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Impact and cost-effectiveness of family Fitness Zones: A natural experiment in urban public parks

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ABSTRACT

We evaluated the impact of outdoor exercise equipment (FZ, Fitness Zones) in 12 parks serving diverse populations. We used the System for Observing Play and Recreation in Communities (SOPARC) to assess use and estimate energy expenditure prior to and twice after FZ installation. Park use increased more in FZ parks than in 10 control parks that did not get equipment, but the difference was not statistically significant. However, self-reports of being a new park user increased more in FZ parks, and estimated energy expenditure in FZ parks was higher at both follow-ups than at baseline. Installing Fitness Zones appears to be cost-effective (10.5 cents/MET increase) and most successful in parks in densely populated areas with limited facilities. Longer-term follow-up measures are needed to determine if the early increases in physical activity associated with the Fitness Zone installations are sustained.

1. Introduction

Many communities and organizations would like to improve community parks to increase physical activity, yet the impact of such improvements is seldom evaluated. Given limited resources, cost-effectiveness is a concern among community-based organizations that would like to optimize their investments. A previous review of interventions promoting physical activity measured estimated cost-effectiveness by determining the cost required to facilitate an increase of physical activity by 1 MET, the amount of energy typically spent in walking for about 20 min (Wu et al., 2011). The findings were quite varied, with costs for signs prompting stair use as little as 0.1 cent per MET gained to several dollars per MET for intensive interventions with trainers. Generally, interventions that reached large numbers of people tended to be more cost-effective than individual-level approaches. On a cost per person basis, however, interventions targeting large populations typically facilitated only small changes for the average individual.

Evaluations of interventions targeting the availability or quality of facilities where people can be active have shown mixed results. One study of park renovation found increases in use (Tester and Baker, 2009), as did an evaluation of a skate park renovation (Cohen et al., 2009). In a study of school playground use, painting playground areas were associated with more vigorous physical activity among children (Stratton and Mullan, 2005). However, other studies found that neither renovating a senior citizens' center with indoor exercise equipment nor renovating or building new gymnasiums attracted more users (Cohen et al., 2008; Cohen et al., 2009). Similarly, an evaluation of a new walking trail did not demonstrate increases in physical activity among local residents (Evenson et al., 2005). In these latter studies, insufficient marketing and outreach were considered partly responsible for failure to increase facility use. Marketing and novel facilities are both likely to be important factors that attract people to parks and influence onsite physical activity.

The idea of bringing activity equipment into parks as a way of stimulating more physical activity is exemplified by installing "Fitness Zones", easy-to-use outdoor gyms consisting of durable, weather-, and vandal-resistant exercise equipment for strength training and aerobic exercise. These are intended to provide new exercise opportunities for large numbers of people in public settings. With support from a variety of funders, the Trust for Public Land (TPL) installed many of these facilities in Southern California public parks. The total cost for each Fitness Zone averaged $45,000, which covered the cost of 8 pieces of equipment, installation, and staff time for coordinating the installations. The equipment needs no electricity and is appropriate for individuals 13 years and older and for all fitness levels.

We evaluated the impact of the Fitness Zone equipment on physical activity in six parks managed by Los Angeles County and six managed by the City of Los Angeles, all serving a wide range of population groups. (Los Angeles is both a County and City). Both City and County parks were included because they offered diversity and all added "Fitness Zones" (FZ). Our objectives were to answer the

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following questions: (a) how well is the TPL fitness equipment used after installation?; (b) which age, gender, race/ethnic groups use it, how often do they use it, and do they use it correctly?; (c) overall, do more people use the parks? (Including both Fitness Zones and other park activity areas), and are park users more physically active in the parks than before the equipment was installed? We calculate the cost-effectiveness of the equipment, based upon the incremental change in park-based physical activity after the equipment was installed, as well as in comparison to parks where FZ equipment was not installed.

2. Methods

To determine whether the Fitness Zones attracted new users or simply provided a new exercise location for individuals already physically active in the parks, we observed not only the Fitness Zone spaces, but all park activity areas before and after the equipment was installed. We used SOPARC (System for Observing Play and Recreation in Communities) (McKenzie et al., 2006) to assess the use of the entire park before and after the installation of the fitness equipment as well as at 10 similar parks that did not get Fitness Zone equipment. SOPARC entails dividing a park into distinct target areas and then systematically rotating through the areas and counting every individual, noting his/her gender, age group, race/ethnicity, and activity level. The activity level is observed momentarily, and each individual is recorded as sedentary (standing, sitting, or lying down), moderate (walking), or vigorous (e.g. jogging or running). Observations were conducted three times per day (morning, noon, and late afternoon) on four days, systematically rotating the hours to cover all daylight time periods over two weekdays and both weekend days in each park. The duration of the observations varied, depending on the number of people in the park, since each person is counted. Generally, rotating through the park target areas took less than an hour. If it took less than half an hour, the SOPARC protocol requires conducting two observations and then averaging the result for that observation period. The reliability of this observation schedule is excellent for estimating the number of users, and is acceptable for estimating the percent of individuals engaged in sedentary and moderate physical activity (Cohen et al., in press). We observed parks in the winter of 2008–2009 before the Fitness Zones were installed and then again during two follow-up periods; the first a year later during the winter of 2009–2010 and the second a few months thereafter (Spring, 2010). Once the equipment was installed, and not before, we also observed the users of each piece of equipment in the Fitness Zones hourly for 10 of the 12 h between 7:30AM and 7:30PM on the four days, varying the starting and ending times in order to capture a longer duration of park use. We also observed people within the Fitness Zone boundaries who were not using the equipment at the moment of observation.

In three parks we limited the number of areas observed. At the largest park (Alondra), we did not measure use of the associated golf course, and at the next largest (Cerritos) we selected areas only proximal (about 14 acres total) to the Fitness Zone, while excluding remote ball fields and picnic areas. At Ladera the Fitness Zone was installed behind a Senior Citizens' Center and we measured areas only in and around the Center, while excluding a large park across the street.

In addition to direct observation, we conducted intercept interviews with park users at all parks at baseline and follow-up, including two follow-up periods at FZ fitness zone parks. We specifically conducted surveys with individuals in Fitness Zone areas after the equipment was installed, distinguishing them from park users recruited in other areas of the park. We systematically interviewed park users from both the busiest and least busy activity areas to reduce selection bias. We queried respondents about their use of the park, use of fitness equipment, and perceptions of the park in general. During the two follow-up periods (after Fitness Zones were installed), we over-sampled park users in the Fitness Zone areas because we were interested in getting feedback on the use of the new equipment. Since women and Fitness Zone users completed surveys proportionally higher than those observed directly, we used post-stratification weighting so that within each park the proportion of female and male respondents using the Fitness Zone and using other park areas matched the proportions from the observation scans. We then conducted descriptive analyses of survey responses.

Because proximity is a predictor of park use, we wanted to see how far visitors traveled to use the fitness equipment. Survey respondents identified the nearest street intersection to their home, and we geocoded their street intersections and park addresses using ArcGIS. Cartesian distances were estimated from the home intersection to the park, so that actual distances traveled to the park may have been underestimated due to the street/sidewalk network surrounding the parks.

We aggregated individual observations to calculate estimated energy expenditure by park. Energy expenditure at a park (and each activity area) is a combination of the intensity of activities occurring and the number of people engaging in them. We estimated energy expended in Fitness Zones and in other park areas using METs, the ratio of work metabolic rate to standard resting metabolic rate. We assigned MET levels as 1.5 for sedentary, 3 for walking, and 6 for vigorous activity as listed in Ainsworth et al. (2000).

We calculated the cost effectiveness of the Fitness Zones by determining the increment in METs generated per cost of the equipment. We amortized the cost of the equipment over 15 years, the duration of the equipment's limited warranty (Greenfield, 2011), and then added $2,000 per year for the cost of maintenance. To obtain the incremental increase in METs, we calculated the amount gained first by averaging the METs observed in activities at the park in the first and second follow-up periods and then subtracting the METs expended at baseline. Since these METs represent 12 h of observation, in order to obtain a conservative estimate of annual use, we multiplied this figure by seven days of the week and by 47 weeks of the year, to account for an average of 35 days of annual precipitation in Los Angeles, which might interfere with Fitness Zone equipment use. We also used 2000 US Census data to determine the population density within a 1-mile radius of the parks as well as the socio-demographic characteristics of residents.

3. Propensity score analysis

In order to determine whether the change in observed or self-reported park use might be attributed to secular trends or to the Fitness Zone installations, we obtained data from 10 similar parks where Fitness Zones were not being installed. Data collection methods were the same, with baseline and follow-up observations being in the same season, but not necessarily the same seasons as for the Fitness Zones observations. The primary difference was that the timing of data collection from baseline to follow-up was an average of two years instead of one, as in the FZ parks. This analysis focused on 10 of the 12 FZ parks. Excluded FZ parks were Ladera, because it was an outlier in placement and use, and Alondra, because of missing respondent data.

Because this is an observational study, survey respondents were not (and could not be) randomized to 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 comparison park at follow-up, for example. 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. We fitted the propensity score weights using the R package TWANG (Ridgeway et al., 2006). We compared four distinct groups of respondents: those sampled at the FZ parks at follow-up (the "treated" group), those sampled at the FZ parks at baseline, those sampled at comparison parks at follow-up, and those sampled at comparison 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, we ran three propensity score models. We then used the obtained propensity score weights to weight the other three groups of respondents to make them look like the "treated" group with respect to the observed characteristics. We included in the propensity score model the following respondent characteristics: age, gender, Latino ethnicity, BMI, self-reported health status, and whether they exercised at work. The propensity score weights eliminated differences with respect to the characteristics between the "treated" group and the three other groups. We then ran propensity score weighted regressions (linear or logistic depending on the outcome) to assess whether the installation of Fitness Zones had an effect on self-reported park use and other outcomes.

Adjustments to baseline observation counts were made based upon unanticipated barriers. In one park during the second day of observation, field staff witnessed drug deals and a potentially dangerous situation, so no further observations were made at baseline. We imputed the potential use of that park by applying the patterns of use in three other parks of similar size in neighborhoods with similar percentage of households in poverty and minority populations. In a second park, the gymnasium was closed at follow-up, so we eliminated counts of persons using the gym at baseline to make the follow-up observations more comparable.

Analysis of the observation data was conducted using a mixed effects model. We used a random effect for every park in order to impose correlation among the two observations over time (baseline and follow-up); this is equivalent to a random intercept. The dummy indicator for FZ parks (versus the comparison parks), wave and their interaction were treated as fixed effects instead. This model is equivalent to a "differences-in-differences" model or repeated measures model. Note that because we introduced a random effect for each park, controlling for park level characteristics is not necessary (in other words, controlling for the park level characteristics does not affect the estimate of the treatment effect). The parameter of interest is the interaction between the FZ park indicator and wave. If it is significantly different from zero, it implies that the change in outcome from baseline to follow-up experienced in the FZ parks is significantly different from the change experienced in the comparison parks.

Although we sampled park users at two follow-ups in the FZ parks, we used only the first follow-up data to match with the comparison parks.

4. Results

4.1. Park characteristics

Excluding unobserved areas like adjacent golf courses, FZ park size averaged 14.4 acres (range, 1–29 acres). Within a 1-mile radius around the parks, the average percentage of households in poverty was 29.3% (range, 6.8% to 61.5%); average population density was 40,964 persons (range, 7,581 to 72,292), percent Latino was 59% (range, 19.1% to 97.3%), and percent African American was 18.9% (range, 0.3% to 68.6%). (See Table 1). The ten comparison parks averaged 12.4 acres (range 0.5–46 acres) and served an average of 33,226 individuals in a 1-mile radius including 46.3% Hispanic and 15.3% African American residents.

Table 1
Park characteristics.

Park	Location	1-mile population (year 2000)	Acres	% Hispanic	% African American	% poverty
48th Street[a]	City	64,409	1.0	67.9	30.1	39.8
Alondra[a]	County	37,962	15.6	42.7	9.9	15.5
Athens	County	24,192	20.0	52.1	45.4	31.7
Cerritos[a]	County	26,391	14.4	19.3	8.4	6.8
Gilbert[a]	City	72,292	18.0	81.5	17.4	41.5
Ladera	County	33,213	15.9	19.1	68.6	14.9
Pathfinder	County	7,581	29.0	25.9	1.9	8.0
Salazar	City	42,278	8.4	97.3	0.3	61.5
Slauson[a]	City	48,529	3.6	83.6	14.8	41.5
South[a]	City	70,060	18.0	78.6	20.4	41.0
Steinmetz	County	19,978	12.8	52.1	1.4	11.9
Trinity	City	44,678	2.0	89.5	8.2	37.5
Average		40,964	13.2	64.8	14.8	29.3

[a] Parks where an increase in use was observed.

4.2. Observations of park users

Across the three observation periods, we counted 23,577 people in the 12 parks, including 2,570 in the FZ areas. Across all 12 parks at first follow-up one year after baseline, we counted 7,906 park users. After adjusting those observed at baseline (i.e, 6,906) for undercounts to 7,105, the difference over the year represents an 11% increase in users. These increases were concentrated in four City parks and two County parks, primarily those with a larger population density. Decreases in the overall number of park users were noted at the other six parks (see Fig. 1). At the second follow-up in the spring, the number counted in the 12 parks (7,017) was similar to baseline.

After installation, we observed Fitness Zone equipment being used throughout the day, with peaks in number of users from 9:30–11:30AM and 3:30–5:30PM. At the first follow-up we counted an average of 2.9 people per Fitness Zone in each of the 10 hourly scans (27 per day), but the number varied substantially across parks, with one Fitness Zone serving 89 users during one day. This observed number of users, however, undercounts actual use, because people typically reported staying less than 60 min and we counted people only once per hour. The average number of Fitness Zone users did not vary between weekdays and weekends (24 vs. 29 per day, respectively). In contrast; during the two follow-up periods, overall mean park use was significantly higher on weekend days compared to weekdays (202 vs. 91 per day, respectively). Across the 12 parks, Fitness Zone users comprised 5.4% and 5.6% of total park visitors at the first and second follow-ups, respectively.

At baseline and at both follow-up periods, over 60% of observed park users were male; but in Fitness Zones fewer than 50% were male ($p < 0.05$). Fitness Zone users did not differ significantly by age group from other park areas. Because they were using the exercise equipment, people in Fitness Zones engaged in substantially more moderate to vigorous physical activity (MVPA) than those in other park activity areas (66% vs. 31% at first follow-up; 72% vs. 35% at second follow-up).

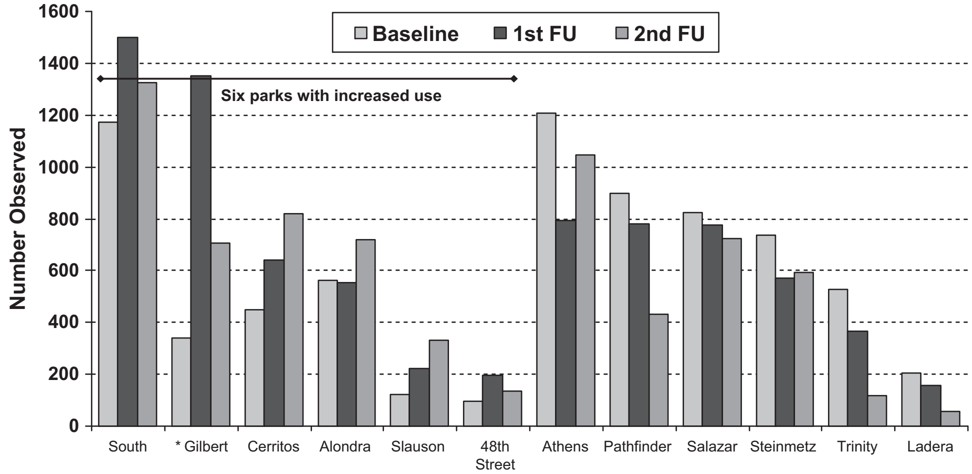

Fig. 1. Park use before and after Fitness Zone installation.

Table 2
Characteristics of park users and survey respondents at baseline and Fitness Zone users at first and second follow-ups.

	All park users: Baseline		Fitness Zone users: 1st follow-up		Fitness Zone users: 2nd follow-up	
	Observed	Interviewed	Observed	Interviewed	Observed	Interviewed
Total (#)	6,906	742	1,357	377	1,213	345
Male	61.4%	45.6%	45.6%	40.3%	46.1%	37.7%
Female	38.6%	54.4%	54.4%	59.7%	53.9%	62.3%
Latino	60.5%	74.1%	77.4%	78.2%	72.5%	81.2%
African American	15.8%	8.5%	9.1%	8.0%	12.4%	10.1%
White	10.8%	12.1%	4.6%	5.0%	3.4%	4.1%
Asian/Other	12.9%	0.8%	9.0%	8.8%	11.7%	4.6%
Children	20.0%	–	24.3%	–	20.1%	
Teens	11.4%	–	11.6%	–	10.0%	
Adults	56.4%	91.3%	60.3%	95.1%	64.4%	96.2%
Seniors	12.2%	8.7%	3.8%	4.9%	5.5%	3.8%

Most (65.1% during the first follow-up; 71.1% during second follow-up) were using equipment items as recommended by the manufacturer. The most frequently used equipment pieces were the dual pendulum, the ski machine, and the leg press; in contrast, the leg curl and the horizontal bars were used the least. A greater proportion of people in smaller parks used Fitness Zone equipment (and the Fitness Zone) than those in larger parks.

Considering observed users and their activity levels, the total estimated METs was 16,900 at baseline (including the imputed values for adjusted counts). Estimated METs at first and second follow-ups were 19,383 and 18,234, representing increases of 15% and 8% from baseline, respectively. Estimated METs expended in the parks by users outside the Fitness Zones was similar at baseline and the first follow-up, but increased by 12% at the second follow-up.

Fewer people used Fitness Zone parks than comparison parks at baseline; over time however, the number using Fitness Zone parks increased more than the number using comparison parks. At the first follow-up an average of 207 additional individuals used a FZ park and the average estimated energy expenditure increased by 685 METs, with neither increase being statistically significant (Table 4).

4.3. Self-reported park use

Across all 12 FZ parks we interviewed 742 adult visitors at baseline, 942 at the first follow-up, and 952 at the second. During both follow-ups, 52% and 48% of the respondents were in Fitness Zone areas. Fitness Zone respondents did not differ demographically from the other park users interviewed: 80% Latino; 9% African American; 61% female; average age=40 years, $sd=12.5$, $p=0.94$ (Table 2).

At both follow-ups, self-reported use of equipment pieces matched the observed data, with the dual pendulum and the ski machine being used most and the leg curl and horizontal bars used the least. Fitness Zone respondents reported visiting the park more frequently than those in other park areas (3.5 vs. 2.4 visits per week, $p<0.0001$), and they reported engaging in more exercise sessions per week (3.9 vs. 2.7; $p<0.0001$). Losing weight was the most common reason reported for using the fitness equipment. Compared to other area users, Fitness Zone users reported getting to the park more often by walking (56.3 vs. 34.9%, $p=0.002$) (Table 3) and visiting the park for the first time within the past six months (20.5% vs. 7.1%, $p<0.0001$).

About 91% of survey respondents provided a valid intersection, which they said was closest to their residence. Based upon this address, Fitness Zone users tended to live closer to the park than other park users (mean=0.71 vs. 1.14 miles, $p<0.02$). About 33% of Fitness Zone users lived within 1/4 mile of the park and 24% lived between 1/4 and 1/2 mile, compared to 28% and 20% of other park users, respectively.

After accounting for differences in respondent characteristics, comparing baseline, and follow-up measures of FZ parks alone, the propensity score analysis showed a trend for the percentage of respondents visiting the park for the first time in the past six

Table 3
Survey responses of Fitness Zone users (1st & 2nd follow-ups combined), weighted[a].

	Weighted		
	Fitness Zone users	Other park users	p-value
Park visits in the past 7 days Mean (SD)	3.46 (0.76)	2.44 (2.21)	< 0.0001
Exercise sessions per week (Mean/SD)	3.87 (0.72)	2.72 (2.41)	< 0.0001
First time visitor in the last 6 months (%)	20.5	7.1	< 0.0001
Ever visiting other parks (%)	31.46	43.2	0.0048
Self reported hypertension (%)	12.57	10.4	0.4126
Overweight or obese, based on BMI from self report height and weight (%)	70.2	72.8	0.5108
Weight loss as primary goal for using Fitness Zone (%)	39.0	27.6	0.0080
Adults with children under 18 bringing them to use Fitness Zone (%)	29.7	12.8	< 0.0001
Perceive park as safe or very safe (%)	86.9	90.0	0.2264
Distance residing from park (Mean miles/SD)	0.71 (0.62)	1.14 (2.66)	0.0216
Mode of transportation to park (%)			< 0.0001
Walk	56.3	34.9	0.0024
Bike	2.4	4.1	0.4978
Car	40.7	60.5	0.0051
Bus or public transportation	0.5	0.3	0.8227
Other	0.2	0.2	1.0000

[a] For continuous variables we used weighted t-test (reported the Pooled, equal variance); for categorical variables weighted chi-square.

Table 4
Difference of differences analysis for the observation data (with control parks) and propensity score analysis for self-reported data (with control parks).

Difference of differences analysis for the observation data

Variable	Parameter estimate (S.E.)	P value
Model 1 (Observation of users)		
Intercept (comparison parks at baseline)	919.1 (174)	0.0001
Fitness Zone parks at baseline	−305.3 (247)	0.23
Change in users in comparison parks	−14.3 (141)	0.92
Change in users in Fitness Zone parks	207.3 (199)	0.31
Model 2 (Expenditure of METS)		
Intercept (comparison parks at baseline)	2,191 (425)	0.0001
Fitness Zone baseline	−687 (601)	0.27
Change in METS for the comparison parks	−100 (350)	0.78
Change in METS at Fitness Zone parks	685 (496)	0.18

Propensity score analysis: self-reported exercise and park use

	Average # exercise sessions/week		New user in the past 6 months (%)		New user in the past one month (%)		Uses park use 1x/week or more (%)	
	Control parks	FZ parks	Control parks	FZ parks	Control parks	FZ parks	Control parks	FZ parks
Baseline	2.13	2.36	8.3	7.1	5.1	3.6	85.3	79.3
1st follow-up	2.17	2.50 (p=0.49)	6.0	11.4 (p=**0.014**)	2.6	6.3 (p=**0.007**)	81.2	81.6 (p=**0.081**)

months to be higher at the first follow-up than at baseline (11.3% vs. 7.2% $p=0.09$). The average number of reported exercise sessions (2.76 vs. 2.49; $p=0.03$) was also significantly higher at the first follow-up than at baseline, but the proportion of respondents using the park at least once per week was no different, nor were the percentage of new users and number of exercise sessions at the second follow-up (data not shown). Comparing all respondents in intervention parks with those from comparison parks confirmed that more FZ park users reported being new users in both the past month ($p<0.007$) and the past six months ($p<0.014$) and that there was a trend for intervention park visitors to report increased frequency of park use ($p<0.081$) (Table 4).

4.4. Cost effectiveness

Calculating cost effectiveness based on change in the Fitness Zone parks over time showed a net gain of 1,909 METs in the 12 parks or 159 METs per park. This is equivalent to 52,311 additional METs/year at a cost of 10.5 cents/MET. This estimate includes the declines in METs in five parks and the increases in METs in seven of the 12 parks. Using the increase of 685 METs per park calculated in comparison to energy changes at non-FZ parks, the cost effectiveness is 2.4 cents/MET; however, the increase in METs was not statistically significant.

5. Discussion

Installing Fitness Zone equipment was associated with absolute increases in park use in about half the FZ parks. Additionally, their installation appears to have increased the level of moderate to vigorous physical activity in the park at a very favorable cost-effective ratio, (10.5 cents/MET). However, these findings do not constitute strong evidence of effectiveness, since the analysis using controls was not statistically significant. This could be due to insufficient power with a sample of only 20 parks, or because there was really no difference between control and intervention parks. The better cost-effectiveness ratio seen with the control park analysis is because it accounts for the overall decline in the use of comparison parks. However, the significant increase in reported FZ park use lends credence to the possibility that Fitness Zones may indeed be having an impact. Based upon studies that indicate investments to increase physical activity are cost effective at less than 50 cents/MET (Wu et al., 2011), the cost-effectiveness ratio of 10.5 cents/MET or less ranks this intervention very highly, especially considering secular trends indicating overall declines in usership across all the parks in general.

Park management practices were not stagnant during the time periods when the Fitness Zones were installed, so changes in park usage cannot be attributed solely to the presence or absence of Fitness Zones. First, the installations occurred during a recession, a time when park budgets declined, and changes in programming and staffing could have affected park attendance. Secondly, a few parks were undergoing construction in specific areas and at different times during the assessments. In one park a new gym was being built and later opened, and in another the gym was closed for renovations at follow-up. We were unable to adjust for the potential confounding influence of a new gym.

Yet, in spite of the dynamic nature of the parks, we saw that nearly all Fitness Zone installations were used on a regular basis and their use appeared to be similar during both follow-up periods. When first installed, Fitness Zones appeared to attract new park users. However, by the second follow-up the percentage of new users and the total number of users, on average, declined towards the baseline. The reduction in new users of Fitness Zone equipment suggests that most potential new users had already been reached with the limited outreach that accompanied the installation. However, given that Fitness Zone users remained a constant percentage of all park visitors their continued use appears to be more than a matter of novelty.

Merely averaging observations across the 12 parks overlooks the larger impact the Fitness Zones had in parks in densely populated neighborhoods and in parks that were smaller and had few other facilities and amenities. We did not see increased use of the larger parks located in more remote locations, parks where Fitness Zones were located in less visible and less accessible areas, and in parks that already had many other amenities and programmed activities. This suggests that in order to increase overall park use and physical activity, FZ equipment should be best installed in areas that are proximal to large populations and that are easily accessible. FZ users lived closer to parks than other park area users, suggesting that people may be unwilling to travel large distances to use outdoor exercise equipment. As well, some equipment pieces were used infrequently (e.g., leg curl and horizontal bars), so in future installations these might be omitted or replaced by others more favored by the local population.

We saw an unexpected increase in MVPA among park users outside the FZ area. A possible explanation is that the FZ equipment attracted more active people to the park and that they were active in other park areas in addition to the FZ. Another possibility may be due to priming: just seeing people on exercise equipment may make others more active. This is in converse to one study in which people who were primed to think about the elderly subsequently walked more slowly (Bargh et al., 1996).

6. Limitations

A significant limitation of the comparison park analysis is the additional year between baseline and follow-up observations. It is possible that declines in park use were more exaggerated in comparison parks over this longer time period, artificially inflating the apparently favorable results. Moreover, due to schedule delays and restrictions on use of research funds, some Fitness Zone parks had the equipment installed only a few months before the follow-up observation; thus, the period between the measurements were not the same across parks. Another limitation is that the second follow-up observation period was conducted at a different time of the year from the baseline and first follow-up periods, making it difficult to interpret the decrease in overall park use from the first to the second follow-up. The decrease could potentially be explained by a secular trend, seasonality, or reductions in park programming or events. Perhaps during the spring, people were more involved in other activities, such as home gardening or end of school activities. Increased use could also reflect a novelty factor, which may not be sustainable. Longer-term follow-ups would elucidate this possibility.

7. Study strengths

The primary strengths of this study are the use of both systematic observation and interviews and its longitudinal nature. Moreover, by observing the Fitness Zones on an hourly basis we were able to get much more detailed information about the equipment and how it is used. The frequent sampling during all daylight hours made our findings more robust.

8. Implications for future research

Fitness Zones appear to be a cost-effective investment of resources for increased use of parks and park-based physical activity, particularly in densely populated areas and in parks where few facilities exist. Only a limited number of studies have conducted objective long-term assessments of park improvements (Cohen et al., 2009; Tester and Baker, 2009), and not enough evidence is yet available to determine whether MVPA will increase if programming does not accompany improvements. With school playgrounds, some increases in physical activity were sustained six months and one year after the grounds were renovated (Ridgers et al., 2007; Ridgers et al., 2010) even without additional programming. Meanwhile, many interventions that try to increase physical activity with programming alone do not show sustained increases outside the study environment (Wilks et al., 2011) or when the programs are over (Webber et al., 1996).

Outreach and marketing may be necessary to sustain early behavior change inspired by improvements in the built environment and innovative programming. Longer-term follow-up measures will help clarify whether the early increases in physical activity associated with the Fitness Zone installations are sustained without programming or marketing.

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