Violent Crime and Park Use in Low-Income Urban Neighborhoods

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Abstract

Introduction—Crime and safety are often cited as potential hurdles to park use and park-based physical activity. Using comprehensive data sources including both objective and subjective measurements at the park level and the individual level, this study aimed to assess the association between crime rates and use of local parks in low-income urban neighborhoods.

Methods—The authors observed 48 parks and conducted local resident surveys in low-income neighborhoods in Los Angeles during a 2-year study period (2013–2015). Crime data was geocoded within a 1-mile radius of parks' addresses and longitudinal models were fitted to estimate the association between crime rates and park use outcomes in 2017.

Results—One gun-related violent crime per 10,000 people during the 6-month period prior to data collection was associated with an average of 13.5% to 15.8% reduction in observed park use and park-based moderate to vigorous physical activity ($p < 0.05$) in the 6-month observation period. The relationship was significant in seniors (33% to 40% reduction) and adults (13% to 18%), but insignificant for teenagers (2% to 4%) and children (10% to 12%). Homicide rates were also significantly related to lower self-reported park use ($p < 0.05$).

Conclusions—Gun-related violent crimes have relatively long-term negative associations with population health by reducing utilization of outdoor park space. There can be additional population health benefits from controlling and reducing gun-related violent crimes beyond immediate impacts on public safety and mortality.

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INTRODUCTION

Neighborhood parks and recreation centers are important public health resources.[1–6] A sizable proportion of the urban population's physical activity is accrued in neighborhood parks.[4,5] In particular, parks in high-poverty neighborhoods are valuable public resources because of the population's limited incomes and access to private health clubs. Public parks typically provide free access to recreational facilities like playgrounds, basketball and tennis courts, and sports fields. Furthermore, most urban residents living in the U.S. have relatively easy access to neighborhood parks.[7]

Previous studies have reported that parks in high-poverty neighborhoods are used significantly less than in low-poverty neighborhoods.[8–11] Concerns about personal safety have often been speculated as a possible factor negatively affecting park use in low-income neighborhoods.[12] Crimes may lead to feelings of being unsafe and thus affect adults' willingness to go outside and visit parks near crime sites. Yet, findings in the literature have been inconclusive. Perceived park safety was a strong predictor of self-reported park use, [13–15] but was not significantly related to observed park use or park-based physical activity. [8,16] One study found that perception of neighborhood crime was associated with physical inactivity and obesity among older adults.[17] Some previous research found safety concerns and fear of crime as self-reported barriers to park use among women.[18,19] Another study, however, showed that objective crime measures were unrelated to the participation in leisure-time physical activity among older adults in a southern European city.[20] A study of Hispanic caregivers showed objective crime data was correlated with perception of crime, but not with the physical activity outcome.[21] Mixed results in a systematic review were reported between crime-related safety and physical activity among youth where most reviewed studies did not find significant correlations.[22] Furthermore, a review for adults' physical activity also noted that various safety factors demonstrated few associations with physical activity among adults.[23]

In many previous studies, proxies (e.g., perception of safety, poverty, environmental incivilities, perception of crimes) rather than objective public crime measures were used. In most studies, park use and park-based physical activity were either self-reports or based on time-limited observations (e.g., 1 week) and from a small sample of parks. The authors consider that the lack of precision and accuracy in both predictors and outcomes may have hindered the identification of the true relationship between crime and park use. This study aims to examine the associations between objective crime data and both objectively measured and self-reported park use and park-based physical activity. This study uses a random sample of 48 neighborhood parks in low-income areas of the City of Los Angeles. The use of the 48 parks during a 2-year period (from June 2013 to August 2015) was measured through both direct observations and resident surveys. The geocoded crime incidents in the 48 neighborhoods during the same period were also mapped. Using these comprehensive data sources, the purpose is to identify whether crime rates are associated with park use and park-based physical activity.

METHODS

Study Sample

These data come from a parent study, which tested interventions to increase park use and park-based physical activity in an RCT. For additional details of the parent study see Cohen et al.[24] The 48 study parks are all managed by the city's Department of Recreation and Parks and all were located in low-income neighborhoods in Los Angeles, where >13.5% of households in parks' 1-mile radius neighborhood were living below the poverty line. The 48 study parks are a random and representative sample drawn from a total of 80 eligible parks in low-income areas (sampling rate=60%). All 48 study parks are staffed and all have onsite recreation centers.

Measures

Objective park use measurement consisted of the aggregated activities of all park users within park boundaries, regardless of where the individual park users live. Park use was measured with the System of Observing Play and Recreation in Communities.[25,26] The primary data generated by System of Observing Play and Recreation in Communities are aggregated counts of park users by gender, age group, and physical activity levels during an observation hour, which were collected by trained observers scanning the use of a park. During the scan, observers also assessed park-level factors directly affecting park use and physical activity (e.g., accessibility and programming), park-level incivilities (e.g., stray dogs, homeless, noise), and weather. A thorough observation schedule was designed to achieve accurate measurements of park use and attenuate confounding because of seasonal trend and temporal correlations. All 48 parks were measured during two waves over a 2-year period, where each wave consisted of a 6-month observation period and the two waves were separated by 6 months. The 48 parks were randomly assigned to four cohorts where each cohort started the baseline observation in a different season.

For the same cohort, the two waves were scheduled during the same seasons. In each wave, a park was observed 1 day per month for 6 months. Of the 6 days of observation for each park, 3 days were weekdays and 3 were weekend days. On each observation day three hourly observations were conducted in a park, all consecutive observations were separated by >2 hours, resulting in a total of 18 observations per park per wave. Experienced and certified observers conducted the field observation between Spring 2013 and Summer 2015.

Subjective park use outcomes were based on resident surveys. Approximately 30 households were randomly sampled in each wave from all residential addresses within a 1-mile radius of each study park. Sixty households were stratified by their distance to parks (within a quarter mile, between a quarter and a half mile, and between a half and 1 mile), with 20 households in each stratum. Trained survey workers visited the sampled households and conducted structured in-person interviews. Nonresponding households (no one at home) were replaced by the adjacent households. In total, combining the two waves, 2,973 surveys of the local residents living within 1-mile of the parks were conducted. Besides the park use outcomes, data were also collected on various covariates during the survey, including demographics and health status.

Annual crime data were obtained through the Los Angeles Open Data (https://data.lacity.org) from 2012 through 2015. Data files contained geocoded crime and collision records provided by the Los Angeles Police Department. Using ArcGIS, crime data were mapped using the provided latitude and longitude. A 1-mile buffer was created around each park using the geocoded park addresses. All reported crimes within the 1-mile buffers were selected. Crimes that occurred within 6 months before each observation wave in each park were counted by the following crime categories: violent crimes including homicide, rape and sexual assault, shooting and other violent crimes (e.g., robbery, aggravated assault), property crimes (e.g., vandalism burglary), and all other non-violent and non-property crimes. Crime rates were defined as frequency of crimes per 10,000 people in the 6-month period, with the population in the 1-mile radius as the denominator.

Statistical Analysis

Descriptive analyses were conducted for park outcomes, crime rates, and all park-level and respondent-level covariates. Objective park use outcomes included the number of observed park users and their estimated energy expenditure in parks using MET scores, assigning the MET value of 1.5 for sedentary, 3 for moderate, and 6 for vigorous activity, respectively. Self-reported park use outcomes included the number of visits in past 7 days, and duration of park visits, where the duration outcome was converted to minutes using the midpoint of each reporting category (e.g., 15 minutes if the report is "between 0 and 30 minutes).

Formal statistical analysis was conducted using longitudinal generalized linear models. Objective park observations and self-reported park use were analyzed separately, with crime rates as the main study factor and appropriate controlled covariates. For park observation outcomes, the authors controlled for park-level and neighborhood-level static covariates (park size, local population in 1-mile radiuses, household poverty rate in parks' census tract), park time-varying factors during a hourly park observation (food vendors on parks' premises, food vendors on parks' surrounding streets, existence of ongoing construction in parks, presence of homeless people in parks, presence of interpersonal confrontations in parks, presence of intoxicated people in parks, presence of smokers in parks, number of accessible facilities, number of target areas having supervised or organized activities, and study cohorts). The authors also controlled for local population density and poverty rate in the neighborhood. Temporal trends were modeled using fixed effects for observation waves, season of a year, day of a week, and hours in a day. Intra-park correlations among repeated observations were adjusted by generalized estimating equations. For self-reported park use, the authors controlled for individual-level covariates of age, gender, distance between home and the park, primary language, education level, BMI category, self-rated general health status, and having children aged <18 years. Random effects were used to account for park-level clustering among sampled residents. For easy interpretation, park observations were modeled on the multiplicative scale (as percentage changes) and self-reported park use was modeled on the original scale (as absolute changes). All analyses were performed in SAS, version 9.4 in 2017.

RESULTS

Table 1 provides descriptive statistics for the 48 study parks as well as observed park use outcomes. The study parks have an average size of 8.4 acres and an average local population of 52,310 people within 1-mile radius of the parks geocoded addresses. Overall, the local population is predominantly Hispanic (68.7%), but there is wide variation. The percentage of residents who are African American, non-Hispanic white, and Asian ranged from <1% to 67.2%, 71.0%, and 31.0%, respectively. On average, 27% of households in the study parks' census tracts lived in poverty. The average rates of homicide and shootings were around 0.5 instances per 10,000 people during a 6-month period. Most parks (45 of 48) had at least one homicide and one shooting incident during the study period. The next rarest crime category was rape and sexual assault (3.7 instances per 10,000 people in 6 months). The other crime categories (other violent, property, other non-violent) had much higher average rates of 72.8, 121.3, and 72.6 instances per 10,000 people in 6 months, respectively. This compares with the citywide rates of 0.3 (homicides), 1.5 (rape and sexual assault), 20 (other violent), 110 (property) per 10,000 people in 6 months during 2013–2014 (www.city-data.com). The study parks had substantially higher violent crime rates but similar property crime rates compared to the city-level average. An average of 3,092 park users accumulating 6,773 METs per park was observed during the observation period (an average of 86 people accumulating 188 METs per hourly observation).

Table 2 gives the sample characteristics of the resident surveys. Most of the 2,973 respondents were female (54.9%). The average age was 43.0 years. A large proportion (46.0%) had children aged <18 years. The sample's race/ethnicity distribution was very similar to that of the local population. Despite the high poverty rate and crime rates in the local neighborhoods, only about a quarter (24.9%) of the respondents perceived their parks as unsafe. Respondents reported an average of 0.94 visits to their parks in the past 7 days, with an average stay of 88.4 minutes.

Table 3 reports the relationship between different categories of crime rates and park observation outcomes. Homicides and shootings had significant negative relationships with observed park use and park-based physical activity levels. One homicide per 10,000 people in the 6-month period leading up to the park observations was associated with a −14.3% difference in park-based physical activity measured in METs ($p<0.05$), and a −13.5% difference in total observed park use ($p<0.01$). One shooting per 10,000 people in the same 6 months was associated with a −15.8% difference in METs ($p<0.05$) and a −15.3% difference in total observed park use ($p<0.01$). The decline was most prominent among seniors (−40.1% and $p<0.05$ for homicide, −33.4% and $p<0.05$ for shooting, respectively), and significant for non-elderly adults (−13.2% and $p<0.05$ for homicide, −18.1% and $p<0.01$ for shooting, respectively). However, there were no significant findings among teenagers and children. Homicide and shooting were significant in both genders with similar effect sizes. The other crime categories (violent sex crimes, other violent crimes, property crimes, and other non-violent crimes) were not significantly associated with any of the observed park use outcomes.

Table 4 presents the relationship between crime rates and self-reported park use outcomes among local residents. Homicide had a remarkable and significant relationship with outcomes. One homicide rate per 10,000 people in the 6-month period was associated with 0.23 ($p<0.01$) fewer park visits in the past 7 days and about 7.5 ($p<0.05$) fewer minutes in a typical park visit, which were roughly equivalent to a 24% decline in park visit frequency and 9% decline in typical park visit duration. Most other crime categories including shooting were not significantly related to self-reported park use. The only significant crime category besides homicide was property crime but the effect size was very small: ten more instances were related to 1.1 fewer minutes in a typical park visit ($p<0.05$).

DISCUSSION

This study identified a consistent relationship between severe violent crime and park use outcomes among adults, both by park-level objective measures and individual-level self-reports. In 2014, roughly 70% of all homicide deaths in the U.S. were by firearms, and shooting crimes must involve a firearm.[27] Therefore, the current findings suggest that two types of primarily gun-related violent crimes (homicide and shooting) have significant negative relationships with adults' park use and park-based physical activity in the same neighborhood as crimes occurred. Severe violent crimes are relatively rare events: on average a study park's neighborhood has a population of approximately 50,000 people, and faces roughly 2.5 incidences of shooting and about the same number of homicides during 6 months (Table 1). These severe violations of laws often receive extensive media coverage through a variety of traditional news media as well as online social media. By contrast, less severe violent crimes, property crimes, and non-violent crimes occur at high frequencies (roughly a few dozen per week in any neighborhood) and do not garner the same level of public attention. In addition, because of their lethality, rare violent crimes may influence one's perception of safety more than other types of crimes, and perception of safety is a direct factor affecting people's park visit behavior.[13]

It is important to note that although the association of severe violent crimes with park use is similar by gender, it is not homogenous across age groups. Park-level observational data showed that adults (non-elderly and seniors) were significantly less likely to visit the park after such crimes, but these incidents did not seem to affect the park use of younger people (teenagers and children). There are several possible explanations for this difference. Adults may pay more attention to local news than younger people. Violent crimes may also have differential psychological impacts on different age groups and thus affect their perception of safety differently. In many neighborhood parks and recreation centers, children and teenagers are the primary users of park-sponsored or permitted programs such as youth leagues, after school activities, and classes. These supervised activities usually have fixed schedules and thus may be less impacted by crimes, most of which did not happen in parks. By contrast, adults are less likely to participate in park programs and more likely to use parks on their own. The authors found no gender difference in the relationship between crimes and objective park use—there were similar reductions in females and males in parks with shootings and homicides in the previous 6 months and no gender differences in the lack of relationship between other crime types and park use and physical activity.

Limitations

This study is subject to several important limitations. First, this paper is an observational study, and the findings are purely associative. It is difficult to design an experiment to manipulate crime rates at the neighborhood level. To establish causality, more empirical studies using high quality measurement data as well as qualitative studies are still needed. Second, all the study parks were in low-income neighborhoods and lacked heterogeneity. It is important to study parks from more diverse communities (e.g., high-income neighborhood, different local demographics, unstaffed parks) to examine if the negative associations between crime and park use are also present. Third, because of resource limitation, the observation schedule for park use was sparse (1 day per month) and the observation period lasted for only 6 months. The limited data prevented studying crimes that occurred in parks (too few) or short-term effects of crimes, both of which may have a more concrete linkage to park use outcomes. Fourth, there may be systematic measurement biases in survey respondents' perception of safety and crimes. Future questionnaire design may need to consider more specific questions probing one's perceptions.

CONCLUSIONS

Despite the limitations, these findings revealed that firearm-related violence can have relatively long-term associations with the local population's physical activity. The negative association with park use and park-based physical activity was statistically significant 12 months after the incident. Neighborhood parks are a major venue for its local population to accrue leisure-time physical activity,[4,5] and it is more difficult to find alternative venues for leisure-time exercise and physical activity in low-income neighborhoods. Thus, a reduction in park use may mean a reduction in total population-level physical activity. Reduction in gun-related crimes may provide additional health benefits beyond their immediate societal effects.

Acknowledgments

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Table 1

Characteristics of 48 Study Parks and Their Local Neighborhoods

Characteristics	Mean	Range
Neighborhood characteristics[a]		
Households in poverty in parks' census tract, %	27.0	13.5–41.0
Population, n	52,310	25,530–133,123
Hispanic, %	68.7	15.7–94.9
African American, %	11.7	0.7–67.2
Non-Hispanic white, %	9.0	0.3–71.0
Asian, %	9.0	0.2–31.0
Other/Multi-racial, %	1.6	0.2–4.5
Crime rates (instances/10,000 residents)[b]		
Shooting, n	0.55	0–3.3
Homicide, n	0.50	0–2.7
Rape and sexual assault, n	3.7	0.7–10.7
Other violent crime, n	72.8	11.8–164.5
Property, n	121.3	31.3–295.2
Other non-violent crime, n	72.6	18.1–221.4
Park characteristics		
Acres	8.4	1.5–25.8
Facilities	8.1	4–14
Park observations		
Total park users, n	3,092	375–7,602
Total METs	6,773	924–16,922
Organized activity sessions	10	0–45

[a]Derived from 2010 Census; based on a 1-mile radius from the park recreation center address.

[b]Crime counts were during the 6-month period leading to the observation wave.

Table 2

Characteristics of the Resident Survey Sample (n=2,973)

Participant Socio-demographics	Percentage/Mean(SD)
Age (years)	43.0 (13.9)
Female, %	54.9
Race/Ethnicity	
Latino, %	73.4
African American, %	9.8
White, %	10.3
Asian, %	2.0
Other race/ethnicity, %	4.5
Education level	
<High school, %	32.7
High school graduate, %	32.8
Some college, %	16.1
College graduate, %	18.4
With child aged <18 years	46.0
Perceive park unsafe, %	24.9
Poor or fair self-rated health, %	22.8
Obese (BMI>30), %	19.0
Mean screen time (minutes per week)	162.2 (79.1)
Language used in interview is Spanish	62.2
Average number of visits in past 7 days	0.94 (1.64)
Typical duration of park visit (minutes)	88.4 (41.5)

Table 3

Estimated Associations of Crime Rates in Parks' Neighborhood and Park Use Outcomes[a]

Crime category (per 10,000 population)	Total METs	Observed park users, n						
		Total	Female	Male	Child	Teenager	Non-elderly adult	Senior
Shooting	−15.8*	**−15.3****	**−14.7***	**−15.2****	−10.5	−4.6	**−18.1****	−33.4*
Homicide	−14.3*	**−13.5***	**−15.4***	**−12.0***	−12.6	−2.2	**−13.2***	−40.1*
Sexual offense	−0.1	0.5	1.4	−0.3	0.1	−2.2	1.2	−4.1
Other violent crime	−0.1	−0.1	−0.2	−0.1	0.0	−0.1	−0.1	−1.1**
Property	−0.1	−0.1	−0.1	−0.1	−0.1	−0.3	0.0	−0.4
Other non-violent crime	−0.1	−0.1	−0.1	−0.1	−0.1	−0.4	0.0	−0.4

Notes: Boldface indicates statistical significance (***p<0.001; **p<0.01; *p<0.05).

[a] All estimates are percentage changes in park use outcome per one unit increase in crime rates. All estimates have adjusted observation time (hours of a day, days in a week, and season), park characteristics (size, accessible areas, organized activities), park atmosphere, neighborhood characteristics.

Table 4

Estimated Relationship in Self-reported Park Use by Local Resident and Crime Rates[a]

Crime category	Park visits in the past 7 days, n	Duration of park visits (minutes)
Shooting	0.09	−0.18
Homicide	−0.23**	−7.46*
Sexual offense	−0.03	−0.07
Other violent crime	−0.01*	−0.10
Property	−0.001	−0.11*
Other non-violent crime	0.0004	0.04

Notes: Boldface indicates statistical significance (***$p<0.001$; **$p<0.01$; *$p<0.05$).

[a] All estimates are absolute changes in the outcome per one unit increase in crime rates. All estimates have adjusted demographics, individual characteristics, health status, primary language, and distance buffer to parks.