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'The park a tree built': Evaluating how a park development project impacted where people play

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ABSTRACT

Community parks have achieved recognition as a public health intervention to promote physical activity. This study evaluated changes in population-level physical activity when an undeveloped green space adjacent to transitional housing for refugees was transformed into a recreational park. A prospective, nonrandomized study design used the System of Observing Play and Recreation in Communities (SOPARC) to document the number and activity levels of park users over time, and to compare trends pre- and post-construction. *T*-tests or tests of medians (when appropriate) were used to compare pre- and post-construction changes in use of non-park and park zones for physical activity and changes in park use by age and gender. Pre- and post-comparisons of people observed using non-park zones (i.e., adjacent streets, alleys and parking lots) and park zones indicated a 38% decrease in energy expended in non-park zones and a 3-fold increase in energy expended within the park ($P = 0.002$). The majority of park users pre- and post-construction were children, however the proportion of adolescent males observed in vigorous activity increased from 11% to 38% ($P = 0.007$). Adolescent females and elderly continued to be under-represented in the park. Our findings support an association between creation of accessible outdoor spaces for recreation and improvements in physical activity. Community involvement in park design assured that features included in the park space matched the needs and desires of the communities served. Some demographic groups were still under-represented within the park, suggesting a need to develop targeted outreach strategies and programming.

Introduction

Public health professionals have long recognized the connection between neighborhoods and health, and have identified park improvements and creation of new parks as public health interventions (Bassett, 2009; Nordh & Ostby, 2013). Proximity to parks is associated with greater frequency of physical activity (Cohen et al., 2007), reduced weight (Liu et al., 2007; Ellaway et al., 2005), reduced weight gain (Bell et al., 2008), lower coronary heart disease(Maas et al., 2009; Dengel et al., 2009), social cohesion (Sullivan et al., 2004) and longevity (Takano et al., 2002). The strength of these associations varies based on park facilities and programming (Cohen et al., 2006, 2010, 2009; Schipperijna et al., 2013) and by characteristics of the potential park users, including sex, race and ethnicity, and age (Cohen et al., 2006, 2007; Lachowycz and Jones, 2011). Research to date has been primarily focused on current park users, their preferences for park features, and association of these features with physical activity (Lachowycz and Jones, 2011). While some qualitative research has been done regarding the greening of alleys to improve storm water drainage and reduce crime (Seymour et al., 2010), there is a research gap in understanding how alleys, streets and undeveloped land are used for play and leisure activities in the absence of neighborhood parks, and how construction of a conveniently situated park could influence *where* play and leisure activities occur, in addition to increasing overall physical activity levels for a community.

In 2009, The Trust for the Public Land (TPL), Denver Urban Gardens and Denver Parks and Recreation proposed transforming a two-acre undeveloped green space, which was situated amidst transitional housing for refugees and Coalition for the Homeless residents, into a recreational park and large community garden (McWilliams, 2010). Prior to construction, a section of the lot was gardened by refugees from Burma, Somalia, Afghanistan, Iraq, and Nepal, while younger people used a bare patch of land and the

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surrounding streets and alleys for play (Hanson, 2011). The goal of the project was to improve and unify these spaces to support community access to safe recreation, fresh food and places to socialize. In 2010, TPL and other agency partners held a town hall meeting at the transitional housing site to explain the project. Fifty-one adults and 28 youth attended. Attendees viewed photo albums with pictures of other park projects and worked in small groups to develop their "wish list" for the park. They then voted on the ideas they liked best by placing stickers next to the park features they preferred. Results of this initial meeting were shared a week later with a demographically representative subset of about 12 community members who were invited to participate in a park design meeting facilitated by TPL. Participants were divided into three groups and assembled a "park" by applying cut-outs of park amenities to a blank template of the park boundaries and natural features. A third meeting took place the following month to share the designs and provide an opportunity for community members to vote on their top choice. Residents advocated for improved soccer fields, playground equipment, basketball courts, benches, picnic tables, and preservation of a large shade tree that was a popular gathering place for residents. Residents also emphasized the need for security and maintenance after the park was built, and conveyed safety concerns related to an adjacent creek. These concerns were incorporated into the final park design. All changes were completed in spring of 2012.

The objective of this study is to quantify and report the use of the surrounding streets, alleys, parking lots and green space for play and leisure activities, and the changes in total energy expended within these spaces following park construction. Variation in energy expended by users of specific park amenities, and their demographic characteristics, are described. We also share lessons and discuss the implications of our findings for policy makers, community planners, public health professionals and researchers interested in designing park environments that will successfully promote physical activity among diverse populations.

Methods

This is a prospective study to assess the number and activity levels of park users over time, and to compare these trends pre- and post-construction (Biglan, Ary, & Wagenaar, 2000). Specifically, the System of Observing Play and Recreation in Communities (SOPARC) tool, developed by Cohen and McKenzie (Cohen et al., 2007), was used to document the number of people observed using the park between June–October 2010 and then again between June–October 2012. Observers rated the number of people, their gender and approximate ages, and the intensity level of the activity being performed by each individual counted. Data were collected and analyzed within specific, predetermined activity zones to gauge how different areas within the park and the adjacent streets, alleys and parking lots were being used before and after park construction (McKenzie and Cohen, 2006).

Variables captured included

Observation context: Raters noted day, time and temperature.

Activity zone characteristics: Raters coded each zone as accessible, usable, equipped, supervised, and/or organized.

Park user physical activity levels. Activity levels were categorized as sedentary (lying down, sitting or standing), moderate (walking at a casual pace) and vigorous (any activity that expended more energy than casual walking) (McKenzie et al., 2006). Physical activity codes were converted to energy expenditure (kcal/kg/min) (McKenzie et al., 2006). Energy expenditure was calculated by summing the number of sedentary, moderate and vigorous observations multiplied by their respective constants (0.051 kcal/kg/min; 0.096 kcal/kg/min; and 0.144 kcal/kg/min) (McKenzie and Cohen, 2006).

Park user demographics (gender, age, race/ethnicity)

Each individual observed was coded based on the raters' estimation of their gender (male or female), age (child appearing to be 12 or under, teen appearing to be 13–19, adult appearing to be 20–64, or senior appearing to be 65 or older), and race/ethnicity (white or non-white). Detailed descriptions of the individual activities were recorded as notes.

Activity zones

Prior to data collection, 7 activity zones were identified and mapped by the research team (Floyd et al., 2008). The zones were located both within the boundaries of the park and garden plans and in areas adjacent to those boundaries. Zones were identified based on their use (Fig. 1) and observations were recorded by Zone. Zones 1–3 and Zones 4–7 were later aggregated to allow for comparison between park activity spaces (Zones 1-3) and adjacent activity spaces (Zones 4–7) pre- and post-construction.

Observation protocol

Data were collected by three raters trained systematically through standardized video trainings, practice, and recalibration (McKenzie, 2013; McKenzie et al., 2006). Observations were conducted monthly, from June to October, in 2010 and 2012, using the schedule recommended by Cohen and colleagues (2011) of 4 one-hour, non-continuous observations per day (where observers moved through each of the designated zones to record numbers and demographics of people and their activity levels), conducted on 4 days per month including at least 1 weekend day (McKenzie et al., 2006; Cohen et al., 2011). Time slots were selected to include hours before school (7:30–8:30 AM), lunchtime (12:30–1:30 PM), after school (3:30–4:30 PM) and after work (6:30–7:30 PM). A total of 72 observation hours were performed over 18 clement days in both years.

Statistical analyses

Data for all observations were entered into Excel, checked for accuracy, and imported into SAS version 9.2 for analysis. The variables of interest were summarized by year and month and graphed over time. Trends were explored across seasons and time and controlled for temperature. The effect of the intervention (park) over time was explored by comparing the change in slope as well as the change in the number of participants from 2010 to 2012. T-tests or tests of medians (when appropriate) were used to compare pre- and post-construction changes in the number of observations and energy expended by demographic attributes and park or non-park zones. Statistical significance was considered at $P < 05$ and P values are reported in the results.

Results

Inter-rater reliability

Ten percent of all park observations were completed in pairs to assess inter-rater reliability. The percent of agreement was calculated on four variables that were present during the paired sessions, i.e., gender, age category, race/ethnicity, and activity level. Inter-rater agreement ranged between 98% and 100%, with highest agreement for identifying moderate activity level. Interestingly, the lowest agreement was for identifying male gender, most likely