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A Descriptive Examination of the Most Frequently Used Activity Settings in 25 Community Parks Using Direct Observation

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Background: The purpose was to examine 9 adult activity settings in 25 community parks to determine the most and least frequently used by gender, physical-activity (PA) intensity, and ethnicity. ***Methods:*** All activity settings were identified, measured, and cataloged with GIS measures using the SOPARC direct observation instrument. Each setting was assessed 4 times a day for 7 consecutive days. ***Results:*** Significantly more male adults were observed at the 25 parks (1598 versus 946; 63% versus 37%). Nine hundred fifty-eight (60%) male adults and 771 (81.1%) female adults used the paved trails. The second most heavily used activity setting for male adults was the softball and baseball fields (n = 239, 14.9%), and female adults chose to use the swimming pools (n = 45, 4.5%). Whites participated in considerably more vigorous PA than minorities. ***Conclusions:*** Paved trails were only in 5 of the 25 parks but were the most frequently used activity setting.

Keywords: built environment, physical activity, recreation

Despite the known benefits of participating in regular physical activity (PA), only 25% of American adults engage in the recommended levels and 29% participate in no leisure-time PA.[1] Recreational facilities, like parks, have been identified as environmental supports for PA. Providing accessible, convenient, and environmentally stimulating places such as community parks can perhaps promote regular PA.[2-8] A recent study by Epstein et al[9] revealed that greater access to parks was associated with greater PA among youth. Many individuals, however, refrain from visiting their community park because they perceive it to lack proper sidewalks, effective streetlights, and accessible facilities, or they believe it to be unsafe.[6,8,10-11]

Parks have a variety of activity settings (eg, tennis courts, trails, playgrounds, playing fields, etc) that provide a multitude of opportunities to participate in PA, yet we know little about specific features related to quantifying PA in parks.[12-14] An initiative by the National Recreation and Park Association titled *Step Up to Health—It Starts in the Parks* was recently developed as an effort to encourage and

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promote regular PA in our nation's parks. The Trust for Public Land also recently disseminated a report titled *The Health Benefits of Parks* to illustrate the roles parks have in promoting regular PA. Furthermore, a supplement of the *American Journal of Preventive Medicine* published in 2005 was entirely dedicated to active-living research in which a conceptual model by Bedimo-Rung et al[12] highlighting the importance of parks to PA and public health was provided. In their model, the authors discussed the importance of objectively assessing PA in parks because of the limited data available quantifying PA.[13]

To better serve the needs of park users, it is essential that the most and least widely used activity settings in each park be objectively identified and cataloged. This type of contextual information will enable park and recreation officials alike to identify the type of PA (eg, sedentary, moderate or vigorous intensity) taking place in specific areas in a park's structure and delineate which activity settings are the most and least heavily used. Most park-user data has focused on characteristics, provided little information about the PA patterns of adults who use community parks, and is frequently obtained using self-report questionnaires.[8,10-12,15] The few published studies available in this area describing the benefits of parks and their effect on PA have been based primarily on individual perceptions.[12] Self-reports of PA are employed with short recall periods, contributing to the variation in the reported activity or poor measurement characteristics of the instrument[10] and do not consider the environmental context.[8,12-15]

Although leisure research over the past 2 decades has provided a voluminous amount of information on the benefits of parks (ie, social, psychological, economical, etc), few resources have focused specifically on the role of parks and physiological health outcomes.[8,12] In particular, leisure research has not focused enough attention on the link between parks and PA intensity (eg, sedentary, moderate, vigorous).[8,12] To the best of our knowledge, no study has been conducted specifically examining associations between specific activity settings in urban and rural parks and PA intensity by gender and ethnicity using direct observation methods. In addition, few studies have examined the potential effect of contextual, environmental supports perhaps related to PA in parks[8,12-15] using objective measures.

Although past research has documented why people choose not to engage in regular PA or choose not to visit a park, far less is understood about the specific characteristics that are linked to PA once at a park.[8,12-14] The purpose of the current study, therefore, was to examine 9 adult activity settings in 25 urban and rural (urban: parks within city limits; rural: parks outside city limits but within the county limit) community parks in a southeastern city of the United States to determine the most and least frequently used setting by gender, PA intensity, and ethnicity via direct observation. This information was used to develop a preliminary seasonal user profile of activity settings during the summer months of 2004 and 2005. This type of data is essential in determining how to best allocate resources based on park use.

Methods

The 25 parks selected represent this city's demographic distributions based on current census data.[16] The research team assessed PA and sedentary behaviors at all 9 activity settings in each park by gender, PA intensity, and ethnicity. Data were

collected using geo-coding procedures to identify most and least frequently used. The 9 activity settings identified were softball and baseball fields, tennis courts, volleyball courts, natural trails (eg, natural-surface trails), basketball courts, paved trails, Frisbee golf courses, playing fields (eg, soccer, football, etc), and swimming pools. The criterion for selecting activity settings in the current study was 2-pronged and consisted of the following: (a) adults were observed using the facility and (b) the activity setting was designed to support adult PA.

Procedures

A site analysis in each activity setting for all 25 parks was identified with the assistance of city's director of parks and recreation. GPS location coordinates were used to develop a digital map with the specific location of each activity setting in each park's defined boundary. GIS procedures were used to spatially display the varying activity settings for all 25 parks. Spatial analysis was used to identify potential clusters of activity settings by gender, PA intensity, and ethnicity. These parks were identified by the city's parks and recreation department as a fair distribution of parks representing the city's population based on an internal needs assessment completed in 2004. The socioeconomic characteristics of the census tracts in which these parks are located are satisfactorily diversified demographically and are a fair representation of the city's population based on current census data.[16]

All activity settings in each of the parks were identified, cataloged, and assigned a target number. Furthermore, GPS data were collected to enable the researchers to enter the coordinates into ArcView GIS to develop spatial display maps for each park. Each activity setting was assessed 4 times a day (eg, 7:30 AM, 12:30 PM, 3:30 PM, and 6:30 PM) for 7 consecutive days at each park for a total of 10 weeks (1 week at each park, 2 to 3 parks per week) during the summers of 2004 and 2005. During each assessment, the number of adults in the specific activity setting was recorded, gender identified, and intensity of PA measured. The researchers did not account for organized activities (eg, recreational youth and adult sport leagues) or hours of operation for facilities (ie, pools) that had a specific schedule for accessibly. The System for Observing Play and Recreation in Communities (SOPARC) uses rigid time allotments during which observations should occur, and these times were strictly followed.

The ethnicity of each individual observed was recorded as well. During each scan, the PA level of each individual was coded as sedentary (ie, lying down, sitting, or standing), walking, or very active using a mechanical counter designed for SOPARC. This instrument will be discussed in the Instrumentation section. Separate scans were made for women and men and for coding park users into ethnicity classifications. Summary counts described the number of participants by gender, PA intensity, and ethnicity. Based on current census data,[16] this particular southeastern city did not have an ethnically diverse population of residents, thus all adults were classified as White or other. Activity intensity was measured during each observation period for 7 consecutive days. Each observer studied a variety of pictures from a database to learn how to distinguish ages, genders, and ethnicities. The observers in the pilot study were tested on 50 pictures and retested on the same pictures exactly 1 week later to establish test–retest reliability. The reliability coefficient was $r = .98$.

Instrumentation

The SOPARC direct observation instrument was used in the current study to assess the PA and contextual elements that might affect recreational park use.[17,18] Direct observation of human behavior in natural and built environments has been used as an objective methodology to study human behavior for over a century, but it has been frequently overlooked by researchers in the disciplines of exercise science and PA.[19] More recently, it has been shown to be a valid and reliable method for assessing PA and the context in which it occurs.[20] Because observers are recording behaviors in open environments with no invasive methodologies to collect data, the rights of all human subjects are not compromised. SOPARC was designed to better understand PA in community and recreational settings and has been used to collect data on PA levels and associated contextual variables in 165 activity areas in 8 large parks.[17-18] It uses momentary time sampling to make systematic scans of predetermined activity settings.

Validity of SOPARC PA codes has been established through heart-rate monitoring.[21-23] Provided that measures of persistent behaviors (ie, PA) are taken at frequent intervals, momentary time sampling techniques have been shown to yield valid behavioral samples because only brief episodes are recorded. Response and recording occur simultaneously, with observations occurring at an approximate rate of 1 person per second.[17-18]

Data Analysis

Descriptive statistics were used to examine frequencies and percentage differences for the 9 activity settings by gender, PA intensity, and ethnicity in all 25 parks. Statistical Package for the Social Sciences (SPSS) 14.0 was used to analyze the data.

Results

Significantly more male adults were observed engaging in PA at the 9 activity settings in the 25 parks than female adults (1598 versus 946, 63% versus 37%). This finding is not consistent with current census data for this area.[16] Women in this particular city comprise 51% of population; however, only 37% of park users were women. The most heavily used activity settings for men and women were paved trails. Nine hundred fifty-eight (60%) male adults and 771 (81.1%) female adults used the paved trails during the summers of 2004 and 2005. The second most heavily used activity setting for male adults was the softball and baseball fields (n = 239, 14.9%), and female adults chose to use the swimming pools (n = 45, 4.5%). The frequencies and percentage differences by gender and PA intensity for all 9 activity settings are listed in Table 1.

Of the male adults (n = 1598) and female adults (n = 946) observed using the 9 activity settings in the 25 community parks, a greater percentage of men participated in vigorous PA (42% versus 20%). Of the male adults (n = 958) using the paved trails, 23% of them (n = 363) participated in vigorous PA. Of the female adults (n = 771) using the paved trails (n = 148), only 16% participated in vigorous PA. The frequency and percentage differences by PA intensity per activity setting can also be found in Table 1.

Table 1 Frequency and Percentage Differences of Physical Activity Intensity per Activity Setting by Gender

Activity setting and type	Frequency	Percentage by gender
Softball/Baseball field		
women		
sedentary	12	1.0
walking	14	1.0
vigorous	1	0.1
men		
sedentary	70	4.4
walking	68	4.2
vigorous	101	6.3
Tennis courts		
women		
sedentary	2	0.2
walking	8	0.8
vigorous	28	2.9
men		
sedentary	8	0.5
walking	25	1.5
vigorous	106	6.6
Volleyball courts		
women		
sedentary	1	0.1
walking	1	0.1
vigorous	0	0.0
men		
sedentary	11	0.6
walking	4	0.2
vigorous	25	1.5
Nature trail		
women		
sedentary	5	0.5
walking	6	0.6
vigorous	3	0.3
men		
sedentary	4	0.2
walking	21	1.3
vigorous	29	1.8
Basketball courts		
women		
sedentary	2	0.2
walking	0	0.0
vigorous	0	0.0
men		
sedentary	5	0.3
walking	22	0.1
vigorous	44	2.7

(continued)

Table 1 ***(continued)***

Activity setting and type	Frequency	Percentage by gender
Paved trails		
women		
sedentary	81	8.5
walking	542	57.0
vigorous	148	15.6
men		
sedentary	88	5.5
walking	507	31.7
vigorous	363	22.7
Frisbee golf		
women		
sedentary	0	0.0
walking	5	0.5
vigorous	0	0.0
men		
sedentary	0	0.0
walking	41	2.5
vigorous	0	0.0
Playing fields		
women		
sedentary	27	2.8
walking	12	1.2
vigorous	3	0.3
men		
sedentary	28	1.7
walking	9	0.5
vigorous	11	0.6
Swimming pool		
women		
sedentary	30	3.0
walking	6	0.6
vigorous	9	0.9
men		
sedentary	7	0.4
walking	1	0.6
vigorous	0	0.0

Examination of park users by ethnicity revealed that significantly more Whites than minorities visited the 25 community parks during the summers of 2004 and 2005. Parks located in low socioeconomic (SES) areas with large minority populations based on census data[16] were rarely used or not used at all. For example, 2 parks did not have one individual use any of the activity settings located in the parks structure. Current census data[16] documents that 75.6% of citizens in this

southeastern city consider themselves to be of White descent. The remaining 24.4% is composed of African Americans, Asians, American Indians, Hispanics, or 2 or more races. In the current study, however, 69% of park users were White, and 31% were minorities (1687 versus 753).

Whites and minority park users also preferred to use the paved trails (1178 versus 583). Approximately 88% of Whites observed at all 25 parks were walkers on the paved trails. Similarly, 91% of all minority trail users chose to walk on the paved trails as well. Of Whites participating in vigorous PA, 73% (n = 453) did so on the paved trails in comparison to 46% of minorities (n = 86). The next most heavily used activity setting by White walkers was the softball and baseball fields (n = 30, 3.9%). The second most heavily used activity setting by minority walkers was the basketball courts (n = 17, 3.9%).

Examination of the PA intensity of Whites and minorities for all 9 activity settings in the 25 community parks revealed that Whites participated in considerably more vigorous PA. The sum of the sedentary, walking, and vigorous behaviors for all activity settings revealed that approximately 19% (n = 315) of Whites were sedentary in comparison to 21% (n = 161) of minorities. Forty-four percent (n = 751) of Whites were observed walking at all of the activity settings in comparison to 53% (n = 417) of minorities. However, 36% (n = 621) of Whites at the 25 parks participated in vigorous PA in comparison to 23% of minorities (n = 175). The frequency and percentage differences by PA intensity per activity setting by ethnicity are listed in Table 2.

It is interesting that the PA findings from the current study were not entirely consistent with current Behavioral Risk Factor Surveillance System (BRFSS) data provided by the Centers for Disease Control and Prevention (CDC).[1] Male park users in this southeastern city participated in considerably more vigorous PA at the 9 activity settings in the 25 parks in comparison to the state's reported BRFSS prevalence data (42% versus 30.7%). The prevalence of vigorous PA observed among women in all 25 parks, however, was similar to the state's prevalence figures (20% versus 19.1%). The BRFSS state survey data also revealed that approximately 26% of Whites participated regularly in vigorous PA. This figure is considerably lower than the findings in the current study. The prevalence of minorities participating in regular vigorous PA based on state BRFSS figures was similar to the findings in the current study (22% versus 23%). It should be noted that not all PA occurs in a park setting, and BRFSS data, therefore, should not be interpreted as park-only PA. This could be a reason for the incongruency between the observational data collected and the BRFSS data for this region.

Paved trails at the 25 parks were the most frequently used activity settings by gender and ethnicity. With the exception of the use of softball and baseball fields by men, few of the other 8 activity settings were used in the current study. Approximately 81% of women were observed on the paved trails during the summers of 2004 and 2004. Thus, less than 19% of women were observed using any of the 8 additional activity settings at the 25 community parks. Although approximately 60% of men used the paved trails in the current study, more than 40% were observed using the other 8 activity settings. The most and least frequently used activity settings by gender and ethnicity can be found in Tables 1 and 2.

Table 2 Frequency and Percentage Differences by Physical Activity Intensity per Activity Setting by Ethnicity

Activity setting and ethnicity	Sedentary (%)	Walking (%)	Vigorous (%)
Softball/Baseball fields			
white	132 (42.0)	30 (3.9)	59 (9.5)
other	17 (9.7)	11 (2.5)	33 (17.4)
Tennis courts			
white	27 (8.5)	2 (0.2)	51 (8.2)
other	0 (0.0)	0 (0.0)	22 (11.6)
Volleyball courts			
white	0 (0.0)	0 (0.0)	15 (2.4)
other	9 (5.1)	0 (0.0)	1 (0.5)
Natural-surface trails			
white	13 (4.1)	38 (5.0)	15 (2.4)
other	0 (0.0)	5 (1.1)	15 (8.0)
Paved trails			
white	66 (21.0)	659 (88.0)	453 (73.0)
other	103 (59.0)	394 (91.0)	86 (46.0)
Basketball courts			
white	10 (3.0)	0 (0.0)	16 (2.5)
other	6 (3.4)	17 (3.9)	24 (12.6)
Frisbee golf			
white	10 (3.0)	0 (0.0)	0 (0.0)
other	0 (0.0)	0 (0.0)	0 (0.0)
Playing fields			
white	27 (8.5)	15 (2.0)	3 (0.4)
other	34 (19.3)	7 (1.6)	9 (4.7)
Swimming pools			
white	30 (9.5)	7 (0.9)	9 (1.4)
other	7 (3.9)	0 (0.0)	0 (0.0)

Discussion

Considerably more men were observed participating in PA at the 25 parks during the summers of 2004 and 2005 than women in the current study. Cohen et al[8] recently examined how parks contributed to PA in urban areas using SOPARC and reported a similar finding. Men, in their study, used the parks more frequently than women. Studies examining access to activity facilities have found that the availability of PA facilities is related to proximity.[4,6-7] Cohen et al argued that residential proximity is associated with PA and park use; however, current census data for this southeastern region in regard to gender, were not consistent with gender distributions of park users in the current study.[16]

The most heavily used activity settings were the paved trails by men, women, Whites, and minorities. Few women were observed using any of the other 8 activ-

ity settings. Men and Whites participated in more vigorous PA in comparison to women and minorities. This finding is consistent with previously published research illustrating how men and Whites tend to participate in higher-intensity PA.[1,24]

Paved trails were the most frequently used activity settings in the 25 parks; therefore, a greater emphasis needs to be placed on finding ways to build more paved trails, considering that paved trails were available at only 5 of the 25 parks assessed. Bedimo-Rung et al[12] recently argued that environmental approaches that specifically target structural factors like trails and parks could positively affect the PA patterns of adults. This point is quite important because the activity settings were not available at all 25 parks observed (refer to activity-setting criterion in Methods section). As was the case in the current study, some activity settings were more frequently used than others but were not available at all parks.

Perceived and actual access to recreation facilities[24] have been identified as correlates of PA. Accessibility to and awareness of PA facilities like city parks[12-14] and recreational trails[4] (sometimes located in parks) have been identified as factors related to adult PA patterns. Although recreational trails were not the primary focus of the current study, they have been identified in the literature as environmental supports for PA[12-14] and were the most frequently used activity settings in the 25 parks observed.

Troped et al[25] examined self-reported and objective physical environmental variables and the use of a bikeway and determined that the presence of trail terrain was an environmental variable in need of consideration when designing more communities. To stimulate the development of recreational trails, policy changes at the local level need to be implemented that recognize the effect of physical environment supports for PA behavior. Individuals who reside in an area that has access to trails and who are aware of the existence of the trails will, perhaps, be more likely to engage in recreational trail use in comparison to those individuals who do not.[4-5]

It is understood that ethnic minority and low-income populations have the highest rates of cardiovascular disease, type 2 diabetes (NIDDM), and obesity and the lowest rates of leisure-time PA.[25-26] Most minority populations do not engage in enough PA to meet the current CDC/American College of Sports Medicine (ACSM) recommendations.[27-28] Whites, in the current study, participated in considerably more vigorous PA than minorities. Although this finding is consistent with current literature,[1,26-28] it is not able to explain why some parks located in low SES areas based on current census data[16] were underused. Even though the percentage of minority park users was greater than the census data for this particular city,[16] the fact that 2 parks were not used at all for 7 consecutive days and were located in high minority and low SES census tracts is concerning. Perhaps residents in this area were not aware of some of the parks located in their neighborhoods.

Lack of awareness of recreational facilities is a frequently cited barrier to PA among minorities, and these facilities are often less prevalent in low SES areas.[4,24] A recent study examining the geographic and social distribution of PA facilities revealed that lower SES and high minority block groups of adolescents had reduced access to facilities and were associated with a decrease in PA and increased overweight.[29] In addition to lack of awareness, perhaps perceptions of safety affected park use among minorities in the current study. It has been observed in focus group studies[30-32] and in quantitative studies[33-34] that fear of crime and fear

for one's personal safety among minority groups are barriers to walking and being physically active in neighborhood settings.

Previous efforts by Wilson et al[28] identified environmental variables that affect the PA patterns of individuals who reside in low and high SES areas. These researchers examined perceptions of access and safety for PA in neighborhoods that were identified as low or high in SES. The high SES group was more likely to have higher household incomes and education levels than the low SES group. The high SES group also reported greater levels PA based on the CDC/ACSM recommendations in comparison to the low SES group. The low (versus high) SES group also reported lower perceptions of access to public recreation facilities.[28] Similarly, Broomhall[11] concluded from a literature review that numerous observable factors, like perceived safety, could influence use of open space such as parks as well. Perception data, however, were not collected in the current study. Although a plausible explanation, it would be outside the scope of the current study to suggest that perceptions of safety and fear were reasons why some of the parks located in low SES census tracts with large numbers of minorities were underused.

The disparity in park users by gender in the current study is equally alarming. Although the number of men and women in this city is relatively the same based on current census information,[16] a significantly larger number of men were observed at the 25 parks. Current PA data suggest that adult women are less active than adult men[1,24]; however, perhaps the activity settings at the 25 parks observed were not as appealing to women. Another plausible reason for the gender disparity observed could be related to the type and number of organized activities offered at the individual parks. More structured activities could have been offered for men, and this finding could have contributed to more men being observed. This is outside the scope of this article, considering that the researchers did not account for any organized activities in the current study; nonetheless, it warrants mention.

Most of the adult women in the current study were observed on the paved trails. An Australian study examined a variety of open spaces and determined that despite the popularity of walking, a disproportionate amount of community activity settings were designed for organized sports (ie, playing fields) instead of informal PA like walking and jogging.[35] In the 25 parks observed, there were only 5 paved trails, 2 nature trails, 2 Frisbee golf courses, and 2 swimming pools. Yet most of the parks observed had at least a playing field, softball or baseball field, volleyball court, or basketball court; and in most cases, each park had a combination of these activity settings.

Findings from the current study illustrate the importance of considering contextual elements of parks to better understand what facilities are most and least frequently used. Paved trails were only available in 5 of 25 parks assessed in the southeastern city, yet approximately 81% and 60% of women and men, respectively, used the paved trails for PA.

This type of information can only be gathered with methodologies that consider contextual elements that perhaps affect PA. Although the BRFSS prevalence data cited in the current study are useful to better understand the intensity of PA engaged in, it does not provide any contextual information concerning what facilities were used to support the activity.

Limitations

The primary limitation associated with the current study was that park use was only examined during the summer months. It is essential to examine park users during the fall, winter, and spring to better understand the seasonal PA patterns of park users and to identify environmental constraints to participating in PA. An additional limitation was that comparisons using BRFSS data were done only at the state level and not at the metropolitan level. SMART BRFSS cannot compare across gender and ethnicity because of sample-size limitations.[1] Because organized activities were not accounted for in the current study and could have taken place outside the observation times used, frequencies of individuals observed have the potential to underestimate park use. In addition, the variability of such organized activities offered at each park could have differed as well.

Implications

Having a better understanding of the activity settings in which adults are observed performing PA in comparison to activity settings that are minimally used will provide important data to assist park and recreational departments in prioritizing their funding distribution. Although ecological models have successfully provided data supporting the relationships between environmental supports and PA,[13-14] additional studies are needed to build on the current study, further expanding the knowledge base on specific park characteristics and their role in promoting PA.[12-14] With a limited amount of success promoting PA with traditional methods, such as curriculum modification in physical education, individual and group counseling, promotional materials, and screenings and self-monitoring, it is imperative that health professionals focus on interventions beyond the control of a single individual.[12]

Furthermore, alternatives to self-reported PA measures have been developed reducing the probability of error (ie, heart-rate monitors, pedometers, accelerometers, and doubly labeled water); their usability and versatility in large epidemiological studies, however, remain limited because these devices do not provide park and recreation officials any contextual information illustrating any specific PA behavior at a specific moment in time. Park-user data obtained using self-report questionnaires[3,14] lack contextual information such as where the activity took place and the intensity of the PA. Although survey methods are a relatively inexpensive methodology to collect user data, they are limited to respondents' memories and perceptions. This methodology is problematic because it occurs inconsistently at different intensities and in different modes, increasing the probability of measurement error.[26] To learn more about factors relating to PA, researchers are using ecological models to examine how natural and physical influences affect PA behavior. Unfortunately, studying park-user behaviors continues to be difficult because of the lack of objective measures in specific ecological contexts,[12-14,17] preventing researchers and practitioners from considering contextual elements that perhaps affect park use.

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