship between the type and the number of active recreation amenities present in a park and the crime experienced by the park and surrounding area. Finally, we hypothesize the rates of crime and disorder-related crime will be higher in and around parks surrounded by areas of mixed (residential and non-residential) land uses. To test these hypotheses, we collect primary data to discover the current physical state of neighborhood parks in Philadelphia, PA and employ a variety of statistical tests to describe the relationship between parks and the density of crime in and immediately surrounding them.

Analytical Methods

The following section describes the unit of analysis, the data and the statistical techniques employed to answer the research questions. We conducted a field survey of the neighborhood parks in Philadelphia to obtain our park-related data. To explore whether crime was higher surrounding neighborhood parks we used two different statistical techniques: (1) location quotients (LQs); and (2) a statistical comparison between park environs and the environs of a set of random street intersections. To determine the impact of physical design elements on crime levels we used ANOVA to determine whether the presence of a particular element was statistically significant. The data and methods are described in detail below.

Data

Our study examines only those parks designated as ‘neighborhood parks’ or smaller by the City of Philadelphia (Leon Younger and PROS, 2004; Appendix B). They include neighborhood parks, mini parks, squares and plazas. All are less than 10 acres (0.016 square miles) and are meant to provide recreation for local residents within a service area of up to ½ mile or approximately 5000 persons. Excluded from the analysis are the larger ‘community’, ‘metropolitan’ and ‘regional’ parks in Philadelphia that are greater than 10 acres and meant to draw users from a minimum of two miles up to and including the entire city or region. These excluded parks include Fairmount Park (4100 acres), Wissahickon Valley Park (2096 acres), Pennypack Park (1769 acres), Cobbs Creek Park (361 acres) and the John Heinz National Wildlife Refuge (1200 acres). Thus our selection of neighborhood parks includes those that are included within a single neighborhood and accessed primarily by local residents.

We identified our data set of neighborhood parks through an iterative process which began with a geographic information systems shape file obtained from Philadelphia Police Department (PPD). The file contained 1296 polygons consisting of land maintained by the Fairmount Park Commission and City of Philadelphia, Department of Recreation, the two public agencies that manage all parkland in the city.² After eliminating all polygons which were not related to parks, we compared the remaining list of parks with those listed on the Philadelphia Department of Recreation website. This left us with 249 ‘neighborhood parks’ in Philadelphia (Figure 1).³ All of these parks were on-site surveyed to determine the type of equipment available in the park.⁴ The average neighborhood park in our data was approximately one block (359 feet × 359 feet, 0.0046 square miles). Parks ranged in size from a minimum of two tenths of a block (58 ft × 58 ft, 0.0001 square miles) to about a block and a half (660 ft × 660 ft, 0.0156 square miles). The majority of parks were smaller rather than larger.

Our unit of analysis for the study is the park and the streets immediately surrounding the park (specifically, the park plus a 50 foot buffer around the park) which we term the ‘park environs’ (see Figure 2). We used the park environs for two reasons, one theoretical and the other due to a data limitation. Theoretically, the streets adjacent to the park are part of its situational backcloth. Proximity translates into a greater likelihood the two will influence one another and thus including the street segments adjacent allows us to represent the two

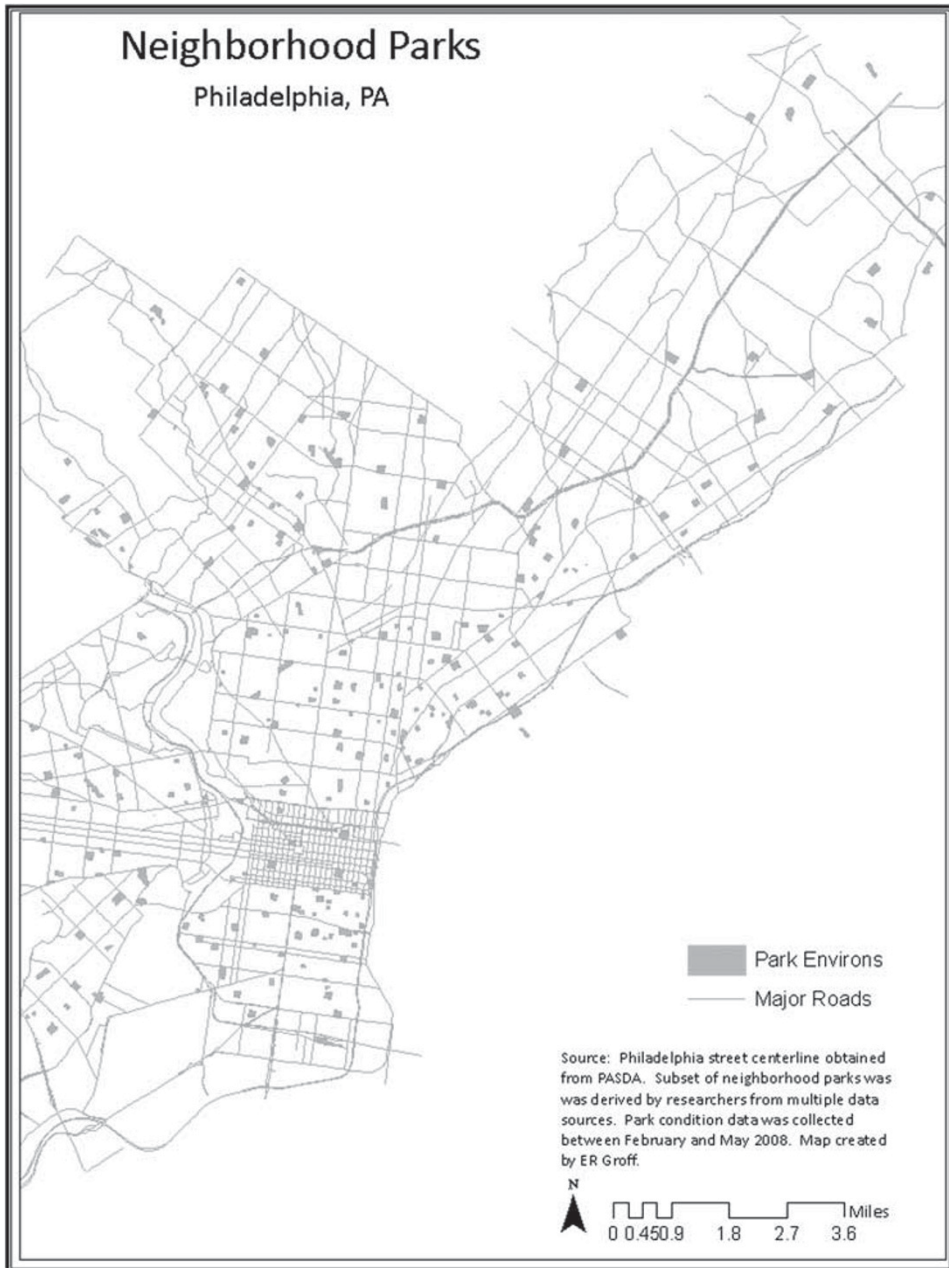


Figure 1: Neighborhood parks in Philadelphia.

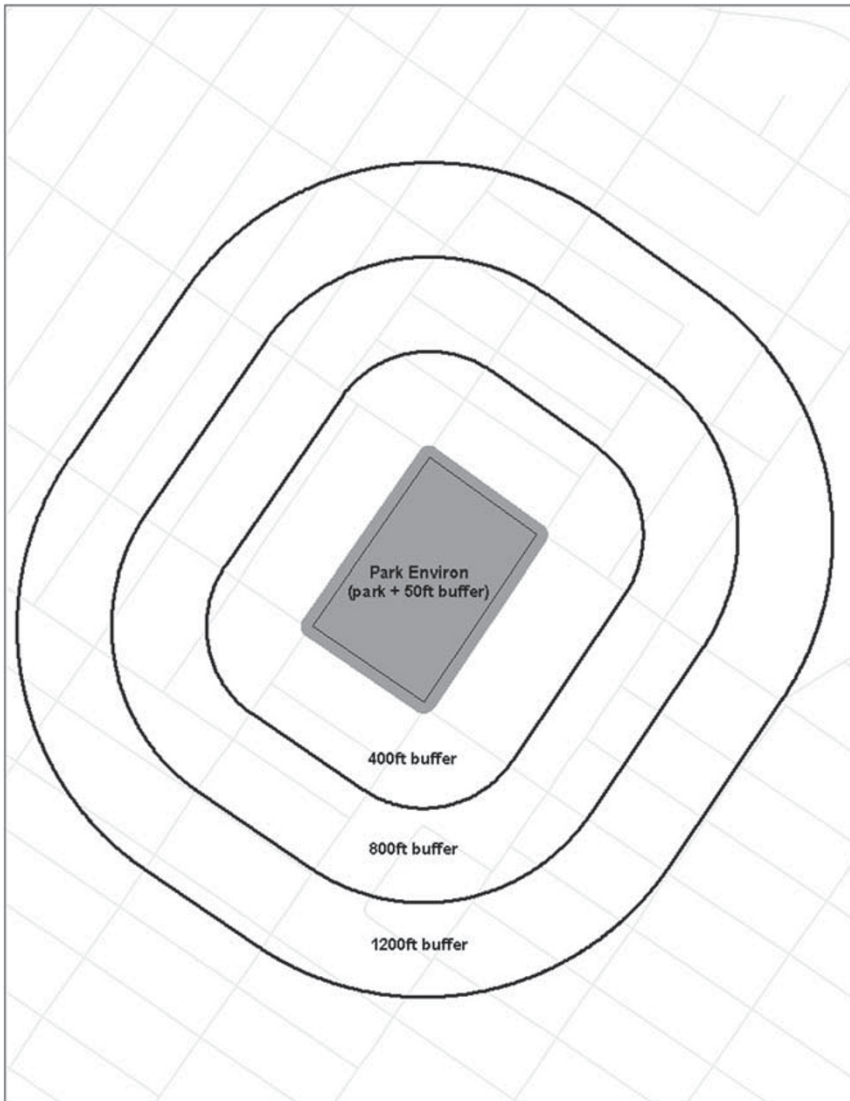


Figure 2: Buffer distances.

areas as a related whole. The crime data were the source of the data limitation; they did not have a reliable field to describe premise type. Thus, we were unable to accurately identify crime events that occurred inside the park from those which occurred on the sidewalk outside of the park. Using the park environs addressed both these concerns because it captured both sides of the streets surrounding each park.

We conducted a systematic survey (Madden *et al*, 1982; Sampson and Raudenbush, 1999) of neighborhood parks between February 2008 and August 2008. During our survey we collected the number and types of activity generators present in each park. To this



end, we gathered information regarding the number of active recreation types in each park (that is, recreation center, children's playground, pool, dog park, basketball court, baseball field, football/soccer fields, tennis courts and other types of courts/fields) and the presence of external activity generators on the edge of the parks (that is, public transit stop). These were used to represent activity generators for the park.

We also wanted to describe characteristics of parks which may have impacted their capacity for situational crime prevention (Clarke, 1983). We collected evidence of park adoption and the presence of bulletin boards to represent neighborhood ownership of the park. Evidence of park adoption was present if signage (such as Neighborhood Watch or Friends of <blank> Park signs) indicated a neighborhood group was involved in the maintenance of the park. Bulletin boards were included as a separate category because they typically are erected after a request by 'friends of the park' groups. These visible signs of community involvement in the park convey the message that someone other than the government cares about the park and could potentially intervene to protect it (Cohen and Felson, 1979; Clarke, 1983). We quantified security-related design features of the park such as type of fencing (security versus territorial or none) and lighting (that is, walkway lights, and court/field lights). Security fencing was 6–10 foot tall fencing on the perimeter of the parks that contained lockable gates; territorial fencing was shorter, had no gates, and was meant only to demarcate the park grounds from the public sidewalk and for esthetic reasons. Field lighting and walkway lighting were also documented based upon its presence or absence. Lighting enables legitimate users to see each other during hours of darkness and thus act as informal guardians for one another. It also allows individuals on the streets surrounding the park to become informal guardians because they can see park users easily. Finally, we collected information on whether park hours and rules were posted. By clearly posting hours and rules, park managers remove the excuse that someone did not know the park was closed or that certain activities were against park rules such as littering or drinking alcohol.

In addition to describing the characteristics of the parks themselves, we obtained data describing the crime at and near neighborhood parks. We limited our crime data to only street crimes and disorder incidents that occurred out of doors. These types of crimes are most likely to be related to the presence of a park.⁵ Crime data were provided by PPD incident logs for 2005 and 2006 (approximately 430 000 confirmed incidents over the two years).⁶ *Violent crime* included murder, rape, robbery, and both aggravated and simple assaults. *Property crime* included thefts and motor vehicle thefts. *Disorder events* included all drug and alcohol offenses, weapon violations, prostitution, gambling, graffiti, and disturbances.

Are neighborhood parks associated with higher crime levels?

To answer our question about whether there is more crime near parks than in other areas of Philadelphia we used LQs computed with ArcGIS 9.2 (Brantingham and Brantingham, 1995b; McCord and Ratcliffe, 2007, 2009). LQs are ratios which compare the characteristics of a sub-area under study to that of the larger, surrounding region. Here we used the area of the parks expanded an additional 50 feet in all directions to capture the sidewalks and streets immediately surrounding the parks, defined earlier as the 'park environs'. We also examined crime in three different buffers drawn from the park environs boundary out a



distance of 0–400 feet, 400–800 feet and 800–1200 feet (Figure 2). The 400 foot buffers were used because they approximate the average length of a street block in Philadelphia. Thus, these areas of analysis represent the park environs, and distances of one, two and three city blocks away from them. The density of crime and disorder in these areas is compared to the density of crime and disorder for the entire city of Philadelphia and represented as a quotient. Through this process, individual parks as well as parks as a whole were assigned a single LQ value. An LQ value of less than 1.0 indicates less density than in the entire city and a value of greater than 1.0 indicates a higher density. Following Rengert *et al* (2005), we use an LQ value of 2.0 as a cut-off point for noteworthy clustering since it indicates the density of crime around a particular park was twice that of the entire city and suggests this park is likely to have promoted the occurrence of crime.

While the LQ is a robust tool it does not have the ability to easily produce standardized significance tests of the null hypothesis. To provide additional rigor, we tested the clustering of crime near parks against the clustering of crime near a randomly selected set of 500 street intersections chosen from throughout the city. By comparing the areas immediately surrounding parks with the areas immediately surrounding the random set of intersections, we mitigate the criticism of LQs that they dilute the crime rate in comparison areas because they include places at which no crime could occur (for example, airport runways, tracts of undeveloped land, rivers, and so on) (McCord and Ratcliffe, 2009). By definition, the density of street intersections is higher in built up areas of the city. Thus a random selection is more likely, just by chance, to include intersections from more densely developed area and provides a good comparison to park locations which tend to be located in more developed areas.

We used the random selection procedure in SPSS to draw a sample from all Philadelphia intersecting streets ($n=21\,152$).⁷ A 400 foot buffer (equal to approximately one city block in Philadelphia) was drawn around each of these street corners. The LQ values for the 500 random street corners are compared with the LQ values of the park environs. If the LQ for the density of crime near neighborhood parks is higher than an LQ for a set of randomly distributed intersections, we can be more confident the association between parks and crime is due to the presence of a park.

What are the characteristics of parks associated with crime?

During our systematic survey we collected several characteristics of parks which we would expect to be related to crime. To identify which characteristics of neighborhood parks were associated with crime rates we used a series of between-group ANOVA tests. These allow us to examine whether the types and overall magnitude of activity generators, levels of surveillance, informal guardianship and the types of neighborhood land uses influence crime in the park environs.

Is crime concentrated at a few parks?

In order to better understand the concentration of crime across the park environs, we ranked the parks on each type of crime (highest to lowest). We then calculated the cumulative



percentage of crime for the distribution (Weisburd *et al*, 2004; Clarke and Eck, 2007). This enabled us to identify the proportion of parks that account for 50 and 100 per cent of all park-related crime. We also computed the concentration of area across all parks to determine whether a few large parks are driving the distribution.

Results

The results from the LQ analysis confirm that crime is more clustered in and around parks than in Philadelphia as a whole. Specifically, the density of violent, property and disorder crime in the park environs (park and surrounding streets) are all over twice that of Philadelphia (Table 1). Disorder-related crime has the highest value (2.48) while property crime has the lowest (2.07), a relationship that holds true at increasing distances from the park environs. Moving out from the parks we find a significant decrease in values for all crime categories in the first 400 foot buffers which rise in the second buffers (400–800 feet) and decrease even lower in the third buffers (800–1200 feet).

These findings differ from the monotonic decrease in density we expected to see as distance from the park increased but may be explained by earlier research. In a study of a large illegal street drug market in Philadelphia, Rengert (1996) found the same type of pattern in relationship to tax delinquencies as proxies for housing abandonment; the streets immediately surrounding and adjacent to the drug market had the highest tax delinquencies, one block over delinquencies were considerably lower, while blocks further out had higher but steadily decreasing delinquencies. On-site observations revealed high uses of territorial markings by residents in the first street over from the drug market leading the author to conclude that the residents were trying to fight off the disorder and crime effects of the drug market through the application of territoriality markers (for example, better kept yards, flower pots, neighborhood flags, and so on) to a degree much more pronounced than on streets further out. It seems these residents were acutely aware of the problems on the street one block over and immediately surrounding the drug market and worked hard to prevent it from impacting their street. While we did not observe the physical environment greater than one block away from parks, it is certainly plausible that residents on those streets have a greater degree of social cohesion than the streets surrounding the parks and thus are more successful at abating the effects of proximity to a park.

In order to determine whether crime was *statistically* higher around park environs, we compared the areas surrounding parks to the areas surrounding a random sample of street intersections within Philadelphia. The analysis of LQs for a one block area (400 feet) around the

Table 1: Location quotients by type of crime

<i>Buffer</i>	<i>Violent crime</i>	<i>Property crime</i>	<i>Disorder crime</i>
Park environs	2.30	2.07	2.48
400 foot	1.71	1.62	2.03
800 foot	2.01	1.80	2.26
1200 foot	1.77	1.59	1.82
Random intersections (<i>n</i> =500)	1.58	1.55	1.57



500 random intersections is shown in Table 1.⁸ Crime densities in park environs were significantly higher than crime densities in the areas surrounding the random set of 500 intersections ($P < 0.05$). This finding holds across all crime types and is a particularly conservative test because the 500 intersections are more likely to be found in built-up areas of the city only.

Once we established the positive association between parks and crime, our next step was to determine the structure of the concentration. For example, is the association being driven by a few high crime parks or are most parks associated with increased crime? To answer this question, we first examined the distribution of crime across park environs using the LQ values for individual parks. To check our results, we used a measure of the concentration to determine what percentage of parks account for 50 per cent and then 100 per cent of crime near parks (Sherman *et al*, 1989). Recall that LQ values are ratios. An LQ value of 1.0 indicates the density of crime incidents in the park study area is equal to that of the entire city (assuming a uniform distribution of crime incidents). Values greater than 1.0 imply clustering of crime. We found that 66.6 per cent of parks had LQ values of greater than 1.0 for violent crime, 70.3 per cent for property crime and 65.1 per cent for disorder crime. Thus, increased crime density is not only experienced by a few parks; the majority of parks have higher density than the city as a whole.

We also used a measure of cumulative concentration of crime to characterize how crime was distributed across park environs. We found that depending on crime type considered, between 14 and 17 per cent of park environs account for 50 per cent of all crime at parks indicating there is a subset of parks with large crime problems (Table 2). This level of concentration of crime in and around neighborhood parks is not as concentrated as crime across places in general or as would be predicted using the 80/20 rule under the theory of 'risky facilities' (Clarke and Eck, 2007). The distribution of crime across parks is three times less concentrated than found by Weisburd and colleagues in Seattle (Weisburd *et al*, 2004, 2010a). Their series of studies revealed 4 to 5 per cent of all street segments had 50 per cent of all crime and 59 to 66 per cent accounted for 100 per cent of all crime. The 80/20 rule predicts that 20 per cent of places will produce 80 per cent of the crime. In Philadelphia, 20 per cent of the parks account for 60 per cent or less of crime in park environs (depending on the type of crime). Like the study of parks in Chula Vista, CA (Clarke and Eck, 2007; J. Stedman, Public Safety Analyst, personal communication by email to E. Groff; Hilborn, 2009), there is a definite concentration of crime in relatively small proportion of parks. At the same time, 90 to 97 per cent of all park environs have some crime. The most concentrated distribution is found for violent crime which has 100 per cent of incidents at approximately 84 per cent of parks. So these findings using

Table 2: Concentration of crime in neighborhood parks

	<i>Park environs (park plus 50 foot buffer)</i>	
	<i>Percentage of parks accounting for 50% of crime at parks</i>	<i>Percentage of parks accounting for 100% of crime at parks</i>
Violent crime	14.06 ($n=35$)	83.53
Property crime	16.87 ($n=42$)	90.36
Disorder crime	14.86 ($n=37$)	95.98



park environs confirm that while crime is more concentrated near certain parks, the extent of the concentration is far less than the typical extent of crime concentration associated with places in general. Thus, it can be argued that Philadelphia neighborhood parks, in general, are related to higher crime levels, and this finding is not merely the product of a few high-crime parks.

Our systematic observation survey provided a wealth of park characteristics which our literature review suggested might explain differences in crime rates across parks. We collected information about the following characteristics of parks: (1) in-park activity generators; out of park activity generators; (2) signs of neighborhood territoriality; and (3) indicators of park security (Table 3). More than half the parks had recreation centers, playgrounds and basketball courts which we considered to be in-park activity generators (that is, they attract large numbers of people to the park). A majority of parks also had public transit stops on their perimeter which we also classified as a crime generating characteristic. Very few parks showed evidence of neighborhood adoption or had bulletin boards; 12 and 10 per cent respectively. Field lights (74 per cent of parks that had fields), walk way lights (67 per cent of parks which had walkways) and security fencing (53 per cent) were park security measures found in more than half the parks.

We used an ANOVA to find out which of the characteristics were associated with crime levels; only significant relationships are shown in the table (Table 4). The presence of playing fields such as baseball and football/soccer fields was associated with *lower* rates of all crime

Table 3: Characteristics of parks

<i>In park activity generators</i>	
Recreation center	129 (52%)
Children's playground	172 (69%)
Pool	55 (22%)
Dog park	8 (3%)
Basketball court	150 (60%)
Baseball field	99 (40%)
Tennis court	45 (18%)
Football/soccer field	59 (28%)
Other court/field	48 (19%)
<i>Out of park activity generators</i>	
Public transit stop on perimeter	144 (59%)
<i>Neighborhood ownership</i>	
Evidence of park adoption	29 (12%)
Bulletin board	26 (10%)
<i>Park security</i>	
Park hours posted	96 (37%)
Park rules posted	116 (47%)
Security fence	133 (53%)
Territorial fence	101 (41%)
Walkway lights	161 (67%) ^a
Field lights	150 (74%) ^a

^aPercentage of lighting based upon number of parks with walkways and fields, not total count of parks.

**Table 4:** Relationship between park characteristics and crime: ANOVA analysis

<i>Park characteristic</i>	<i>Mean value with facility (n)</i>	<i>Mean value without facility (n)</i>	<i>F value</i>
<i>Violent crime</i>			
Basketball court***	2.5 (150)	3.2 (99)	2.8
Baseball field**	2.1 (99)	3.3 (150)	8.7
Tennis court*	2.0 (45)	3.0 (204)	4.0
Football/soccer field**	1.8 (59)	3.1 (190)	8.9
Field lights*	2.5 (150)	3.4 (51)	3.9
<i>Property crime</i>			
Basketball court*	2.3 (150)	3.2 (99)	5.7
Baseball field**	2.1 (99)	3.1 (150)	8.2
Tennis court***	2.1 (45)	2.8 (204)	2.9
Football/soccer Field**	1.8 (59)	2.9 (190)	8.1
Other court/field*	1.9 (46)	2.8 (203)	4.2
Park adoption*	3.7 (29)	2.5 (220)	4.9
<i>Disorder crime</i>			
Recreation center*	3.0 (129)	4.5 (120)	5.6
Baseball field**	2.1 (99)	4.8 (150)	17.9
Tennis court***	2.4 (45)	4.0 (204)	3.6
Football/soccer field**	1.6 (59)	4.4 (190)	13.4
Other court/field*	2.3 (46)	4.0 (203)	4.0
Field lights**	2.8 (150)	5.3 (51)	10.4
Walkway lights*	3.2 (161)	4.9 (79)	5.8
Public transit*	3.1 (145)	4.6 (104)	5.6

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.10$.

types. Parks with tennis courts and other courts/fields were associated with significantly lower crime rates of all types of crime with one exception, other courts/fields (that is, bocce ball, horseshoes, croquet) were not related to violent crime. Finally, basketball courts were associated with lower rates of violent and property crime but not disorder crime.

The two park characteristics measuring surveillance and guardianship yielded mixed results. The presence of recreation centers, which are frequently staffed by individuals who could act as place managers (Eck, 1995), was only significantly related to (lower) levels of disorder crime. This may be because recreation center personnel, who could act as place managers in the situation, tend to stay inside the building rather than go outside where they could act as place managers for the rest of the park (Eck, 1995). Another characteristic we expected to be related to guardianship was the presence of park lighting. Our results indicate field lights and walkway lights were both associated with reduced disorder crime but not violent or property crime.

The accessibility of parks was a significant differentiator only for disorder crime. Park environs with a public transit stop on the streets adjacent to the park had significantly less disorder-related crime than those which did not have a public transportation stop. Explanations for why this relationship might exist (for example, more people on the streets around and in the parks thus providing more surveillance) should have also predicted lower rates of



violent and property crime. More focused observation of the parks is needed in order to explain why only disorder crime was affected by the presence of public transit.

The remaining significant relationship was between parks with evidence of park adoption and higher property crime rates. This relationship is opposite what we expected. Recall that theoretically evidence of park adoption would indicate territoriality; someone cares about the place and would intervene if rules were broken, thus suggesting lower crime levels. A possible explanation for this finding is that these parks were recognized as problem and signs concerning park adoption were posted immediately prior to our study in an effort to ward off further criminal activity. The effect, if any, would be in the future and thus not measurable in a cross-sectional study.

To check whether differences in crime category levels among parks were related to the total number of activity generators present or to the size of the park we used zero-order correlations (Table 5). To obtain a total number of activity generators, we added together the following types: recreation center, each type of playing field/court, playground, pool, dog park, lighting (to encourage nighttime usage) and public transportation stop (mean number of activity generators=4.8, SD=2.9, minimum=0, maximum=11). We found that as the number of activity generators increased the amount of crime significantly decreased for each of the three crime categories: violent, property and disorder crimes (Table 5). This finding may reflect the greater usage of parks with a variety of different types of activities available, since legitimate park users prefer mixture over single activity parks (Whyte, 1980; Burgess *et al*, 1988, p. 467; Project for Public Spaces, 2005). It might also support the argument that activity generators produce additional guardianship and surveillance, sometimes in the form of adult guidance for organized sports (for example, coaches, umpires, referees, parents, and so on) and other times through increased numbers of legitimate users. We also found a moderate negative correlation between park size and crime rates; as park size increased the amount of crime in the three categories decreased. The correlation was strongest for disorder crime followed by violent crime and weakest, but still significant, for property crime.

Given these results we also decided to directly test the strength of the correlation between park size and the number of park activity generators present. We found a strong positive correlation between the two attributes (0.501, significant at $P < 0.01$) suggesting larger parks often have room for more activity generators whereas smaller parks do not.

Finally, we examined the relationship between the type of land use surrounding the parks and crime (Table 6). The results of our survey indicate that neighborhood parks in Philadelphia are surrounded by three different types of land use combinations. The first is *exclusively residential* (20.5 per cent of parks) with no other land uses located on the streets immediately surrounding the parks except residences (including multi-unit housing). The

Table 5: Park crime, activity generators and park size: Zero-order correlations

	<i>Violent crime</i>	<i>Property crime</i>	<i>Disorder crime</i>
Number of activity generators	-0.149*	-0.175**	-0.247**
Park area (square feet)	-0.224***	-0.304***	-0.334***

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.10$.

**Table 6:** Park crime and land use

<i>Crime compared across land use types: Between groups ANOVA</i>			
	<i>Violent crime (mean)</i>	<i>Property crime (mean)</i>	<i>Disorder crime*^a (mean)</i>
Exclusively residential (<i>n</i> =51)	3.3	2.6	5.1
Primarily residential with some commercial (<i>n</i> =87)	3.1	2.8	4.2
Non-residential (<i>n</i> =111)	2.4	2.6	2.7

^a*F* (2, 246)=4.504, **P*<0.05.

second category is *primary residential with some commercial* (34.9 per cent). In this category the vast majority of land uses surrounding the parks are residential with small amounts of commercial (a single corner market or a few small shops). The third category is *nonresidential* (44.6 per cent) with the vast majority of land uses surrounding the park being commercial, industrial, office or institutional, with little or no residential. Since Philadelphia is a large urban city with many mixed land use neighborhoods the low percentage of exclusively residential neighborhoods is not surprising. What is more interesting is the low number of parks surrounded by solely non-residential land uses. While approximately 80 per cent of parks are in mixed use areas, all but two of the parks have at least one residential street along their border.

Results for our ANOVA comparing type of land use and type of crime revealed consistent differences across parks. The analysis showed that parks with adjacent streets, which were *exclusively residential* or which were *primarily residential with some commercial*, had higher violent and significantly higher disorder crime levels than those of parks in *nonresidential* settings (Table 6). Land use type differences however were only statistically significant for disorder crime.⁹ Interestingly, parks with a school on a border (*n*=28, all but two being elementary school) had significantly lower disorder crime levels (*M*=1.8) than parks without schools (*M*=4.0, *F* (1, 248)=4.6, *P*<0.05).

The finding regarding the difference between residential or primarily residential with some commercial may reflect the impact of mixed land uses on the level of surveillance provided to the park. Areas which draw more people in general provide more 'eyes on the street' (Jacobs, 1961). It follows that parks which are surrounded by mixed use streets (including schools) draw more people and receive more surveillance by non-park users. In addition, just because the park is part of their activity space, the park may be utilized by a wider audience than those in strictly or predominantly residential areas (Brantingham and Brantingham, 1991 [1981]). This increased utilization provides more informal surveillance which reduces opportunity to commit crime unobserved (Jeffery, 1971; Newman, 1972; Whyte, 1980; Clarke, 1997).

Discussion

Neighborhood parks in urban areas have long been seen as contested spaces. Because they are publically owned, they are at the same time everyone's and no one's. Our primary goal



in this research has been to directly and specifically examine the question of whether neighborhood parks in urban areas are crime generators. Beyond that we were interested in which park characteristics differentiate between high crime parks and low crime parks and at examining the distribution of crime across neighborhood parks. Our unit of analysis was the park environs (that is, the park and the area within 50 feet of the park).

We originally hypothesized that the presence of a neighborhood park in an urban area would increase crime in the area of the park; in other words, that parks act as crime generators. Our findings supported this hypothesis. Not only did the park environs have a higher density of crime than Philadelphia as a whole; they had a higher density of crime than the environs of a random selection of 500 street intersections in Philadelphia. However, we did not find the expected monotonic decrease in crime density as distance from the park environs increased. Instead we identified a significant decrease in values for all crime categories in the first 400 foot buffer which rise in the second buffer (400–800 feet) and decrease even lower in the third buffer (800–1200 feet).

One explanation for this finding might lie in the behavior of residents (Rengert, 1996). Residents one block away from a park may be employing 'defensible space' (Newman, 1972)/Crime Prevention Through Environmental Design (Jeffery, 1971) strategies such as territorial markers (for example, better kept yards, flower pots, neighborhood flags, and so on) more effectively than either the residents of the block on which the park is located or the residents of streets further out. It is logical that these residents would be more aware of the problems related to the park and take steps to prevent it from impacting their street. While we did not examine the physical environment greater than one block away from parks, it is certainly plausible that residents on those streets have a greater degree of social cohesion than the streets surrounding the parks and thus are more successful at abating the effects of proximity to a park.

Since our results indicated crime is concentrated near parks, we also investigated the natural follow-up question regarding the structure of that concentration. Is the finding being driven by a few high crime parks or are most parks associated with increased crime? Upon examining this question we found some park environs did have a much higher density of crime around them than other park environs. However, higher crime density was not confined to only those high crime park environs; rather the majority of parks had higher density of crime around them. While it is the case that crime is concentrated at certain park environs, the extent of the concentration is far less than the typical extent of crime concentration associated with places in general. This indicates the concentration of crime across parks is present in amounts that should make a difference to policy decisions (Clarke and Eck, 2007), even if it is not as much as what has been found for street segments (Weisburd *et al*, 2004, 2009).

So if park environs are crime generators and it is not just a few parks which are driving the association, what characteristics of the park environs differentiate between high crime and low crime parks? Our primary data regarding park characteristics indicates that activity generators such as the number of facilities present within a park are important to understanding the amount of crime that is associated with the presence of the park. In the aggregate, we find neighborhood parks with more activity generators tend to have less crime. Since the number of activity generating facilities is strongly correlated with park size, it is often the larger parks which have more users and less crime. Our findings suggest that the more activity generators a park has, the more legitimate users are attracted to the park.



When parks attract a large number of legitimate users, they may act as capable guardians so the sheer numbers of people at a place do not translate into more crime (Jacobs, 1961; Cohen and Felson, 1979; Whyte, 1980).

However, park usage is not only driven by the number of activity generators present at a neighborhood park but also the variety of activities which are available. Surveys of park users have found parks with a variety of uses are the most highly valued (Whyte, 1980; Project for Public Spaces, 2005). Specifically, they found '[s]uccessful public open spaces combine formal flower beds and naturalistic areas with a mix of recreational facilities and a variety of congenial social settings' (Burgess *et al*, 1988, p. 467). So, it is likely that larger parks with a variety of activities will draw more legitimate users and thus benefit from the natural guardianship they provide to both the park and its surrounding areas.

Digging a bit deeper, we also find that certain types of facilities are associated with lower crime levels in parks. Specifically, parks with fields and courts for organized active recreation tend to have lower crime. The presence of baseball and football/soccer fields are the most consistent protective characteristic; they are associated with lower crime levels across all categories of crime. It may be that these types of fields attract more users who are part of organized leagues. Instead of impromptu pick-up games, these fields attract people to the park who have defined roles (for example, coach, referee, parent, spectator, and so on) for both organized practices and official games. These legitimate users then reduce the opportunity for crime to occur because of the presence of coaches and spectators who act as intimate handlers for some users of the space because of the personal relationship they have with potential offenders (Felson, 1995). In all these ways, legitimate users increase the level of informal guardianship and surveillance of the park for all other users. Thus they act to increase guardianship in the park regardless of the mechanism at work.

Another possible mechanism which may be at work in parks with fields and courts to support organized league recreation is increased territoriality felt by users who frequently practice at or play games at the park. The same coaches and referees who are intimate handlers to the players could be acting as place managers in the park setting. In other words, other users perceive them to have a formal relationship to the park and thus to be willing to intervene if anyone gets out of line. Parks with fewer activity generators attract fewer legitimate users who might play these roles. Together the findings related to the presence of activity generators clearly point to parks as crime generators. The type of activity being generated (that is, organized versus spontaneous), however, appears to moderate the criminogenic effect of the park. Future work should consider collecting more specific information on the types of organized activities in parks and analyze different types of neighborhood parks separately to more precisely parse out effects due to park size and/or types of recreation available.¹⁰

Interestingly, park characteristics related to surveillance and guardianship yielded mixed results. Both opportunity theories of crime and situational crime prevention posit the importance of surveillance in understanding crime patterns. However, park characteristics representing surveillance such as field lighting and walkway lighting were associated with reduced property crime rates only. They had no significant effect on violent or disorder crime levels. One explanation might be the lack of variation in the characteristic across parks. For example, lighting was present in over 65 per cent of parks. We also expected that recreation centers would reduce crime because they have paid staff who could act as place managers (Eck, 1995). However, the presence of recreation centers had a significant effect



on disorder crime only. It may be that recreation center employees rarely leave the building and thus are not a deterrent to violent and property crimes which occur in the outdoor portion of the park and on adjacent streets-crimes which often occur over a very short time window. However, these employees may act as a deterrent to disorder-related crime because they periodically check the entire grounds.

Along the same lines, our accessibility measure of the presence of public transportation was a factor only for disorder crime. The majority, almost 60 per cent of parks, had some type of public transportation present (for example, subway stop, bus stop or trolley stop). Of course, Philadelphia is well served by public transportation. Once again, it could be there was not a significant enough difference in the level of accessibility in the park environs or surrounding areas versus accessibility experienced by other places in the city.

Our finding of general support for Jane Jacobs' (1961) hypothesis that mixed land use reduces crime is especially intriguing. As Jacobs would predict, parks surrounded exclusively by residential land uses experienced higher violent crime and disorder than those with mixed land use. However, we also found that parks which are located in primarily residential areas but with some commercial had higher crime than those which had some other combination of land uses mixed (for example primarily commercial, institutional, and so on). It was the most mixed land use areas which had the least amount of crime. Jacobs would explain this finding as related to the timing of surveillance in residential or predominantly residential neighborhoods. While the residents are working, no one is around to keep an eye on the park. It seems at least where parks are concerned, mixed land use reduces crime. Our findings that larger parks and those with more activity generators are related to lower crime levels also support the efficacy of more 'eyes on the street' in reducing crime. Arguably, the mechanism for the reduction is the greater number of people who utilize the park throughout the day.

Limitations of the Study

While this research answered some basic questions about the role of parks as crime generators, some limitations in the data exist that deserve mention. First, we use official crime data to measure crime that occurs in and near urban parks. The limitations of official crime data are well known and are not reiterated here (Sampson and Groves, 1989). Second, the time period of the official crime data and the data collection period were not coincident. The latest crime data we could obtain at the time of the study was 2005 and 2006 but the field observations were done two years later in 2008. However, recent studies find great stability of crime at the vast majority of micro level places (Weisburd *et al*, 2004; Groff *et al*, 2010). Thus we believe the crime was not likely to have changed dramatically over a two-year period. Third, we measured park characteristics using dichotomous scales. Measuring some of them, in particular lighting and the numbers of characteristics such as fields, posters on bulletin boards, and so on, as quantities would have provided more detailed information about the amount of organized activity, guardianship, neighborhood investment, and so on. Fourth, our study only examines neighborhood parks in one highly urbanized northeastern city, Philadelphia, PA. In many ways Philadelphia is a typical northeastern city. The downtown parks were incorporated into the original city plan. The city has an old, dense urban core surrounded by more recent developments which are less dense. Thus, the findings are not necessarily generalizable to other types of parks or even neighborhood parks in other cities.



By design, the research addressed fundamental questions about the role of parks as crime generators (that is, bivariate relationships between the characteristics of parks and crime in their immediate area and up to 1200 feet from the park). However, this narrow focus meant that many other important aspects of parks went unexamined in this initial work. Most critically, examination of neighborhood socio-economic and demographic characteristics as well as measures of disorder to better describe the context in which the park exists was left to future research. Research including such information should consider hierarchical linear modeling or geographically weighted regression to identify confounding about park and neighborhood characteristics and to remove any multicollinearity in the model. In addition, we did not collect any information on the number of park users, the types of activities undertaken by those users, or the timing of the activities in the parks we surveyed. Nor did we inquire regarding the users of the park; how far they had traveled to use the park and their perceptions of the park would provide a more nuanced picture and flesh out our more quantitative data. Only through more comprehensive data collection and the application of more advanced statistical techniques will we be able to tease out the most important factors driving whether a park is an amenity or a nuisance.

Implications for Policy

Because of the simplicity of the study, our policy recommendations are also straightforward. First and foremost, our finding that crime (regardless of specific type) is concentrated across a significant subset of parks and not just a few problem parks means that generalized policy changes should be an effective means of addressing the problem. Second, the current success of hot spots and problem-oriented policing strategies imply that focusing police attention on the problem parks is likely to produce dramatic reductions in park-related crime (Braga, 2001, 2007). Especially if the interventions employed use problem-oriented policing strategies (Braga *et al*, 1999; Weisburd and Eck, 2004; Weisburd *et al*, 2010b).

Since they are public places, parks are more susceptible to both positive and negative influences of the surrounding area. This characteristic makes them more important in the crime calculus than may have been previously recognized and suggests police agencies should make them a high priority (Hilborn, 2009). Police agencies interested in addressing park crime issues often employ problem-oriented policing (Hilborn, 2009). But, even police-led efforts to improve a park should include citizen groups and other city agencies (Brower, 1984; Hilborn, 2009). Our study adds to a growing body of evidence suggesting police, citizen groups and other agencies in the city of Philadelphia could realize much larger crime reduction effects if they concentrate their efforts to address park crime on those 35–42 parks which account for half of all the crime occurring in park environs.

Third, related to the design of parks we identified several elements associated with lower crime rates. Our research suggests the importance of activity generators in parks. All types of fields and courts affected at least one category of crime and most affected multiple categories. In particular, fields associated with use by formal leagues such as baseball, football and soccer fields as well as tennis courts were associated with reduced crime levels within and immediately surrounding urban neighborhood parks. This suggests planners may want to consider developing neighborhood parks which include activity generators related to organized sports since their presence is associated with reduced crime in the park environs.



Community groups can play a vital role by organizing and supporting activities designed to maximize use of park facilities.

Design elements such as field and walkway lighting and recreation centers improve opportunities for surveillance and reduce the incidence of disorder crime in park environs. Park planners could assist in reducing crime by ensuring parks have both field and walkway lighting. Together these findings recommend that a promising strategy for reducing crime associated with parks would be to encourage the inclusion of these characteristics in both existing and planned parks.

Finally, we found park environs which consisted of multiple land use streets had lower crime than residential or primarily residential land use environs. Park placement should be evaluated with our findings in mind. Rather than placing parks in residential areas planners should consider placing new parks in mixed use areas and enacting land use policies to encourage mixed land use around existing parks. This strategy has the dual benefit of bringing together a wider variety of potential users of both the park and the streets around the park. Such users act as natural guardians and increase the potential for reducing crime in park environs.

Conclusions

This study clearly demonstrates that many neighborhood park environs play the role of crime generators. In addition, the research points out characteristics of parks and their environs associated with higher crime. But those two findings do not tell the whole story. We also found that crime is not distributed evenly across parks within the urban landscape. Some park environs have many crimes while others have few or none. Thus, while increased crime is generally associated with the presence of neighborhood parks, the relationship between parks and crime is not uniform across places. Additional research is needed to more fully explicate the relationship between the characteristics of the neighborhood of the park and the role of a park as amenity or nuisance. Such a study would take into account the socio-economic characteristics and built environment of the neighborhood in which the park is situated. Our understanding of park dynamics would also be advanced by qualitative work examining the types of people who use the park and the activities undertaken by parks users (Hilborn, 2009). It is only through such observations that we will be able to obtain more thorough information about the dynamics of park presence, use and crime in neighborhoods.

Notes

- 1 A search of the Center for Problem Oriented Policing website (www.popcenter.org) on 11 July 2008 revealed 62 unique references to parks as sources of crime problems.
- 2 Many of the larger parks consisted of more than one polygon and were merged into a single polygon for each park. Additionally, many of the identified properties were not parks, but areas of vacant or open land the Fairmount Park Commission was responsible for maintaining. These included center medians and grass areas along major highways in the city, and numerous parcels of vacant land that were publicly owned. They were identified via aerial photographic images and were excluded from the data set.
- 3 Field surveyors went to 276 parks but an additional 27 were removed because they were not actually parks. Most of these were small, undeveloped lots that were city owned, while a few others were small grass medians located where three or more streets intersected.

- 4 We used a research team of three undergraduate students to survey 200 of the 249 parks. The other 49 parks were surveyed by undergraduate students as part of class activities. These students received the same training as the research staff. We randomly selected 6 per cent of these to be repeated by research staff to verify accuracy. No significant discrepancies were noted. In addition, a subsequent test of the instrument revealed significant inter-rater reliability for all observational items analyzed herein.
- 5 Crime and disorder incidents were identified as occurring out of doors by their PPD assigned premise code, which identified the incident as occurring on the highway, in a vehicle, parking lot, in a building, and so on.
- 6 All crime incidents were investigated and documented by PPD officers, disturbances were calls-for-services that did not require official reporting but were still confirmed as occurring.
- 7 The set of random intersections was developed in an earlier study by McCord and Ratcliffe (2009).
- 8 We compare the park environs, rather than parks with 400 foot buffer to the intersection with a 400 foot buffer because they each represent approximately one block from a location (that is, the park centroid and intersection respectively).
- 9 Bonferroni *post hoc* test indicated differences between land use types for disorder crime is due to significant difference between mean values of park environs classified as 'Residential' and those classified as 'Nonresidential' land use combination.
- 10 We thank one of our anonymous reviewers for this suggestion.

References

- Braga, A.A. (2001) The effects of hot spots policing on crime. *Annals of the American Academy of Political and Social Science* 578: 104–125.
- Braga, A.A. (2007) Effects of hot spots policing on crime, http://www.sfi.dk/graphics/Campbell/reviews/Hot_spots_policing_review.pdf.
- Braga, A.A., Weisburd, D.L., Waring, E., Mazzerole, L., Spelman, W. and Gajewski, F. (1999) Problem-oriented policing in violent crime places: A randomized controlled experiment. *Criminology* 37(3): 541–580.
- Brantingham, P.J. and Brantingham, P.L. (1991 [1981]) *Environmental Criminology*. Prospect Heights, IL: Waveland Press.
- Brantingham, P.L. and Brantingham, P.J. (1993) Environment, routine, and situation: Toward a pattern theory of crime. In: R.V. Clarke and M. Felson (eds.) *Routine Activity and Rational Choice*, Vol. 5. New Brunswick, NJ: Transaction Publishers, pp. 259–294.
- Brantingham, P.L. and Brantingham, P.J. (1995a) Criminality of place: Crime generators and crime attractors. *European Journal on Criminal Policy and Research* 3(3): 5–26.
- Brantingham, P.L. and Brantingham, P.J. (1995b) Location quotients and crime hotspots in the city. In: C. Block, M. Dabdoub and S. Fregly (eds.) *Crime Analysis Through Computer Mapping*. Washington DC: Police Executive Research Forum, pp. 129–149.
- Brower, S. (1980) Territory in urban settings. In: I. Altman and C.M. Werner (eds.) *Human Behavior and Environment: Current Theory and Research*, Vol. 4. New York: Plenum.
- Brower, S. (1984) *The Harlem Park Renovation Project: Baltimore Maryland*. Baltimore, MD: University of Maryland at Baltimore County.
- Burgess, J., Harrison, C.M. and Limb, M. (1988) People, parks and the urban green: A study of popular meanings and values for open spaces in the city. *Urban Studies* 25(6): 455–473.
- Chiesura, A. (2004) The role of urban parks for the sustainable city. *Landscape and Urban Planning* 68: 129–138.
- Clarke, R.V. (1983) Situational crime prevention: Its theoretical basis and practical scope. In: M. Tonry and N. Morris (eds.) *Crime and Justice: An Annual Review of Research*, Vol. 14. Chicago, IL: University of Chicago Press, pp. 225–256.
- Clarke, R.V. (ed.) (1997) *Situational Crime Prevention: Successful Case Studies*, 2nd edn. Albany, NY: Harrow and Heston Publishers.
- Clarke, R.V. (2008) Situational crime prevention. In: R. Wortley and L. Mazerolle (eds.) *Environmental Criminology and Crime Analysis*. Portland, OR: Willan Publishing, pp. 178–194.
- Clarke, R.V. and Eck, J. (2007) *Understanding Risky Facilities*, Center for Problem-Oriented Policing, http://www.popcenter.org/tools/PDFs/risky_facilities.pdf.
- Cohen, L.E. and Felson, M. (1979) Social change and crime rate trends: A routine activity approach. *American Sociological Review* 44: 588–608.



- Crewe, K. (2001) Linear parks and urban neighborhoods: A case 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: 1–31.
- Dehring, C. and Dunse, N. (2006) Housing density and the effect of proximity to public open space in Aberdeen, Scotland. *Real Estate Economics* 34(4): 553–566.
- Eck, J.E. (1995) A general model of the geography of illicit retail marketplaces. In: J.E. Eck and D. Weisburd (eds.) *Crime and Place*. Monsey, NY: Willow Tree Press, pp. 67–93.
- Espey, M. and Owusu-Edusei, K.J. (2001) Neighborhood parks and residential property values in Greenville, South Carolina. *Journal of Agricultural and Applied Economics* 33: 487–492.
- Evans, D.J. and Oulds, G. (1984) Geographical aspects of the incidence of residential Burglary in Newcastle-Under-Lyme, U.K. *Tijdschrift voor Economische Sociale Geografie* 75(5): 344–355.
- Felson, M. (1995) Those who discourage crime. In: J.E. Eck and D.L. Weisburd (eds.) *Crime and Place*. Monsey, NY: Willow Tree Press, pp. 53–66.
- Groff, E.R., Weisburd, D. and Yang, S.-M. (2010) Is it important to examine crime trends at a local “micro” level?: A longitudinal analysis of street to street variability in crime trajectories. *Journal of Quantitative Criminology* 26: 7–32.
- Hakim, S. and Shachamurove, Y. (1996) Spatial and temporal patterns of commercial burglaries: The evidence examined. *American Journal of Economics and Sociology* 55(4): 443–456.
- Hayward, J. (ed.) (1989) *Urban Parks: Research, Planning, and Social Change*, Vol. 10: Public Places and Spaces. New York: Plenum Press.
- Herbert, D.T. (1982) *The Geography of Urban Crime*. New York, NY: Longman.
- Hilborn, J. (2009) *Dealing with Crime and Disorder in Urban Parks*, http://www.popcenter.org/responses/PDFs/urban_parks.pdf.
- Jacobs, J. (1961) *The Death and Life of Great American Cities*. New York: Vintage Books.
- Jeffery, C.R. (1971) *Crime Prevention through Environmental Design*. Beverly Hills, CA: Sage Publications.
- Knutsson, J. (1997) Restoring public order in a city park. In: R. Homel (ed.) *Policing for Prevention: Reducing Crime, Public Intoxication and Injury*, Vol. 7. Monsey, NY: Criminal Justice Press, pp. 133–151.
- Kühlhorn, E. (1978) *Deprivation of Freedom and the Police*. Stockholm, Sweden: National Swedish Council for Crime Prevention.
- Kurtz, E.M., Koons, B.A. and Taylor, R.B. (1998) Land use, physical deterioration, resident-based control, and calls for service on urban streetblocks. *Justice Quarterly* 15(1): 121–149.
- 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.
- Leon Younger and PROS (2004) *A Bridge to the Future: Fairmount Park Strategic Plan*. Report to Fairmont Park Commission; Philadelphia, PA.
- Lockwood, D. (2007) Mapping crime in Savannah: Social disadvantage, land use, and violent crimes reported to the police. *Social Science Computer Review* 25(2): 194–209.
- Lutzenhiser, M. and Netusil, N.R. (2001) The effect of open spaces on a home’s sale price. *Contemporary Economic Policy* 19: 291–298.
- Madden, K., Love, K. and Davies, S. (1982) *User Analysis: An Approach to Park Planning and Management*. Washington D.C.: American Society of Landscape Architects.
- Maguire, M. (1982) *Burglary in a Dwelling*. London: Heinemann.
- McCord, E.S. and Ratcliffe, J.H. (2007) A micro-spatial analysis of the demographic and criminogenic environment of drug markets in Philadelphia. *The Australian and New Zealand Journal of Criminology* 40(1): 43–63.
- McCord, E.S. and Ratcliffe, J.H. (2009) Intensity value analysis and the criminogenic effects of land use features on local crime patterns. *Crime Patterns and Analysis* 2(1): 17–30.
- Michael, S.E., Hull, B.R. and Zahm, D.L. (2001) Environmental factors influencing auto Burglary: A case study. *Environment and Behavior* 33(3): 368–388.
- Miethe, T.D. and McDowall, D. (1993) Contextual effects in models of criminal victimization. *Social Forces* 71: 741–759.
- New Yorkers for Parks and Ernst & Young. (2003) Analysis of secondary economic impacts resulting from park expenditures [Electronic Version], http://www.ny4p.org/index.php?option=com_content&task=blogcategory&id=25&Itemid=211.
- Newman, O. (1972) *Defensible Space: Crime Prevention Through Environmental Design*. New York: Macmillan.

- Parkes, A., Kearns, A. and Atkinson, R. (2002) What makes people dissatisfied with their neighbourhoods? *Urban Studies* 39(13): 2413–2438.
- Pendleton, M. (1998) Policing the park: Understanding soft enforcement. *Journal of Leisure Research* 30(4): 552–571.
- Pendleton, M. and Thompson, H.L. (2000) Criminal careers of park and recreational hot spots. *Parks and Recreation* 35: 57–63.
- Perkins, D., Wandersman, A., Rich, R. and Taylor, R.B. (1993) The physical environment of street crime: Defensible space, territoriality and incivilities. *Journal of Environmental Psychology* 13: 29–49.
- Project for Public Spaces. (2005) *How to Turn a Place Around: A Handbook for Creating Successful Places*. New York: Project for Public Spaces.
- Reeves, N. (2000) The condition of public urban parks and greenspace in Britain. *Journal of CIWEM* 14: 157–163.
- Rengert, G., Ratcliffe, J.H. and Chakravorty, S. (2005) *Policing Illegal Drug Markets: Geographic Approaches to Crime Reduction*. Monsey, NY: Criminal Justice Press.
- Rengert, G. and Wasilchick, J. (1985) *Suburban Burglary: A Time and a Place for Everything*. Springfield, IL: Charles Thomas.
- Rengert, G.F. (1996) *The Geography of Illegal Drugs*. Boulder, CO: Westview Press.
- Roncek, D.W. and Faggiani, D. (1985) High schools and crime: A replication. *The Sociological Quarterly* 26(4): 491–505.
- Roncek, D.W. and Lobosco, A. (1983) The effect of high schools on crime in their neighborhoods. *Social Science Quarterly* 64(3): 598–613.
- Sampson, R.J. and Groves, W.B. (1989) Community structure and crime: Testing social-disorganization theory. *American Journal of Sociology* 94(4): 774–802.
- Sampson, R.J. and Raudenbush, S.W. (1999) Systematic social observation of public spaces: A new look at disorder in urban neighborhoods. *American Journal of Sociology* 105(3): 603–651.
- Schroeder, H.W. and Anderson, L.M. (1984) Perception of personal safety in urban recreation sites. *Journal of Leisure Research* 16(2): 178–194.
- Sherman, L.W., Gartin, P. and Buerger, M.E. (1989) Hot spots of predatory crime: Routine activities and the criminology of place. *Criminology* 27(1): 27–55.
- Smith, W.R., Frazee, S.G. and Davison, E.L. (2000) Furthering the integration of routine activity and social disorganization theories: Small units of analysis and the study of street robbery as a diffusion process. *Criminology* 38(2): 489–523.
- Taylor, R.B. and Harrell, A. (1996) Physical environment and crime, <http://www.ncjrs.gov/pdffiles/physenv.pdf>, accessed 21 January 2010.
- Troy, A. and Grove, J.M. (2008) Property values, parks, and crime: A hedonic analysis in Baltimore, MD. *Landscape and Urban Planning* 87: 233–245.
- Voicu, I. and Been, V. (2008) The effect of community gardens on neighboring property values. *Real Estate Economics* 36(2): 241–283.
- Weisburd, D. and Eck, J. (2004) What can police do to reduce crime, disorder and fear? *The Annals of the American Academy of Political and Social Science* 593(1): 42–65.
- Weisburd, D., Bushway, S., Lum, C. and Yang, S.-M. (2004) Trajectories of crime at places: A longitudinal study of street segments in the city of Seattle. *Criminology* 42(2): 283–321.
- Weisburd, D., Morris, N. and Groff, E.R. (2009) Hot spots of juvenile crime: A longitudinal study of arrest incidents at street segments in Seattle, Washington. *Journal of Quantitative Criminology* 25(4): 443–467.
- Weisburd, D., Groff, E.R. and Yang, S.-M. (2010a) *Explaining Developmental Crime Trajectories at Places: A Study of 'Crime Waves' and 'Crime Drops' at Micro Units of Geography*. Washington DC: National Institute of Justice.
- Weisburd, D., Telep, C., Hinkle, J.C. and Eck, J.E. (2010b) Is problem-oriented policing effective in reducing crime and disorder? Findings from a Campbell Systematic Review. *Criminology and Public Policy* 9(1): 139–172.
- Westover, T.N. (1985) Perceptions of crime and safety in three Midwestern parks. *Professional Geographer* 37(4): 410–420.
- Whyte, W.H. (1980) *The Social Life of Small Urban Spaces*. New York: Project for Public Spaces.
- Wilcox, P., Quisenberry, N., Cabrera, D.T. and Jones, S. (2004) Busy places and broken windows? Toward defining the role of physical structure and process in community crime models. *The Sociological Quarterly* 45(2): 185–207.