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Effects of Park Improvements on Park Use and Physical Activity Policy and Programming Implications

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Abstract

Background—Many assume that improving the quality and the perceived safety of facilities in parks and recreation centers are critical to attracting more users and increasing population physical activity. There are few studies in which these assumptions have been tested.

Purpose—To assess the impact of park improvements on park use and physical activity.

Methods—Five intervention parks and five matched comparison parks were studied by objectively measuring park use and collecting self reports of park use by residents before and after park improvements. After using the System for Observing Play and Recreation in Communities (SOPARC) to count park users and measure their activity levels and conducting household interviews and intercept surveys with park users, propensity score analyses were used to adjust for differences in respondents' characteristics between pre- and post-intervention and across conditions.

Results—Overall park use and physical activity declined in both intervention and control parks, with 39% of the decline directly attributable to fewer scheduled organized activities. Perceptions of park safety increased more in the intervention parks than in the comparison parks.

Conclusions—Improvements to parks may not automatically result in increased use and physical activity, especially when programming decreases. Multiple factors contribute to park use and need to be accounted for in future community-level interventions. Improving perceptions of safety alone are unlikely to result in increased park use.

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Introduction

Many civic organizations and government agencies have lamented the low levels of physical activity and high levels of obesity that plague American adults and children and have called for stepped up efforts to help citizens become healthier.¹ According to a recent NHANES assessment using accelerometry, only 42% of children, 9% of teens, and fewer than 5% of adults meet national recommendations for physical activity.² Multiple barriers to physical activity have been noted, including large distances between homes, work, and school that require motorized transport, busy streets, lack of destinations to walk to, and insufficient park space. In addition, over the past several decades there have been insufficient investments in updating recreational facilities and many believe that the lack of attractive and safe venues is a primary reason why it is difficult to increase levels of physical activity.^{3,4}

Some localities, however, do manage to allocate funds to renovate and improve public recreational spaces in local neighborhoods. In one city in Southern California, the citizens approved a bond measure which specifically allocated funds for upgrading and acquiring new open spaces for recreation. The plan was broad and was intended to improve more than 300 parks and open spaces. In addition, the bond mandated citizen participation and input in the design of new facilities and improvements. It is commonly believed that community participation in decision making results in improvements that meet local needs and preferences that simultaneously enhance feelings of ownership and local pride, resulting in greater success and better use of facilities.⁵

An opportunity for a natural experiment to improve local parks using community participation in the design served as the basis of the current study which was aimed at determining the impact of the improvements on park use and the physical activity of park users.

Methods

The study was conducted in ten urban parks and their surrounding communities. Five intervention parks had been scheduled for major improvements with budgets in excess of \$1,000,000 after December of 2003, and each intervention park was matched with a similar park (i.e., comparison park) which was not planned to receive upgrades by the city. The selected comparison park had similar size, features, and amenities and it served a population with similar sociodemographic characteristics as its intervention counterpart. (See Table 1).

Each intervention park scheduled open public meetings to discuss improvements and a Voluntary Oversight Committee was formed with members appointed by local elected officials to ensure community participation. Three parks constructed completely new gymnasiums. Two of the three parks had old gymnasiums: one retained the old gym, so they ended up with two gyms, while the other razed and replaced the one they had. The fourth park had its old gymnasium refurbished and underwent some field improvements in watering and landscaping. The fifth had improvements to picnic areas, upgrades to a walking path, and enhancements to a playground area so that it had rubberized surfacing around the climbing apparatus and stationary horses.

Assessments consisted of direct observations of park use and park characteristics plus intercept and household interviews at pre- and post-construction. Baseline data were collected between Dec 2003 and Nov 2004, and follow-up data between April 2006 and March 2008. To account for seasonal variation, pre- and post-measures were conducted at the same time of year. In addition, follow-up measures were initiated at least 3 months after construction; thus, the onset of post construction observations varied from 3 months to 14 months.

We used the System for Observing Play and Recreation in Communities (SOPARC) protocol that was developed specifically to objectively assess baseline park use and physical activity in the is project. SOPARC has been found to have good reliability⁶ and has recently been validated as an accurate method for providing estimates for total park use.⁷ Observations were conducted in all activity areas 7:30–8:30am, 12:30–1:30pm, 3:30–4:30 pm, and 6:30–7:30pm during each of the 7 days of the week. Any observation cancelled because of inclement weather was made up at the same time and on the same day of the following week. All area users are counted by gender (female or male), age group (child, teen, adult, or senior), race/ethnicity (Latino, black, white, or other), and activity level (sedentary, walking, or vigorous). The characteristics of each target area were also recorded (e.g., accessibility, usability, equipped, and whether activity in the area was being organized or supervised).

We also surveyed park users and recruited them systematically from the most and the least busy areas, by gender, and by activity level (i.e., sedentary, physically active). In addition, residents living within a 2-mile radius of the park were surveyed. More specifically, households were classified into four strata (within ¼ mile, from ¼ to ½ mile, from ½ to 1 mile, and from 1 to 2 miles from each park) and sampled approximately equal numbers of households from each stratum. Field staff, trained bilingual promotoras from a community-based organization, administered the interviews in either English or Spanish with the adult at home whose birthday most closely matched the visit date. Interviewers returned to a sampled household up to 5 times to locate residents before selecting an alternate address. Respondents were questioned about their use of the park and their physical activity. The same households were visited at baseline and follow-up, but unique identifying personal information was not collected from respondents. All methods were approved by the RAND IRB.

Propensity score analysis

To assess whether park improvements had an effect on outcomes of interest (such as park use, perceived park safety, physical activity during leisure time and health, and use of other parks), a propensity score analysis was conducted. This analysis included only 8 of the 10 study parks. The first pair was eliminated from this analysis because a few key questions had not been included in the initial survey given to residents living near them. Park users and residents within a 2-mile radius were sampled and interviewed both before and after the park improvements (note that two different samples of people were drawn at the two time points). Because this is an observational study, survey respondents are not (and cannot be) randomized to live in a certain area or use a certain park; therefore, differences in the respondents' characteristics, which in a randomized study would likely be null, might in part explain the observed intervention effect.

Propensity score weighting is an effective way of eliminating the differences in the observed characteristics (such as age, gender, and race) between survey respondents sampled at an intervention park at follow-up and respondents sampled at a control park at follow-up. Regression models rely too heavily on the linear assumption and are highly sensitive to model specification, such as the inclusion of important interaction terms. Propensity score weighting does not make linear assumptions and is more robust to model specification. The propensity score weights were fitted using the R package TWANG⁸. Four distinct groups of respondents were compared: those sampled at intervention parks at follow-up (the “treated” group), those sampled at intervention parks at baseline, those sampled at control parks at follow-up, and those sampled at control parks at baseline. Because the respondents of the treated group differed from the respondents of the other three groups with respect to some observed characteristics such as age, race, and gender, three propensity score models were run. The obtained propensity score weights were then used to weight the other three groups of respondents to make them look like the “treated group” with respect the observed characteristics. The following

respondent characteristics were included in the propensity score model: age, gender, Latino versus non-Latino, BMI, distance from home to the park, and whether the respondent engages in moderate to vigorous physical activity at work. The propensity score weights eliminated differences with respect to the characteristics between the treated group and the three other groups. A propensity score weighted logistic regression was then run to assess whether the changes in the intervention parks were significantly different from the changes in the control parks over time.

Results

Characteristics of parks and respondents

The 10 parks were located in predominantly Latino and African-American and low-income neighborhoods (average 31% households in poverty). The parks ranged from 3.4 to 16 acres (mean=8 acres) and served an average of 67,000 people within a 1 mile radius and 210,000 people within a 2 mile radius. Parks contained an average of 12 physical activity areas, which included indoor gymnasiums and classrooms as well as baseball and softball diamonds, bleachers, basketball, handball, tennis, and volleyball courts, multi purpose fields, playgrounds, gymnastics areas, and picnic and lawn areas.

Survey respondents included 768 park users and 767 household residents at baseline and 712 and 620, respectively, at follow-up. Significantly more Latinos and women were interviewed at follow-up than baseline ($p<.0001$ and $p<.0001$, respectively).

Observed park use

Overall, the number of people observed using the parks declined from baseline to follow-up. An average of 2000 people were observed using a park per week at baseline, but at follow-up only 1500 were seen (Figure 1), with the decline in all age groups, except teens. Only three parks showed increased use at follow-up, with one being a control park where the director had scheduled additional baseball games that drew extra people. The two intervention parks (# 4 and #6) with increased users had added new gymnasiums, rather than upgraded or replaced existing facilities. The increase in park # 4, however, was less than that of its matched comparison park (#3). The number of users increased in park # 6 while they declined in its comparison park (#5), but at follow-up more people still used the comparison park.

Target areas that were vacant during an observation increased from 57% at baseline to 69% at follow-up. Meanwhile the number of areas with organized activities also declined, with the largest decline in the number of organized baseball games, from 27 observed at baseline to only 9 at follow-up. Parks were observed during the same weeks of the year, but baseball season was shortened at follow-up. There was a decline in organized activities seen from baseline to follow-up across the 10 parks, with observed organized activities in gymnasiums declining from 35 to 27 and soccer competitions on multipurpose fields declining from 4 to 0. Among all park users the percentage observed in organized activities declined from 20.1% to 13.0% (from 3,935 to 1,854), accounting for 39% of the total decline in the average number of park users.

Reported Park Use and Safety

At baseline 67.0% of users reported going to the park one or more times per week, and 37.8% said they exercised at least 3 times per week in their leisure time. At follow-up, consistent with the observed decline in park use, survey respondents reported going to the park less frequently than respondents at baseline (50.5% at least once per week) and significantly more reported never going to the park at all (Figure 2). After accounting for differences in respondent characteristics, the propensity score analysis showed that the decline in observed park use for

the intervention parks was not significantly different from the decline in park use in the control parks, even though the overall decline in park use over time was significantly different from zero. Thus, improvements in intervention parks did not result in increased park use and physical activity. However, the percentage of respondents who had visited the park for the first time within the past 12 months at follow-up doubled for intervention parks compared to less than 25% for parks that were not improved. Meanwhile, the proportion of respondents reporting going to parks other than their neighborhood park did not change significantly, so the decline in park use could not be explained by increased visits to other parks. Moreover, after accounting for differences in respondent characteristics, both intervention and control parks experienced a significant decline in the percentage of respondents reporting exercising at least three times per week—from 67% to 48% in control parks and from 62% to 42% in intervention parks. The decline in the intervention parks over time, however, was not significantly different from the decline experienced by the control parks (Table 2).

Perceptions of park safety from baseline to follow-up improved among intervention park users and neighborhood residents; while it decreased for the control parks. This was a significant change; however, it was not correlated with observed park use or self-reported exercise.

Discussion

Given the large investments in improving park facilities, the lack of increased use in the parks was disappointing. In 2 of the 3 parks with completely new facilities that did not replace or upgrade previous ones, there was a small increase in users. The numbers of users in the respective comparison parks which did not have new facilities, however, was still higher. The general decline in park use and in the amount of exercise reported by respondents over time is particularly distressing when a major source of health problems and chronic diseases stem from an energy imbalance, which theoretically could be addressed in part by increasing physical activity. Given that declines occurred in both intervention and comparison parks, these secular trends appear to be unrelated to park improvements. The findings of this study are counterintuitive until one examines other changes that occurred concurrently with facility improvements. During the study period the Dept. of Recreation and Parks suffered budget cuts that led to reduced programming. This resulted in reduced hours for several gymnasiums, and one gym reduced hours as a consequence of gang intimidation. Another park shortened its baseball season, which attracted both players and hundreds of spectators. Subsequently, with reduced hours of operation and fewer organized programs and events, lower attendance would be expected regardless of new park facilities. An estimated 39% of the decline in park users can be directly attributable to a reduced number of organized programs, with the remaining decline being indirectly related, with fewer accompanying friends and family who might use play areas or other parts of the parks concurrently. Other reasons for the remaining decline in park use could be due to competing demands, other entertainment or leisure opportunities, or even the economic recession, which was concurrent with much of the follow-up period.

Even with reduced park use and programming, respondents at intervention parks perceived them as being safer than at baseline and being safer than comparison parks. Perhaps the new look of the buildings and facilities contributed to this perception. Meanwhile, parks with lower ratings of safety were often used more frequently than parks with higher safety ratings; suggesting that increasing park safety in itself is not sufficient to attract people to parks. In a comparison park which had the lowest safety ratings and a shooting/attempted murder incident, park visits actually increased. This increase was attributable to the scheduling of additional baseball games. Factors, such as programming, staffing, and outreach, thus appear to play a larger role in park use than safety.

Community participation was built into the design and plan for park improvements, but was limited to initial plans and did not continue once they were approved. Because the duration of facility construction was between 1 and 2 years, any potential advantage of the community participation component may have been diluted by the length of time between facility development and completion.

Study Limitations

Because of the lengthy time span between baseline and follow-up measures it is possible that factors beyond the scope of the study contributed to the decline in park use. Observations were limited to a single week in a single season at each time period, and if changes occurred in other seasons, they would have been missed. Although having additional random measures over an extended period of time would provide a more representative evaluation, the logistics and costs of assembling field staff to work intermittently made this infeasible.

Other Barriers

Few of the parks were doing any extensive outreach or marketing. Most only published a brochure on their offerings that was available at the park office and not widely distributed, except to local public schools. Public parks are considered public goods with a purpose of supplying a place for recreation and leisure and they are traditionally not supposed to compete with the private sector⁹; thus their personnel usually do not have the skill sets to recruit park users. In addition, parks typically subsidize recreation programs, so there is little financial incentive to develop more programs and fill them.

Rapid changes in technology and communications have occurred in our society recently, and the increasing accessibility and convenience of stimulating sedentary behaviors are factors with which outdoor and active recreational programs must compete. Attracting people to improved park venues may not be successful unless the physical changes are so novel and remarkable that these alone would draw people to them. Multifaceted approaches that couple marketing, programming, and other outreach efforts are likely needed to ensure that facility use is optimized and that the full benefits of investing in parks will accrue to local residents. With sedentary living becoming so easy and increasingly attractive, the challenge to parks and recreation professionals to promote active living will only increase, particularly as the declining economy forces even further funding reductions for park programming and outreach.

Acknowledgments

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Figure 1.

Changes in park use from baseline to follow-up by age group, aggregate results for all ten parks

Baseline: Avg of 2000 persons observed per park

Follow-up: Avg of 1500 persons observed per park

Figure 2.
Reported frequency of park use at baseline and follow-up by park users and residents, aggregated for all ten parks.

Table 1

Park and Community Characteristics (Paired parks are in the same consecutive shading, “a” is a comparison park, “b” intervention) and Respondent Characteristics

	Acres	# of facilities	% White	% Latino	% Black	% Asian	% Households in poverty (1999)	% < 18	% > 60
Park 1 Comparison	16.0	17	2	65	31	2	44.3	42.2	6.3
Park 1 Intervention	9.0	17	0	65	34	0	36.1	38.1	10.7
Park 2 Comparison	3.4	8	1	95	0	4	54.9	38.0	8.0
Park 2 Intervention	4.2	7	5	80	2	12	35.6	25.8	15.8
Park 3 Comparison	8.5	12	0	11	88	0	16.6	26.3	21.8
Park 3 Intervention	8.1	16	1	21	75	1	16.3	28.8	16.6
Park 4 Comparison	6.4	11	2	94	0	3	31.9	31.7	14.0
Park 4 Intervention	6.9	11	5	86	5	2	41.2	41.9	6.8
Park 5 Comparison	9.0	10	26	52	3	17	23.9	21.3	10.9
Park 5 Intervention	10.0	9	27	55	1	11	9.8	29.7	14.6
Park Users		Residents							
	Baseline <i>n</i> = 822	Follow-up <i>n</i> = 714	Baseline <i>n</i> = 81	Follow-up <i>n</i> = 620					
Median Age ^a	36.5	37.1	38.5	40.5					
% Male	46.2%	37.5%	37.8%	28.1%					
Race/Ethnicity									
% Latino	79.2%	90.5%	74.2%	86.5%					
% White	3.3%	0.6%	5.8%	0.7%					
% Black	16.9%	8.7%	18.8%	12.3%					
% Asian	0.6%	0.3%	1.0%	0.2%					
Lived in neighborhood ≥ 5 years	54.8%	44.2%	58.2%	47.5%					

^a Surveys were also conducted with 51 people who were not categorized as either a resident or a park user

Table 2

Results for Key Outcomes, Using Propensity Score Weighting and Logistic Regression

Propensity Score Analysis	First time user		Neighborhood Park use		Other park use		Park safety		Health		Regular exercise	
	Control	Intervention	Control	Intervention	Control	Intervention	Control	Intervention	Control	Intervention	Control	Intervention
Baseline	0.080	0.097	0.692	0.587	0.117	0.111	0.860	0.696	0.374	0.468	0.667	0.616
Follow-up	0.099	0.195	0.582	0.488	0.108	0.066	0.774	0.913	0.433	0.521	0.482	0.419
Logistic Regression	Ratio of ORs		Ratio of ORs		Ratio of ORs		Ratio of ORs		Ratio of ORs		Ratio of ORs	
Interaction effect	1.08	0.007	1.01	0.850	0.96	0.249	1.35	<.001	0.99	0.905	0.99	0.812

Table 2 reports the exponential of the interaction coefficient between the Intervention and Follow-up dummies (or interaction effect) obtained from the logistic regression and the associated p-value. From the formula below it can be seen that the exponential of the interaction parameter is a ratio of ORs. So this parameter allows an assessment of the change in odds for the intervention parks over time with respect to the change in odds of the control parks over time.

$$\frac{\frac{P(Y=1|Intervention,Follow-up)}{P(Y=0|Intervention,Follow-up)}}{\frac{P(Y=1|Intervention,Baseline)}{P(Y=0|Intervention,Baseline)}} = \exp(Interaction) \times \frac{\frac{P(Y=1|Control,Follow-up)}{P(Y=0|Control,Follow-up)}}{\frac{P(Y=1|Control,Baseline)}{P(Y=0|Control,Baseline)}}$$

Or, the formula above could be rewritten in this way:

$$\frac{Odds(Y|Intervention, Follow - up)}{Odds(Y|Intervention, Baseline)} = \exp(Interaction) \times \frac{Odds(Y|Control, Follow - up)}{Odds(Y|Control, Baseline)}$$

[CE: please change n-dashes in “Follow-up” in equations above to hyphens, or ask author to do so]