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# The Significance of Parks to Physical Activity and Public Health

## A Conceptual Model

Ariane L. Bedimo-Rung, PhD, Andrew J. Mowen, PhD, Deborah A. Cohen, MD

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**Abstract:** Park-based physical activity is a promising means to satisfy current physical activity requirements. However, there is little research concerning what park environmental and policy characteristics might enhance physical activity levels. This study proposes a conceptual model to guide thinking and suggest hypotheses. This framework describes the relationships between park benefits, park use, and physical activity, and the antecedents/correlates of park use. In this classification scheme, the discussion focuses on park environmental characteristics that could be related to physical activity, including park features, condition, access, aesthetics, safety, and policies. Data for these categories should be collected within specific geographic areas in or around the park, including activity areas, supporting areas, the overall park, and the surrounding neighborhood. Future research should focus on how to operationalize specific measures and methodologies for collecting data, as well as measuring associations between individual physical activity levels and specific park characteristics. Collaboration among many disciplines is needed.  
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### Introduction

Regular physical activity has been shown to reduce morbidity and mortality by decreasing heart disease, diabetes, high blood pressure, colon cancer, feelings of depression/anxiety, and weight, while building and maintaining healthy bones, muscles, and joints.<sup>1</sup> Due to increasingly sedentary jobs and an increased reliance on motorized transport, leisure-time physical activity may be important in fulfilling recommended physical activity levels. Leisure-time physical activity can be conducted in a variety of community environments, such as local parks, which are often accessible to citizens at low or no cost.<sup>2</sup> However, almost a quarter of the adult population in the United States in 2002 reported getting no leisure-time physical activity at all during the past month.<sup>3</sup>

Traditionally, research on disease prevention has targeted individuals to effect behavioral change. Typical approaches to encourage physical activity include curriculum modification in physical education

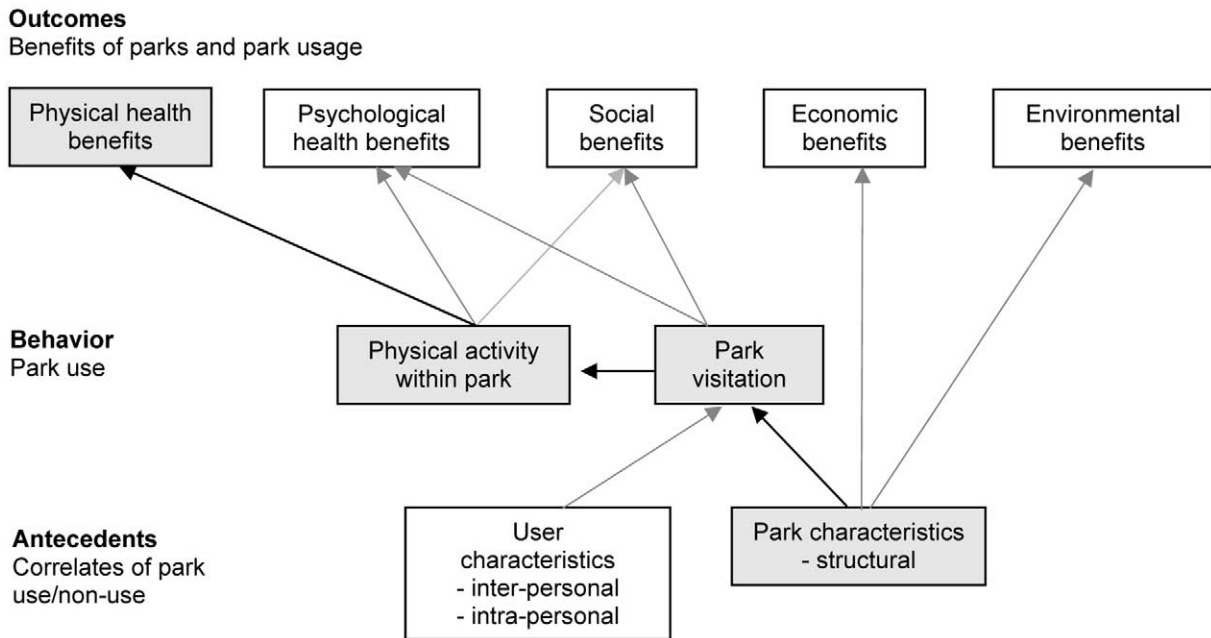
and health classes, one-on-one and group counseling sessions in a variety of settings, provision of promotional materials, screenings, and self-monitoring. These approaches all share a focus on changing behaviors over which individuals theoretically have control. Because such approaches alone have not made sufficient inroads in increasing physical activity, there have been recent calls for interventions that include environmental approaches as well.<sup>4–6</sup> An approach that targets structural factors beyond the control of a single individual could modify the community environment and make it easier for individuals to be physically active. Such environments include facilities for leisure activity, such as trails, public swimming pools, and parks.

Parks are common community features that provide opportunities for physical activity, yet we know little about the specific park characteristics that are most related to physical activity.<sup>7</sup> Many aspects of parks could be measured and studied in relation to physical activity. Since it is not feasible to test them all in a single study, a conceptual model is needed to guide thinking and suggest hypotheses. This paper highlights how park and recreation settings might influence public health through a conceptual framework relating park environments to physical activity and, ultimately, the health of park users. Finally, transdisciplinary field research is encouraged in order to examine the relationships between park envi-

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From the School of Public Health, Epidemiology Program, Louisiana State University Health Sciences Center (Bedimo-Rung), New Orleans, Louisiana; Recreation, Park and Tourism Management, Pennsylvania State University (Mowen), University Park, Pennsylvania; and RAND Corporation (Cohen), Santa Monica, California

Address correspondence and reprint requests to: Ariane L. Bedimo-Rung, PhD, Louisiana State University Health Sciences Center, School of Public Health, 1600 Canal Street, Suite 800, New Orleans LA 70112. E-mail: abedim@lsuhsc.edu.



**Figure 1.** The relationship between parks and physical activity. Note: Darker arrows and shaded boxes indicate the main connections covered in this paper.

ronmental attributes and physical activity levels within park settings.

### A Conceptual Model of the Role of Parks in Public Health

Twenty-five years of leisure research have provided a wealth of information regarding the benefits of parks and recreation services, including individual, social, economic, and environmental benefits.<sup>8</sup> Less attention has been paid, however, to studying the links between parks and physiologic health outcomes. Recommended guidelines for physical activity encompass four components: frequency, time or duration, type, and intensity of physical activity.<sup>9</sup> While leisure research has focused on frequency of leisure participation, leisure time utilization, and type of leisure time physical activity, what is missing from this literature are studies linking park-based leisure to physical activity intensity levels (e.g., sedentary, moderate, and vigorous activity). Documentation of these leisure benefits has also largely been based on self-report methodologies. Recently, there has been a growing interest in establishing more objective evidence of such benefits (e.g., increased economic benefits due to higher property values, lowered health-care costs due to leisure-based wellness programs). By providing opportunities for physical activity, parks can facilitate physical and psychological health benefits.<sup>10</sup> Many disciplines (public health, landscape architecture, and parks and recreation) are now questioning how existing park settings can be better promoted or modified to increase physical activity levels and health.

While several studies have established linkages between park use and health,<sup>11–22</sup> few have systematically examined the specific environmental attributes that correspond to higher levels of physical activity. To provide a foundation for such research, a conceptual model is proposed that couches park environments in terms of their benefits and, more specifically, proposes the linkage between physical activity and specific park features.

Figure 1 highlights the potential relationships among park environmental characteristics, park visitation, physical activity within parks, and physical health benefits (see shaded boxes of the model). The lower section of the model shows antecedents, or correlates of park use (the factors that influence frequency of use and nonuse). At the most basic level these correlates can be grouped into two broad categories: the characteristics of potential park users and the environmental characteristics of parks themselves. The environmental characteristics of parks are presented in further detail below. The middle section of the model illustrates the extent and nature of park use. Park visitation considers individuals who visit the park, regardless of the type of activity they pursue once there. Once individuals are in the park, the “physical activity within park” box then describes the level of activity they engage in, be it sedentary, moderate, or vigorous. Finally, the top section of the model illustrates the various types of outcomes (or benefits) resulting from parks and park usage. These include physical health benefits from physical activity such as a lower risk of obesity, heart disease, and diabetes; psychological health benefits

such as stress reduction; social benefits such as increased social capital; as well as economic and environmental benefits that may accrue to society resulting simply from the existence of the park in a community. These benefits are described below.

### **Benefits of Parks and Park Use**

Parks facilities and services offer various opportunities to fulfill individual, social, economic, and environmental benefits.<sup>8,23</sup> Some of these opportunities benefit an entire community, not just park users. For example, a rail-trail may attract restaurants and shops that in turn spend and invest money in the community and increase the community's tax base. Although the focus of this study is on the health benefits that are obtained via physical activity in parks, other important benefits of park use (such as psychological, social, economic, and environmental benefits) must also be acknowledged.

### **Physical Health Benefits**

Previous leisure research has focused on the role of park-based leisure in improving moods, reducing perceived stress, and enhancing a sense of wellness.<sup>22</sup> However, few studies have explicitly investigated the impact of park-based leisure activity levels on the physical health of park users. Exercise facilities, including parks, that are conveniently located (as measured by self-reports) have been found to be associated with vigorous physical activity in a number of studies, among both adults and children.<sup>11,12</sup> Other neighborhood factors that have been positively associated with physical activity include the presence of enjoyable scenery,<sup>24–27</sup> frequency of seeing others exercise,<sup>24–26,28</sup> and access to and satisfaction with recreational facilities.<sup>12,24,25,28–32</sup> Future research on the specific features of parks that promote physical activity could investigate the relative importance of access to well-maintained park facilities, a park's esthetic surroundings, and perceived safety.

### **Psychological Health Benefits**

In addition to the physical health benefits of parks, there may be numerous psychological benefits for park users that arise from the proximity of "natural environments." Studies among workers,<sup>33</sup> college students,<sup>34</sup> hospital patients,<sup>35</sup> inner-city girls,<sup>36</sup> public housing residents,<sup>37</sup> and apartment residents<sup>38</sup> have found a variety of psychological, emotional, and mental health benefits stemming from having a view of nature through their windows. Other studies have suggested that people place value on the existence of parks even when they do not use them. Ulrich and Addoms,<sup>13</sup> for example, found that college students derive substantial psychological benefits, including "feelings of open space," "change of scenery," and "place to escape campus," from their experiences in or nearness to the

park. These psychological benefits ranked higher in importance than the recreational and social aspects associated with parks. Other studies have shown that "having the park there" is the biggest source of pleasure for residents living near a small park.<sup>14,15</sup> In addition to park proximity, actual use of parks also relates to improved psychological health. In a study of older adult park users who participated in light to moderate aerobic activity, Godbey and Blazey<sup>16</sup> found that half of the sample indicated that they were in a better mood after visiting the park. In addition, More and Payne<sup>17</sup> also found that park users reported lower levels of anxiety and sadness after visiting parks. Hull and Michael's<sup>18</sup> investigation of park users found that the longer the participants stayed in park settings, the less stress they reported.

Physical activity and psychological health are also associated. Several reviews of exercise and depression research indicate that exercise reduces depression symptoms among people diagnosed with depression by three fourths to one standard deviation and among people without depression by about one half standard deviation.<sup>39–43</sup> Therefore, combining the beneficial effects of physical activity on depression with the restorative effects of nature would indicate an important role for parks in improving psychological health.

### **Social Benefits**

Parks may also facilitate social interactions that are critical in maintaining community cohesion, pride, and social capital.<sup>44</sup> Parks play a role in increasing social capital by providing a meeting place where people can develop social ties and a setting where healthy behavior (such as physical activity) is modeled. Social capital, which is defined as the relationships among people that facilitate productive activity,<sup>45</sup> may be associated with health and physical activity.<sup>46,47</sup> Studies in poor urban areas suggest that park-like natural elements promote increased opportunities for social interactions. Coley et al.<sup>48</sup> found that in two Chicago public housing developments natural landscaping and spaces with trees attracted larger groups of people than did spaces devoid of nature. A similar study found that exposure to green common spaces among elderly inner-city individuals is significantly positively correlated with social integration.<sup>49</sup> However, the physical environment may also inhibit the formation of neighborhood social ties when settings are crowded, dangerous, and noisy.<sup>50</sup> Studies among public housing residents suggest that the greener a building's surroundings, the fewer crimes, intrafamily aggression, and violence reported.<sup>51,52</sup> Settings in which there are more trees and vegetation appear to inhibit crime, aggression, and violence, while promoting social interaction among individuals. These results point to the importance of

examining similar relationships further afield, both in neighborhood park settings and in other populations.

### **Economic Benefits**

Outdoor recreation facilities may also provide a number of direct and indirect economic benefits for their communities.<sup>53</sup> For example, several studies have found that proximity to a particular reservoir<sup>54,55</sup> state park,<sup>56</sup> or regional park<sup>57</sup> was positively related to property value. A study done in Boulder, Colorado, showed that the greater the distance of a residential property from the greenbelt, the lower the price of the property.<sup>58</sup> However, others showed mixed or insignificant relationships between property values and distance from a park.<sup>59–61</sup> For example, one study examined the exact location of houses relative to parks and found that there was a positive influence on property value only for those houses adjacent to and facing a park, and a negative influence for those houses located on a lot which backed on to the park or that were located adjacent to a heavy use area of the park.<sup>62</sup> The majority of these studies looked simply at distance of property to a park and did not take into consideration the quality of a park. Parks that have fallen into disuse and disrepair may attenuate the potential positive influences on land values. Future research should continue to investigate the park attributes that may impact property prices and the local economy in general.

### **Environmental Benefits**

Parks may also play a role in preserving and purifying the environment.<sup>8</sup> Air pollution is a significant human health concern as it can cause coughing, headaches, lung, throat, and eye irritation, respiratory and heart disease, and cancer.<sup>63</sup> Trees in urban areas play a role in reducing air pollution by absorbing gaseous pollutants and storing them, thereby removing them from the atmosphere.<sup>63</sup> Urban trees also moderate temperatures by providing shading and cooling to an area, thus helping to reduce the risk of heat-related illnesses in city dwellers,<sup>64–67</sup> and in turn altering building energy use, which affects pollution emissions from power plants.<sup>63</sup> Since parks are areas that generally contain significant numbers of trees, their potential environmental contribution should be considered.

### **Park Use and Park Physical Activity**

Recreation and park use studies have demonstrated a continuous growth in the prevalence of outdoor recreation activity participation. In 1994–1995, 95% of the U.S. population reported that they had participated in one or more outdoor recreation activities over the 12 months before the survey; 68% reported trail/street/road activities (such as biking), and 22% cited participation in individual sports.<sup>68</sup> Much of this participation

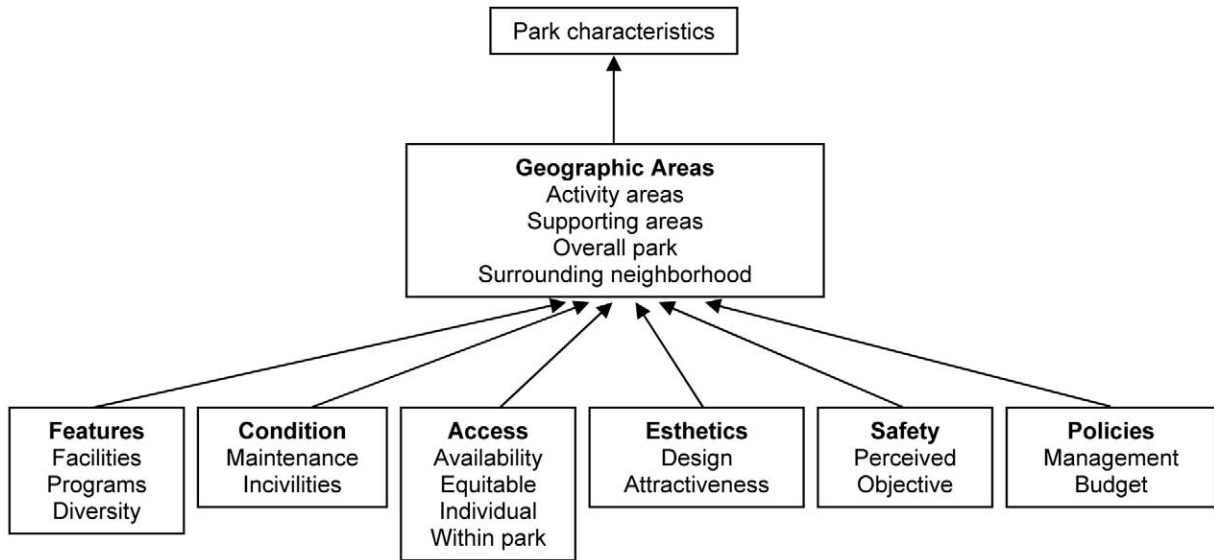
occurred at low-cost settings such as federal, state, and local parks. Despite this growth in the prevalence of outdoor recreation participation, only a third of the population accounts for the majority of participation days. Most park participation came from a smaller group of active leisure enthusiasts (7% to 21%) who accounted for 70% to 89% of total participant days.<sup>68</sup> Consistent with other localized studies of recreation use, walking was the most frequently cited activity (reported by 67% of respondents) followed by other, more sedentary, forms of activity (e.g., viewing scenery, family picnics/gatherings). A study of exercise facilities in San Diego found that 15% of survey respondents reported using parks; of these, 21% were “exercisers” (reporting three or more sessions of vigorous activity per week) compared to 11% who were in the “sedentary group” (reporting no sessions of vigorous activity per week).<sup>69</sup> Hoefler et al.<sup>70</sup> showed that use of parks and playgrounds by adolescent boys was a significant positive correlate of physical activity.

Certain populations, however, are less likely to use public parks. Park activity participation rates depend upon a variety of demographic, socioeconomic, and regional characteristics. In particular, inner-city and poor populations are much less likely to report participation in outdoor recreation activities than other metropolitan and nonmetropolitan residents. For example, 13% of inner-city poor residents reported running or jogging, compared to 29% of metropolitan residents.<sup>68</sup> In fact, the inner-city poor were less likely than other residents to participate in any of the 23 outdoor recreation activities surveyed. Other groups, such as older adults, racial/ethnic minorities, and females are also more likely to be infrequent or nonusers of parks.<sup>71</sup>

However, the singular act of visiting or getting to a park is only the first (albeit the major) step in the process of leisure activity participation. Given that park settings offer opportunities for both sedentary and active forms of leisure, it is important to understand what environmental characteristics are associated with activity levels. Recent regional and local park studies have demonstrated that the majority of park visitors are more likely to engage in sedentary recreation activity.<sup>68</sup> While many forms of park activity (both sedentary and active) can have a positive influence on mental health and stress, all activities do not contribute equally to recommended levels of moderate to vigorous physical activity. We should identify the kinds of park environmental characteristics that are correlated with moderate- to vigorous-intensity park activities.

### **Correlates of Park Use and Park Physical Activity Levels**

There are many studies that have examined leisure constraints and barriers to leisure activities and park



**Figure 2.** Environmental classification of park attributes.

utilization.<sup>72</sup> Common reasons for not engaging in park-related activities include lack of time, money, personal health, information, transportation and access, safety concerns, maintenance and/or inadequacy of park facilities, and the lack of leisure companions.<sup>68,73</sup> In a study of barriers to urban park use, Scott and Jackson<sup>71</sup> provided park nonusers and infrequent users a list of “strategies” and asked them which ones might result in their using public parks more often. They found that the most preferred barrier-reduction strategies were “making parks safer,” “providing more information about parks,” “providing more park activities,” and “building parks closer to home.”<sup>71</sup> In this model, the correlates of park use are separated into those concerning the individual characteristics of users and potential users (at both the intra- and inter-personal levels) and those concerning park physical and policy environments (at the structural level). The constraints mentioned above can fall into either of these two categories.

### Individual Characteristics of Park Users

A number of individual-level characteristics can influence park use. For example, there are significant differences in park and outdoor recreation behaviors based on a number of demographic or social characteristics, such as age, gender, race/ethnicity, socioeconomic status, and residential location.<sup>74</sup> Studies of park settings have also found that older adults, racial/ethnic minorities, females, and lower-income families are more likely to be infrequent or nonusers of parks.<sup>68,71,73,75–77</sup> Since these characteristics are relatively immutable, focusing on environmental and policy correlates of physical activity within parks is needed.

### Park Environment Characteristics

While there is a significant understanding of why people do not engage in leisure activity and visit parks, there is less understanding concerning which park characteristics relate to physical activity levels once at a park. Knowledge of such relationships may assist in the development of park environmental and policy changes to promote more physically active forms of park use. A park environmental classification scheme is proposed as a basis for future field experiments to test such linkages (Figure 2). Park environment characteristics may be composed of six conceptual areas that operate through four geographic areas to support physical activity within parks. The conceptual areas are the type of data that should be collected, while the geographic areas are locations where such data should be collected.

### Geographic Areas

The activity areas and supporting areas within the park, the overall park, and the surrounding neighborhood are the four geographic areas that should be considered when assessing parks for their relationship to physical activity and in which data must be collected.

**Park activity areas.** Activity areas are the sections, zones, or opportunity areas within a park that are specifically designed or commonly used for physical activity. They can include sports fields and courts, swimming pools, paths or trails, playgrounds, open green spaces, or other areas where physical activity occurs.

**Park supporting areas.** These park areas include those facilities and equipment that make physical activity in

parks attractive and safe to a variety of users. Such areas contain features that may not directly promote physical activity but are nonetheless an integral part of the park visitation experience, such as community buildings, shelters, restroom/changing facilities, picnic areas, parking lots, and so on. These areas may be correlates of frequent park use, how long people stay at parks, and how active people are within the park environment.

**Overall park environment.** Because a park is more than just the sum of its parts, it is necessary to consider an overall impression and meaning ascribed to the park as a whole.<sup>78</sup> Certain park characteristics, such as aesthetic appeal, size, and diversity of programs, are not limited to specific areas of the park and must be considered as applying to the overall park. Other examples of characteristics that could be collected in the overall park category include overall park usage and accessibility to the park.

**Surrounding neighborhood.** Since people must cross through the surrounding neighborhood in order to enter the park, conditions in the park's surrounding neighborhood are likely to have a strong influence on how a park is used. A variety of neighborhood characteristics across several domains are likely to have an effect on how people perceive and use a park, including traffic (access),<sup>79,80</sup> blighted or abandoned housing (aesthetics),<sup>24–26</sup> crime (safety),<sup>11,24–26,28,79,81–83</sup> and resident demographics.<sup>82</sup>

### Park Conceptual Areas

The six park conceptual areas serve as the basis for operationalizing measures to assess park environmental and policy characteristics in their relationship to physical activity levels. These categories represent the “type” of data that should be collected. Because many of these concepts overlap, an item listed in one category may actually satisfy the requirements of several.

**Features.** Parks contain a wide variety of features that lend themselves to different types of usage. For example, the presence of sports fields can lead to use by sports teams, whereas the presence of natural areas may lead to more passive contemplation of nature. Rather than trying to presume an overall purpose or assign a classification type for each park, this paper proposes instead to catalog the features that are actually present. Future studies can then assess relationships between certain types of activity and specific features. Some of the major park characteristics that may influence park use are the physical components, or on-site characteristics, of a park. People are attracted to parks so that they may partake in specific behaviors and realize certain benefits, and the presence or absence of a variety of park attributes can be an important determinant of a park's ability to promote physically active leisure behavior.

These park features include facilities, programs, and diversity. Facilities refer to the physical facilities that are available to users, such as tennis courts, picnic tables, or security lighting. A qualitative study done in Australia identified the availability of amenities (e.g., swings, barbecue equipment) as among the important features influencing respondents' use of local parks.<sup>84</sup> Also included in this category are the recreation programs, or the organized activities that take place within a park setting. They can be regularly scheduled programs, such as an after-school sports league for children, or they may be one-time events such as concerts and races. The concept of diversity comprises the mix of park facilities, programs, users, and location. A park with diversity is one that is used for a variety of purposes at different times of the day, week, and year.<sup>85</sup>

**Condition.** People choose to visit or not visit parks not only because of what features are located there, but also because of the condition of those features. Public health research to date has largely been devoted to studying the relationships between physical activity and the presence or absence of features, but little work has been done to distinguish among the potentially varying conditions of those features. Park users are more likely to visit a park where the features are maintained on a regular basis and shun those places containing elements that are in disrepair. Another important aspect of the condition of parks is the safety of the equipment. In 2001, almost 190,000 children required emergency room treatment after being injured on public playground equipment.<sup>86</sup> Several studies have highlighted the inadequacies of playground equipment that have led to injury and even death.<sup>86–88</sup> The condition of play equipment is likely to factor into parents' decisions to let children play in certain parks.

Another component of park condition is visual cues of incivilities. Incivilities are defined as “low-level breaches of community standards that signal an erosion of conventionally accepted norms and values.”<sup>89</sup> They include disorderly physical surroundings (e.g., trash, graffiti) and disruptive social behaviors (e.g., drinking, loitering). Such cues may provide a signal about how to behave. When properties are poorly maintained, a message is sent that there is a breakdown in accepted civil behavior. Studies have found that people interpret certain features of the neighborhood environment, such as a well-tended lawn or garden, as a sign of care that makes areas look safer and discourages certain antisocial behaviors and fear of crime.<sup>89–92</sup> The same principles that apply to environmental cues around residential property are likely to apply to cues in parks. Parks that are not maintained and/or attract vagrants could contribute to people's perceptions of safety within the park, which likely impacts their use.

**Access.** Access is defined as the ability of people to get to and navigate within a park. Four categories of access

are considered here: availability, equitable access, individual access, and within park access.

Availability refers to the amount of park space available in a given city, measured either as park space per capita or per acre. Good quality parks may not be present in sufficient numbers in cities to be accessible to all people. No national standards exist that address the optimal amount of park space necessary in a city, although Doell<sup>93</sup> suggested in 1963 that 10 acres per thousand population for the entire park and recreation system in a municipality be set aside. A recent national survey found that park space per capita ranged from 2.7 acres per thousand residents in Fresno to 46.8 acres per thousand residents in El Paso, with a national average of 15.8 acres per thousand residents.<sup>94</sup> Clearly, cities across the country have varying distributions of park space, with the mean today surpassing previous recommendations. However, we have yet to determine how much and what kind of park space is optimal for any population.

What is not captured in these statistics, however, is how park space is distributed within a community and among its people. Equitable access refers to the equitable distribution of parks across different types of neighborhoods. It may be important to know if all ethnic and economic groups have equal access to parks, if parks are concentrated in certain sectors of a city, and if they are equally maintained and supported.

Individual access refers to the distance that an individual must travel to get from his home to the closest park. This is likely to be a strong indicator of physical activity in parks, as those who live closest to a park may be the most likely to visit and thus be physically active in it.<sup>11,25,28-30,69,79,95,96</sup> A study done by Whyte<sup>97</sup> estimated that about 80% of users will come from a radius of three blocks. Heavy vehicular traffic in surrounding neighborhoods may also impede pedestrian access to parks.

Access within a park refers to the ability of people to move around easily inside the boundaries of a park. Few studies have explored this type of access, but it is likely to be important. An example of this concept is the distance from the parking lot to the golf course. Players who have to carry their equipment long distances between their cars and the course may be discouraged from using a particular park. Alternatively, basketball courts attracting loud teenagers that are placed too near playgrounds serving young children may discourage some parents from using that park. Within park access needs to be defined according to the design of particular parks. Perceived access should also be considered, given that perceptions of inaccessibility may inhibit park activity behaviors.

**Aesthetics.** The category of aesthetics incorporates the perceived attractiveness and appeal of the various design elements of a park. Having something beautiful or

interesting to look at while exercising or visiting a park can be a powerful motivator of physical activity. Enjoyable scenery, for example, was found to be positively associated with physical activity in at least three studies.<sup>24-26</sup> Aesthetics also considers how the physical features of a park are laid out. Some design characteristics are amenable to change over time, while others are fixed at the initial park planning stages. Some important design issues include the size of a park, its layout, landscaping, the balance between sun and shade, topography, ease of access, visual appeal, and other aesthetic features such as ponds or sculptures. The placement of park features in appropriate and logical ways, such as locating benches near a playground or drinking fountains near sports fields, may also be important.

**Safety.** Safety refers to the personal security of park users, and is an important barrier to park use.<sup>68,71,76,98</sup> It can be defined and operationalized as both a perceived and an objective measure, where perceived safety refers to people's perceptions and feelings of safety, while objective safety refers to actual incidents of crime. Distinguishing between the two concepts is important in order to adequately address safety concerns, yet most public health research has focused solely on perceived safety. Perceived safety is usually measured by surveying individuals on how safe they feel their neighborhood is from crime.<sup>24-26,81,82</sup> Of these studies, only one found an association between neighborhood safety and physical activity levels.<sup>81</sup> Only one other study has used an objective measure of safety, that of reported incidents of serious crime in the neighborhood, and found an association with physical activity.<sup>83</sup> The lack of a consistent association between safety and physical activity may suggest that people find other ways to be active, such as in indoor gyms, despite the perceived lack of safety in their environment. However, there is still much to be learned about these relationships.

**Policies.** The category of policies includes issues related to park design policies, park management practices, and budget procedures. Some park organizations may have unwritten policies of building and maintaining facilities that are most accessible to their user population and leaving the less accessible parts of their park undeveloped and/or not well maintained. Moreover, recent park maintenance practices that promote ecologic diversity may detract from the visual appeal desired by certain park user groups. A major factor contributing to a park's maintenance and facility development is its operating and capital budget. However, public expenditures on park and open space per resident vary widely across the country.<sup>94,99</sup> Kansas City, Missouri, spent \$184 per resident on park and open space in 2000, while Indianapolis spent only \$35, with the average falling around \$79.<sup>94</sup> In smaller cities and

towns, park expenditures are often even lower. Other examples of policy characteristics include operating hours of the park, costs of programs, and rules of behavior.

## Summary

This paper has proposed a conceptual model to guide thinking and suggest hypotheses about relationships between park benefits, park use, and physical activity levels, as well as the antecedents/correlates of park use. In this classification scheme, the various components are highlighted that comprise the environmental characteristics of parks. In describing parks' environmental characteristics, research could consider measures that cover the categories of park features, condition, access, aesthetics, safety, and policies. Data from these categories should be collected within specific geographic areas in and around the park; these areas include activity areas, supporting areas, the overall park, and the surrounding neighborhood.

Future research should focus on how to operationalize specific measures derived from the park characteristic categories listed above and the most efficient and accurate methodologies for collecting these data. Follow-up studies should then test the associations between physical activity levels and these specific park characteristics. Examples include defining the "aesthetic appeal" of parks, evaluating the condition and maintenance of park facilities, and investigating their relationship to park-based physical activity; studying the relative importance of each of the park conceptual areas to park-based physical activity as well as overall physical activity; and exploring differences in park environmental correlates among different population subgroups. Effective collaboration between public health professionals, parks and recreation planners and managers, sociologists, psychologists, economists, urban planners, architects, landscapers, and public safety officers is needed to design feasible interventions and enhance park-based physical activity levels.

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