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A Framework for Assessing Equitable Health Outcomes of Parks

Guidance for Park Practitioners and Local Leaders

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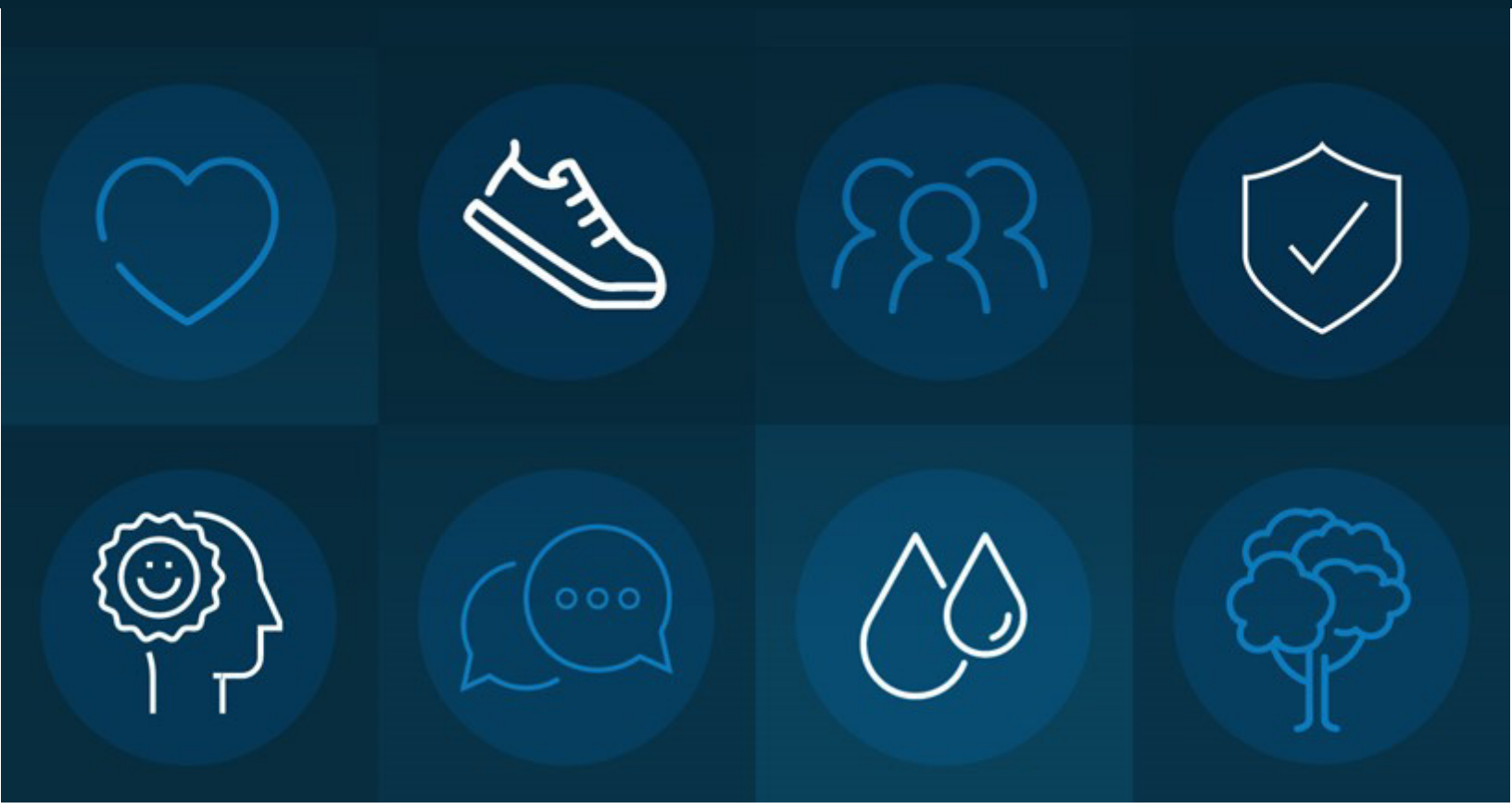

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Introduction

Parks and green spaces contribute significantly to the health and well-being of their users, particularly users who visit frequently. Parks provide both individual and community benefits and are increasingly recognized as a key social determinant influencing individual health outcomes (NRPA 2021a; Omodior and Ramos 2019).[1] The benefits of parks are maximized when parks are accessible, high quality, and designed to reflect user priorities and interests (Yañez et al. 2021).

Understanding how parks contribute to health can be complex. People spending increased time in parks can yield individual and community benefits, actual and potential benefits, and avoided health costs. Health benefits can be understood on their own terms (such as increased positive health outcomes) or framed in terms of overall economic impact. Quantifying the economic value of a park's health contributions requires closely examining local health data, understanding of how the features of the local park system connect to local communities, measuring actual and potential health-related benefits to those communities, and translating those benefits into economic measurements of associated costs or costs avoided from park use.

Not everybody is equally well placed (either in physical or socioeconomic terms) to receive the benefits of parks. This means it is important to use an equity lens to understand current benefits *and* the potential for future benefits accruing from more equitable access and use: benefits become amplified when a park system is more equitable and ensures different groups have adequate and quality access that meets their needs and interests and translates to actual use and realized benefits. People of color or low-income residents are less likely to use these public spaces than are white people and higher-income residents (Jay et al. 2021; Larson et al. 2021), in part because of barriers such as access or usage fees, mismatch between park programming and community needs, safety concerns, physical barriers (e.g., highways and proximity), legacies of restrictive policies that have made these spaces exclusionary or hostile, lower investment in the maintenance and operation of parks in lower-income areas, divested communities, or other barriers. *Equity in Parks and Recreation: A Historical Perspective* (NRPA 2021a) further describes how historical and present-day policies affect park access.

Yet living in a neighborhood with access to green space can reduce health disparities, particularly for lower-income people and people of color. For Black and Latinx and low-income people in particular, barriers to access and use may prevent people from realizing the full benefits of parks

(Derose et al. 2015). Their chances of receiving the rich health benefits of parks are greater when they are within 1.2 miles (or under a 22-minute walk) from one (Rigolon et al. 2021).

To unlock the health benefits of park spaces for all users, local leaders, park practitioners, and advocates are working to improve equitable access and better understand who they serve. This can be challenging with limited funds and staff that are often already spread thin. In response to the growing demand for parks and green spaces and increased recognition of the wide benefits they provide, park practitioners are looking for concrete ways to demonstrate the value of park systems.

BOX 1

Glossary of Terms

The key terms used throughout the framework are defined as follows:

- **Health equity:** Everyone has a fair and just opportunity to be as healthy as possible. This requires removing people's obstacles to health such as poverty and discrimination and addressing their lack of access to healthy food and safe environments, including parks and recreation, health care, good jobs with fair pay, and quality education and housing.[a]
- **Park equity:** This considers whether all residents have reasonably equal access to quality parks. We are including both proximity (i.e., parks located close to residents) and quality (i.e., parks that are well maintained and appropriately programmed) in our definition. Quality also measures whether parks offer amenities and programming that are responsive to the needs of users, including being culturally appropriate. (Eldridge, Burrowes, and Spauster 2019)
- **Economic benefit:** The contribution of a park determined in dollars generated, costs avoided, and overall impact to the local economy. There are several economic benefits, measured historically in measures of increased property value, tax revenue, tourism revenue, and business development,[b] but in the context of this framework, we are highlighting the economic benefits of the health contributions of parks.

[a] "Elevating Health Equity through Parks and Recreation: A Framework for Action," National Recreation and Park Association, accessed November 4, 2022, https://www.nrpa.org/our-work/Three-Pillars/equity/elevating-health-equity-through-parks-and-recreation-a-framework-for-action/.

[b] "Economic Benefits of Parks," WeConservePA, accessed November 4, 2022, https://conservationtools.org/guides/98-economic-benefits-of-parks.

Purpose of the Framework

This framework provides park practitioners with directions for assessing how equitable their park system is, identifying how their park system improves health outcomes for users, and understanding how parks address health disparities. It accomplishes this goal by helping park practitioners use public data to demonstrate the local health of communities close to the park system across four domains of health: physical, mental, social, and environmental. It then communicates the economic value of equitable health benefits. The framework provides guidance for incorporating local data and knowledge to deepen practitioners' assessment of health outcomes and associated economic impacts, particularly for park systems with greater capacity and interest. We also offer tools for original data collection to complement what is publicly accessible and outline key considerations for communicating the inherent value of park and green space investments.

Using the framework will help park practitioners and local leaders demonstrate the health contributions of their park systems quantitatively and qualitatively. They can make the case that park users see improved health outcomes such as reduced rates of obesity and increased community health outcomes such as increased public safety, and understand how to interpret the economic value of health in the communities surrounding parks based on how they advance park equity.

The framework provides five steps for assessing the health impacts of parks, and their economic impacts:

- **Step 1:** Identify park characteristics
- **Step 2:** Examine who has access
- **Step 3:** Select and measure health outcomes
- **Step 4:** Estimating economic benefits
- **Step 5:** Drive equity through action steps

This is part of a large body of work the National Recreation and Park Association is developing for the parks and green space field (box 2).

BOX 2

Studying the Health Impacts of an Equitable Park System

This framework is the second phase in a larger project commissioned by the National Recreation and Park Association to understand and communicate the economic impacts of local parks based on their health benefits. The goal of this work is to better equip local park and recreation professionals and advocates with the evidence to make a health-based case for the value of parks. In the first phase of this work, Urban prepared a literature review summarizing the evidence described in recent, relevant literature to situate parks within broader conversations on equity and access and provide a comprehensive summary of the research on the health equity benefits of parks (Cohen et al. 2022). An advisory committee composed of park and recreation professionals, health experts, and equity experts are informing the work, and the project will culminate in an adaptable and practical tool for measuring the health equity impacts of parks at a local level in the third phase.

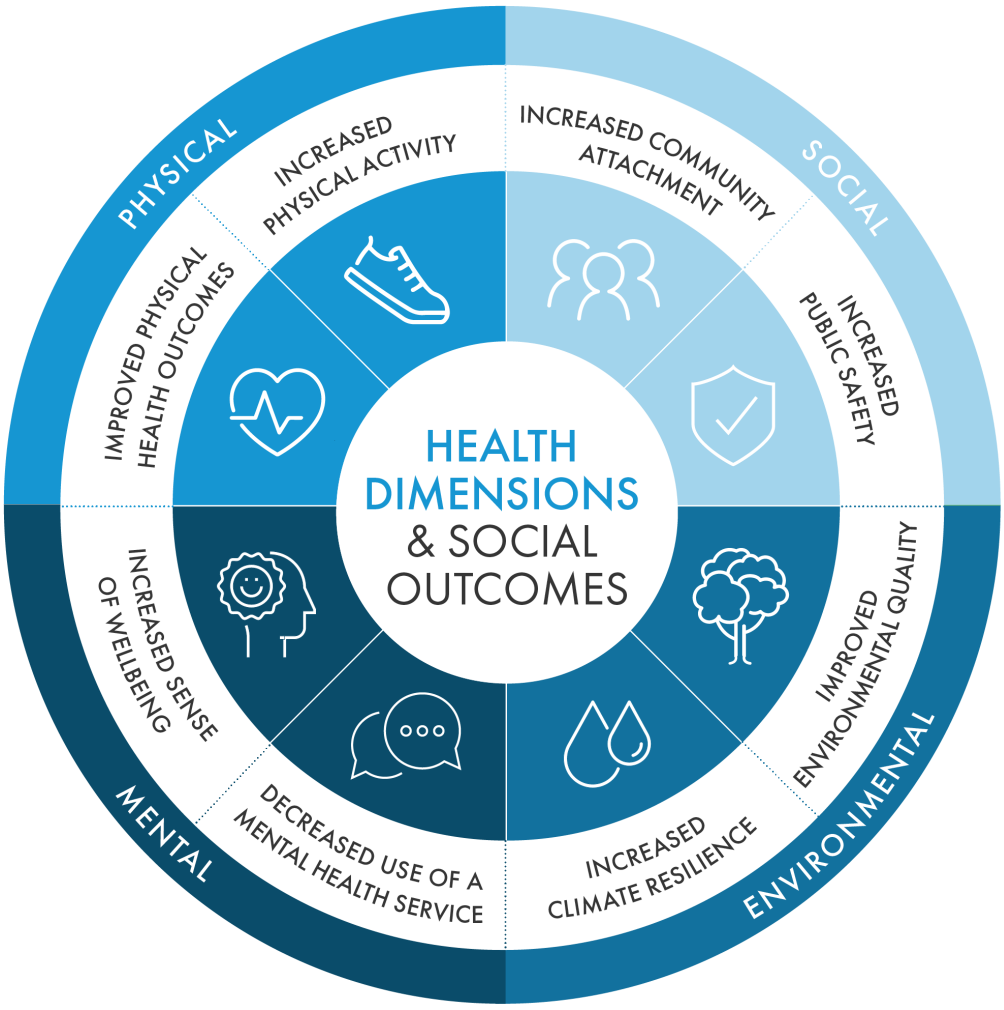
The Four Dimensions of Health

The framework examines four dimensions of health—physical, mental, social, and environmental—and the associated outcomes for individuals that use a park system. Figure 1 illustrates the four dimensions and the outcomes of each. These health outcomes were selected based on robust evidence documenting recent, relevant literature on the health equity benefits of parks (Cohen et al. 2022).

Each outcome selected for the framework demonstrates core drivers of estimating a park system's contribution to health with the goal of supporting local leaders, park professionals, advocates, and others in advancing the field of park and green space health equity with more strategic investments. Other health equity outcomes were not included in the framework because they lacked sufficient data sources to demonstrate how to estimate contributions or because they could not clearly identify how an equitable park system can derive benefits for users. Emerging research may show additional outcomes that can be used to make the case for parks, but the core dimensions in this framework provide a foundation for beginning this work.

FIGURE 1

Health Dimensions and Associated Outcomes



Source: Authors' analysis.

Understanding Economic Benefits

The growing body of evidence laying out the health benefits of parks and park systems provides an opportunity to more systematically access what those benefits look like in actual places. The outcomes laid out in figure 1 can be understood as having potential quantifiable impacts on people, communities, and local systems: healthier communities and populations put less stress on local health

and environmental systems (lowering overall and acute/emergency use), often framed in terms of "costs avoided."

The challenge of quantifying economic benefits, however, is in being as specific as possible about who benefits and how. Because different groups experience the benefits of parks differently, any assessment of economic benefits that is at least partially responsive to real-world conditions needs to account for the different entry points these groups have to experiencing benefits from parks. This means any economic analysis of the benefits of parks to particular groups needs to account for who those groups are, how those groups use parks of different types, and how those groups experience benefits differently. Once those relationships are laid out, we can construct a more quantitative estimate of overall impact and suggest opportunities to increase that impact.

In step 4, we describe how to incorporate economic value in assessing the health contributions of equitable park systems.

Questions This Framework Can Help Answer

This framework is intended to equip park practitioners and local leaders to demonstrate the health outcomes of parks and green spaces and help them make a better case for targeted investments. It identifies data showing how park systems contribute to physical, mental, social, and environmental health and includes guiding principles and key considerations for examining park equity.

Here are some examples of questions the framework can help park practitioners think through:

1. What are the health-related benefits of the park system, and how can they be quantified?
2. Which health benefits are best positioned to be convincing to local stakeholders showing the importance of greater park investments?
3. In what ways are community members engaging with the park system?
4. Where are the greatest gaps in who is accessing a park and the health benefits of parks, and how might they be addressed?
5. How does articulating the four dimensions of health—physical, mental, social, and environmental—align with policymakers' agendas for local investments in parks and green space? Where do further connections need to be made?

6. What partnerships can be leveraged to further understand the health outcomes users gain from being in a park?

Depending on the data that are available for assessing these questions, you can add local data or collect original data for more robust analyses. Measuring how equitable a park system is (i.e., its quality, use, and proximity, among other variables) can deepen our understanding of how (and for whom) that park system might contribute to a specific health outcome.

The assumptions for the framework were derived from an equitable parks and health outcomes research summary (Cohen et al. 2022) where we examined the evidence on parks' contribution to health and well-being. The literature identifies data associated with key health outcomes and demonstrates the importance in integrating equity through the analysis. For more on the methodology for developing this framework, see appendix A.

Considerations for Using This Framework

Before using this framework, practitioners should be aware of limitations and considerations for its use, understanding what it can do and what it cannot:

- This is a framework to help practitioners explore health outcomes that their park system can contribute to; it is not an automated calculation, and it does provide analysis about independent places. Practitioners will need to do some work to use the framework and to interpret the results. But it does provide easily understood guidance for undertaking that process.
- The analysis focuses on the overall benefits of park systems rather than on individual parks. This lets us focus more broadly on park systems or jurisdictional units (whether city or county) and identify ways that managers can think about their park systems.
- Although the body of research assessing and estimating the benefits of parks on users and communities is growing, parks exist within a broader socioeconomic context, and exact causality is both difficult to determine and multidirectional. For one, health benefits associated with parks are at least in part also caused by other local factors (such as local access to health care networks, pollution, and transportation access). And parks may affect local communities and residents, but they are also affected by those local conditions.

- We do not provide a ranking or index for park systems to measure against each other, because advancing park equity requires more local influence and strategies grounded in community engagement. Places are different: they have different histories, resources, challenges, and populations. To better track equity over time, starting with a baseline understanding of a community and using that as a point of comparison will be more useful.
- Our framework suggests data sources and provides examples for how to collect and analyze data, but actual data collection, availability, and format might vary by place.
- The framework is grounded in four core dimensions of health that the literature and conversations with practitioners suggest have the best evidence and are the most universal in their perceived value. However, the relative importance of these, as well as the importance of health dimensions and intersectional dynamics (e.g., how mental health relates to social resilience) will vary by place.
- Practitioners with access to more comprehensive local data or greater capacity to conduct original data collection will have a richer, more place-specific understanding of health benefits. To make this easier, the framework suggests several data tools and tips.
- The framework illustrates how to center equity at every stage of the assessment, while appreciating that not all equitable parks look the same, and the goals of different places dictate investments. Users of the framework should ensure equity remains central to their data analysis and interpretation to maximize the benefit of the framework.

The Framework

This framework provides an approach for better understanding the health contributions of parks in a specific place, the economic value of these contributions, and the benefits of equitable parks. When making the case for parks to decisionmakers and elected officials, park practitioners can use this framework to identify specific health outcomes for their users, communities, and broader region.

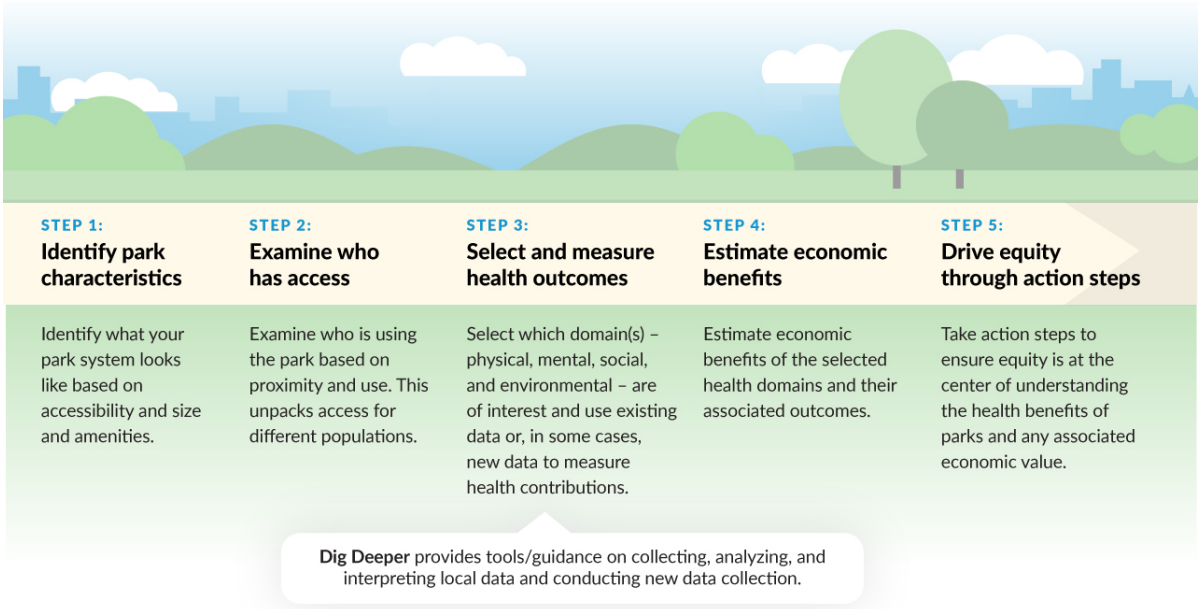
The user will begin by reviewing the four dimensions of health—physical, mental, social, and environmental—to determine the outcomes and impacts they are most interested in assessing. Using publicly accessible data, the framework helps users calculate a baseline assessment of a given park system's health benefits. To gain a more precise estimate, the framework offers guidance and tools for park practitioners to leverage their local data and conduct original data collection. We offer two types of data guidance:

1. **Data snapshots**, which identify publicly accessible data to generalize the key indicators for each dimension of health. This is a simple process and is best for making the case to local elected officials who may not understand that the health benefits of parks are quantifiable.
2. **Dig deeper tools**, which use specific local data or new original data to contextualize the health outcomes within a park system. This works well for park practitioners with access to robust local data and capacity to conduct deeper analysis of health outcomes. The dig deeper tools are best for local officials and community members who are interested in a more nuanced understanding of the outcomes and metrics and wish to inform discussions on equitable funding of the park system.

We recommend all users take the following steps to use the framework (figure 2) most effectively.

FIGURE 2

Steps for Users



Source: Authors' analysis.

Step 1: Identify Park Characteristics

Each park is built differently and developed for a myriad of purposes. They host a diversity of activities and programs, such as concerts, food distribution clinics, and neighborhood cookouts, they can include elements such as a community gardens, dog parks, or playgrounds, and they might have different physical landscapes, such as nature trails, bicycle paths, or courts for basketball and tennis. Further, the geographic area a park is in—whether dense or semidense urban, suburban, or rural—can also determine the park's characteristics. This is particularly true in assessing what transportation routes to a park might look like.

The characteristics of a park system are important because they can help determine the types of benefits a user might receive. Research has shown that parks in communities of color are half the size as parks in majority-white communities yet serve five times as many people (Trust for Public Land 2020). The quality of parks also matters because a less welcoming park might be underutilized by park goers.

As the first step in the framework, you must ask yourself the following questions:

- What are the types of parks different people have access to? What amenities exist in them?
- Is the park system located where people are, and how does access change by geography and demographics?
- Are the elements of the park inviting for park users?
- How do users get to the park, and what is their experience on that route?

To discuss these questions, there are two main elements of park characteristics: **accessibility** and **size and amenities**.

Accessibility

Knowing what people need to do to actually get into those parks is important. How safe are the routes that people need to take to parks? How many park entrances are there, and where are they located? How accessible are those entrances? The routes to the parks—their quality, quantity, and location—equally matter in determining accessibility. Park users need to feel connected to park entrances, and it helps when larger parks, such as those in regional park systems, have multiple entrances. For instance, if someone lives close to a park but needs to walk several blocks to access it, they may not frequent that park.

Access also includes the number of amenities, the quality of those amenities, and types of programming for park users. Amenities can include courts (e.g., for basketball or tennis), water features (e.g., splashpads), playgrounds, benches, pathways, pergolas, and other active and passive features. The amount and quality of these will determine a park's use and where further investment might be needed. For instance, if an exercise program in the park is oversubscribed or park benches need repairs, this can indicate the amenities and programs that are most used and where more might need to be offered. Further, the park and its amenities and programs may operate during specific hours, which has implications on accessibility.

Tracking access requires identifying transportation routes that people need to take to parks. This requires knowing how parks are connected to road, trail, and transit networks, where entry points are located, and knowing where amenities within parks (particularly larger parks) are located. Tracking access also requires recognizing that the larger built environment affects access: parks in more suburban or rural communities might generally be only reachable by driving (and include parking), but parks in denser urban areas may be more reachable by foot, bicycle, or transit (Ussery et al. 2016). More specifically, in urban areas, a rule of thumb is that people should be within a 10-minute walk of a

quality park to receive the park's benefits. In suburban or rural areas, parks within a short drive (10 minutes or less) can increase park use.[2]

Size and Amenities

The size of parks within a park system can estimate their reach and diversity of use. They might be part of a neighborhood park system (e.g., Grant Alvernon in Tucson, Arizona), a city park system (e.g., Rock Creek Park in Washington, DC), or even part of a regional network of parks (e.g., Tilden Regional Park in East Bay Regional Park District, California).

Park size cannot be correlated with the number of amenities it might have. Many large parks may have a limited number of amenities, such as nature preserves that are vast but only have trails, or pocket parks with community programming every night. This is why when determining park characteristics, park system size and amenities available are joint elements. Moreover, to gain the benefits of the park system, these must match the surrounding community's needs. In Step 2, we will discuss ways to examine who has access.

Recently, we have seen more flexible and adaptable amenities in parks. These are often quick, temporary, pop-up features that are responding to user demand. For instance, the department of parks and recreation in Minneapolis offers a program called Pop-Up Parks, a youth violence prevention and public health initiative, with designated public space and activities in neighborhoods between June and September. This is less costly than permanent or semipermanent park infrastructure and pilots ideas in underutilized spaces.

How to Identify Park Characteristics

You can use the following process to identify park characteristics by examining accessibility and size and amenities.

1. Use mapping shapefiles to identify where parks are located within communities. Geographic information systems (GIS) resources exist online that provide basic information on road networks and the location of parks, although this is an area where local resources and files may have more detailed and up-to-date information.[3]
2. Understand the context of the built environment within which the park system is located. For example, urban, rural, suburban, or other community classification.

3. Inventory features and amenities of the park. Are there benches, playgrounds, hard courts, natural trails, and other such elements? On-the-ground review would indicate the existence of these amenities and whether the park system supports a diversity of features.[4] Additionally, local park system maps and inventory may provide information on pilot projects, such as pop-up parks and temporary features.
4. Use local databases to determine types of programming and activities in the space.

Step 2: Examine Who Has Access

Each place is different, and a park can reflect a microcosm of larger dynamics in a community. We can learn a lot from who visits a park and the larger ecosystem of who has power and social capital. To use this framework effectively, after you identify your park system's characteristics, you must examine who is accessing their park systems, for how long, and why.

Evidence shows that not everyone has equal access to parks and that access varies distinctly between some population groups (Derose et al. 2015). In particular, Black and Latinx people and low-income communities are less likely to have access to and to utilize quality parks and green space. Another key characteristic is age: children and young people, adults, and older adults must all be considered differently when it comes to getting to, using, and benefiting from parks. Finally, as a proxy for resources, income is another key measure useful for understanding potential users. These and other characteristics are intertwined, but a good starting point for understanding park access and use is having a sense of the race and ethnicity, age, and income of your community.

Park equity is concerned with whether all residents have reasonably equal access to quality parks. Box 3 describes how to think about equity and access. Equitable parks enhance health benefits for systematically marginalized users. In addition, taking an equity approach enables park practitioners and local leaders to leverage equitable and sustainable resilience investments, support intentional and inclusive park development and programming that can yield improved user satisfaction and usage, prioritize operations and maintenance spending around community need, improve access to parks in reasonable walkable and drivable distances, and strengthen community ownership and stewardship of park assets by the residents collectively.

BOX 3

Understanding Equity and Access to Parks

Typically, park access is measured by spatial proximity to determine who lives within walking distance to a park. The 10-minute walk campaign has been an important mayoral initiative to promote the development of parks in underserved areas identified based on proximity data. It encourages local government and parks agencies to target their investments toward where people live.

Yet policies, procedures, and decisions for parks and green space have been designed to concentrate quality parks and park programming in predominately white and higher-income neighborhoods, leaving people of color and low-income residents lacking the same quality of amenities as white people (Yañez et al. 2021). These historic and present-day inequities mean that even if people of color or low-income people reside close to a park, they may not feel welcome to use the space, and the park itself may have limited amenities, lower funding, and less upkeep. This in turn means those people will not gain the health benefits of being in parks and green spaces and may have widening health disparities.

Recent research surfaces more comprehensive ways to examine park access and equity. It can include multiple measures of the usability of parks and green space, such as proximity, density, quality, safety, and amenities. In doing this, park access should focus on eliminating barriers along these measures for all potential park visitors (MacCleery, McConville, and Hammerschmidt 2021).

Note: See also Wang et al. (2021) and Clement Lau, "Park Access: More Than Just Proximity," *OpenSpace* (NRPA blog), October 14, 2021, https://www.nrpa.org/blog/park-access-more-than-just-proximity/.

The framework centers equity as a lens for assessing the health impacts of a park system and interpreting the implications of disparities. There are some key questions that help determine how equitable a park system is:

- How do different people get to parks, and how do they do so?
- How do different people use and benefit from parks?
- How do underlying health issues that parks can help address vary across people and population groups? Are the outcomes mirrored in subpopulations?

These questions frame how a park system serves the community and if there are gaps in design or programming. They identify power dynamics in a locality and push practitioners to ask what are we doing, why are we doing it, and who are we doing it for. You can use this to direct their investments in a more equitable way, to ensure all people can access the full benefits of parks.

To develop equitable parks, you must understand the demographics of the surrounding neighborhoods. As noted, race and ethnicity, age, and income, are good starting points for this work. These factors can help determine who a park serves and in turn can indicate the quality of their access to and interactions with parks. There are two main elements measuring who has access: **proximity** and **use**.

Proximity

Who lives close to a park can serve as a proxy of who might use the space, and research has shown how these patterns vary significantly across the United State by community and by racial and ethnic group (Ussery et al. 2016). Although there is evidence stating that living close to a park does not mean someone might use it (Kaczynski et al. 2014), the amount of people living in walking or driving distance can tell us the number of potential park users and whether the amenities and programs suit the volume of visitors.

Neighborhood-level data exist that let us broadly understand how close different people and communities are to park assets. Using US Census Bureau data on race and income at the local level is generally the best way to understand where groups live, and—when compared to park locations and accounting for access—how close they are to parks. Privacy considerations mean there are limits to how specific the user can get in understanding where people of certain groups live, but overall, because of their richness and range, census neighborhood-level data are exceptionally valuable for understanding where different types of people live.

Use

We want to understand how different people might use the park and determine who the main users are. Identifying who lives close to parks is relatively straightforward using US Census Bureau data on race, income, age, and other characteristics at the neighborhood (census tract or census block) level. If you know where parks are, then you have a sense of how close they are to different communities.

But identifying who is actually using parks requires more in-depth analysis. Research has measured what these patterns look like in general (Kacyznski et al. 2014; Ussery et al. 2016), but specific places and specific parks are all different. Although technological approaches (whether counters or social media analysis) are increasingly being used to estimate actual usage, on-the-ground understanding requires on-the-ground data collection, whether through intercept surveys,

observations, or programming attendance logs. We discuss data and tools for doing this in Step 3 as part of determining social health.

How to Examine Who Has Access

You can use the following process to locate people in examining proximity and use.

1. Select the demographic groups of interest (such as racial and ethnic groups or age groups).
2. Using the census data, identify where people of these groups live in your community.
3. Identify spatially where people these people live in relation to parks. You can use the Urban Institute Spatial Equity Data Tool for this.[5]
4. Using the map on spatial access, include how people get to parks and how they get to specific features in these parks (and, where available use existing research that estimates how proximity translates to actual use for different demographic groups).

This process is designed to serve as a point-in-time snapshot for identifying opportunities to build more equitable communities. Inputs may change over time: if you are using US Census Bureau data, it will be updated regularly, although significant changes will only show up over relatively long periods of time. However, information on park locations, features, and quality *can* be updated regularly to assess how changes can improve equity of access. Appendix C gives you an example of how to identify key park system and population characteristics of interest. This exercise will offer the foundation for examining the overall health equity impacts of parks in a given community.

Step 3: Select and Measure Health Outcomes

Parks and green spaces help improve population health through several pathways. Understanding the extent to which a given park system is equitable is a critical framing for assessing park benefits. After conducting Steps 1 and 2, you can begin to unpack the health benefits your park system produces and who is receiving these benefits. The framework addresses health outcomes for four dimensions of health—physical, mental, social, and environmental—and aligns data sources to assess the outcome locally. Table 1 outlines a snapshot of how to use publicly accessible data to demonstrate health outcomes, and it contextualizes how to use local data or new original data. The health outcome measures for each dimension are illustrated in a table with guidance for practitioners on how to assess.

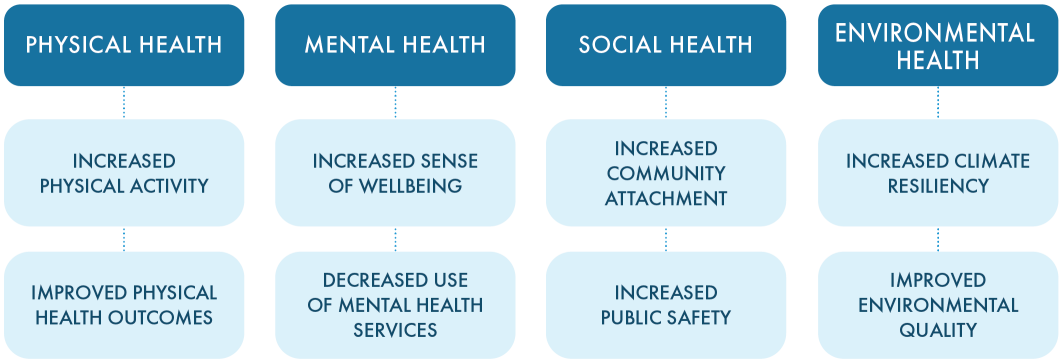
TABLE 1

Health benefits of parks and associated outcomes	
Unit of analysis	Identifies what the data can show; evidence measured for: Individual Community Population
Definition	Describes what this health benefit includes and why it's important to articulate the connection between parks, the health metric, and subsequent outcomes for users.
Metric(s)	Lists the indicator(s) used to measure the health benefit.
What data can show	Describes list of outcomes and impacts that could result from health benefit.
Data snapshot	Lists the sources for collecting these data and the level of data (e.g. census tract-level, city-level, state-level)
Examples of metrics in use	Provides an example from a park system or describes how a data set/ combined data sets were used to demonstrate the health contribution of parks and green space.

Begin by selecting which health dimension you are most interested in exploring (figure 3). Then identify the evidence-based health benefit of parks you would like to measure. Each outcome is underpinned by a methodology with assumptions and caveats (more details on this can be found in appendix B) and can be estimated based on existing, publicly accessible data sets or new (but easily generated) local data.

FIGURE 3

Health Dimensions and Associated Outcomes



Source: Authors.

Physical Health

Parks can contribute to improving physical health by providing a venue for physical activity, including walking, hiking, jogging, or bicycling (Rand 2014). These activities are generally provided by parks at little or no direct cost to users and parks themselves. Proximity to parks can influence physical activity rates. Several studies among adults and older adults reported the presence of nearby parks to be positively associated with different measures of physical activity (Cohen et al 2007; Godbey and Mowen 2010). Furthermore, park systems—especially those with large acreage, playgrounds, and outdoor gyms—encourage physical activity, which can prevent obesity and reduce the incidence of chronic medical conditions. (Eichinger et al. 2015; Pretty et al. 2005).

HOW TO MEASURE PHYSICAL HEALTH

Research indicates that proximity to and use of parks is associated with (1) increased levels of physical activity and (2) improved physical health outcomes.[6] Consult the tables below to measure the physical health contributions of your park system and local context.

TABLE 2

Increased physical activity

Individual

Definition

Physical activity can be described as any bodily movement that requires energy expenditure. This can include walking, biking, active recreation and play, and can be done at any skill level. It also be described as a health benefit when a user performs "at least 30 minutes of moderate to vigorous activity at least three days per week." People who have access to parks and green space are more likely to engage greater levels of physical activity. Public data can provide a baseline of how many people are already active in your community.

Metric(s)

Percentage of adults that participate in physical activity in the past 30 days (ParkServe Tool)

What data can show

Park's potential contribution to:

- higher rates of physical activity
- increased activity leading to better physical health outcomes
- current physical activity and health in community of interest

Data snapshot

In your neighborhood (Census tract):

- CDC PLACES

Metric: No leisure-time physical activity among adults aged ≥18 years

In your county:

- County Health Rankings

Metric: Percentage of adults age 18 and over reporting no leisure-time physical activity (age-adjusted).

In your state

- Behavioral Risk Factor Surveillance System

Survey Question: Respondents aged ≥18 who answered "yes" to the following question: "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise."

Note: Some states have samples that allow for comparisons of counties, public health districts, or other local geographies.

At the national level:

- National Health Interview Survey (NHIS)

NHIS data are collected on a broad range of health topics through personal household interviews. Estimates are available for the nation as a whole and for selected subgroups defined by characteristics such as sex, age, race, ethnicity, family income, and region of the United States.

Increased physical activity

Individual

Examples of metrics in use	The Park Serve tool has a community health measure, which is a combined index based on the rate of poor mental health and low physical activity from the 2020 CDC PLACES census tract dataset, relative to urban areas. A 10-minute walkable service area was created to determine proximity for each park. The tool identifies priority areas for park development by using a comprehensive index of six equally weighted demographic and environmental metrics to show populated areas that are not within a 10-minute walk of a park. Park practitioners can use park utilization rate data to estimate physical activity rates within parks. The Trust for Public Land assessed the recreational use value of parks to residents of Lucas County by determining the number of visits to Metroparks through telephone surveys. Lucas County residents provided information about the frequency of their visits to Metroparks, as well as detailed information about the types of activities in which they participated.

Sources: "Physical Activity," World Health Organization, accessed November 15, 2022, https://www.who.int/news-room/fact-sheets/detail/physical-activity, Cohen et al. (2006); Eichinger et al. (2015); Harnik and Welle (2009); Pretty et al. (2005).

TABLE 3

Improved physical health outcomes

Community

Definition	Physical exercise can reduce the likelihood of certain illnesses such as obesity, cardiovascular disease, diabetes, and arthritis. Consequently, it can also help reduce associated medical costs.
Metric(s)	▪ Percentage of adults aged 20 and above with diagnosed diabetes (age-adjusted) ▪ Percentage of low birthweights ▪ Percentage of adults with diagnosed hypertension ▪ Heart disease mortality rates ▪ Medical expenditures ▪ Rate of hospital stays for ambulatory-care sensitive conditions per 100,000 Medicare enrollees (preventable hospital stays) ▪ Percentage of the adult population (age 18 and older) that reports a body mass index greater than or equal to 30 kg/m2 (age-adjusted)
What data can show	Park's potential contribution to: ▪ reduced incidences of type 2 diabetes ▪ reduced risk of certain types of cancer

Improved physical health outcomes

- greater birthweights
- fewer preventable hospital stays
- reduction in obesity
- increased healthcare savings

Data snapshot

In your neighborhood (Census tract):

- County Health Rankings

Metrics: diabetes prevalence, adult obesity, and preventable hospital stays

In your city, county, and state:

- National Center for Health Statistics - Natality files

Metric: birthweight (subgroup data available on age, educational attainment, and marital status of parents; race; sex; and geographic area)
Note: city data available for those with 100,000 population

At the national level:

- National Medical Expenditure Panel Surveys

Metric: cost and use of health care and health insurance coverage.

Examples of metrics in use

The Trust for Public Land determined cost between those who exercise regularly and those who do not. Using data from a telephone park use survey of activities and age, the team created a Parks Health Benefits Calculator based on studies in seven different states that showed people over the age of 65 incur two or more times the medical costs of younger adults. There was a $250 cost difference for people below 65 and $500 for people above 65 between those who exercise regularly and those who don't.
A recent report (Becker 2021) used the National Medical Expenditures data provided by the Center for Medicare and Medicaid Services to examine the association between Medicare spending and the amount of total greenness at the county level. The dataset includes Medicare expenditures by race, age, gender, and disability.

Sources: Kaczynski and Henderson (2008); Becker and Browning (2021); Cutts et al. (2009).

Dig Deeper into the Data

USING MEDICAL COST DATA

Physical health benefits that result from active park use by adults contribute to medical care cost savings. If you have data on the number of people who use the park for active purposes for a

sufficient time to make a difference (e.g., 90 minutes a week), you can couple it with local health data to determine medical costs averted. Age and ability are also important factors affecting health outcomes and can influence medical costs. We encourage you to examine local health data to select the most prominent health conditions and then couple the park-use data to determine how park users are actively using the space. This can demonstrate through correlation (not causation) how parks could contribute to improved physical health outcomes. The data sources that can be consulted here include

1. park use and monitoring data,
2. Health Department/Board of Health data reports,
3. hospital community assessments, and
4. insurance provider community profiles/assessments.

QUANTIFYING PHYSICAL ACTIVITIES

1. The Physical Activity Resource Instrument. A survey instrument that looks at physical activity by documenting amenities in parks. It requires multiple observations over different days or seasons of the year to be reliable.
2. Public Open Space Desktop Auditing Tool. A short survey in a remote environmental auditing tool that identifies amenities using GIS analytics to assess the influence of environmental features.
3. Internet-based Participatory GIS. A mapping tool plus survey questions to determine the location of amenities associated with increased physical activity. Includes park features and type of urban parks measured by variability in size and spatial dispersion. Offers access to multiple maps scales and customizable base map to specify data by place.

TOOLS THAT INCLUDE QUESTIONS ON PHYSICAL HEALTH

1. System for Observing Play and Recreation in Communities. An observational survey instrument for assessing physical activity in community settings.
2. International Physical Activity Questionnaire. A collection of questionnaires on amount of time spent in physical activity administered via telephone or self-administered. Downloadable formats are available in different languages.
3. Park Use Questionnaire. A series of questions on demographics, visitation, and park use.

4. Monitor of Engagement with the Natural Environment. A survey that seeks to capture ways people engage with the natural environment by including question on how many days you have done 30+ minutes of physical activity which increased breathing rate.
5. Harvard Flourishing Index. An online survey method aligned with three levels of nature exposure; indoor, neighborhood, and municipal level. It has a domain on mental and physical health and a question on perceived health (rate from 0 to 10).

Mental Health

Parks can play a role in improving mental health principally by providing opportunities for exposure to and interaction with nature (Frumkin 2011). Exposure to nature has been linked to a greater ability to cope with life stressors, a greater sense of self-esteem, and greater life satisfaction (White et al. 2014). General well-being is a key indicator of mood, happiness, and comfort in parks and green space. When people have access to green space, whether through physical presence or views, they display reduced stress levels, higher functionality, and productivity (Maric et al. 2021). But there is a causal connection between proximity and time spent in the park and the benefit to park users; those who spend more time in parks can achieve greater mental health outcomes.

HOW TO MEASURE MENTAL HEALTH

Research indicates that proximity to and use of parks is associated with (1) an improved sense of well-being and (2) decreased use of mental health services. Consult the tables below to measure the mental health contributions of your park system and local context.

TABLE 4

Increased sense of well-being	Individual
Definition	An improved sense of well-being can decrease stress, aid in mental fatigue recovery, and reduce levels of depression and anxiety. Outdoor time and access to nature have been associated benefits to mental health. The data on how adults generally feel in an area can be paired with local data collection efforts on how people's sense of well-being is after accessing a park.
Metric(s)	▪ Average number of mentally unhealthy days reported in past 30 days (age-adjusted).

Increased sense of well-being

Individual

- Percentage of adults reporting 14 or more days of poor mental health per month (age-adjusted).
- Adults with major depressive episode(s)

What data can show

Park's contribution to

- Fewer mentally unhealthy days—reduced levels of stress, anxiety, and depression
- Greater happiness and life satisfaction
- Reduced risk of poor mental health
- Fewer depressive symptoms

Data snapshot

In your neighborhood (Census tract):

- CDC PLACES
  - » Data on "poor mental health" included on physical health index

In your county and state:

- National Survey on Drug Use and Health

Metrics: serious psychological distress, mental illness

- Institute for Health Metrics and Evaluation (IHME)

Data on hypertension (2001-2009)

In your state

- Behavioral Risk Factor Surveillance System

  Metrics: poor mental health days; number of mentally unhealthy days; adults with major depressive episodes; frequency of mental distress

Note: Some states have samples that allow for comparisons of counties, public health districts, or other local geographies.

Examples of metrics in use

A study looking at capital improvements of the neighborhoods in Los Angeles involved fielding a survey to residents with questions based on the mental health inventory (MHI-5). The questions refer to both positive and negative aspects of mental health and include questions on depression and anxiety. Surveys were stratified by distance from the park. The team used multiple regression analysis to estimate the relationship between the psychological distress measured by the survey measures and distance to parks.

Sources: White et al. (2014), Frumkin et al. (2017); Cuijpers et al, (2009).

TABLE 5

Population

Decreased use of mental health services

Definition	Determined as a health benefit when measuring reduced rates of mental health treatment services and the costs of these services. Can help reduce associated medical costs.
Metric(s)	▪ mental health service utilization among adults with any mental illness in the past year ▪ reduced mental health unwell days as a proxy for need of services
What data can show	Park's contribution to: ▪ reduced mental health utilization rates
Data snapshot	**In your state:** ▪ Substance Abuse Mental Health Services Administration *Survey: National Mental Health Services Survey* ▪ National Survey on Drug Use and Health *Metrics: mental health care* *Data on some substate regions available*
Examples of metrics in use	A recent assessment of park use by people in New York City tracked participant mental health and park proximity and use (Orstad et al. 2020).[a] People living closer to parks indicated they exercised in the park more often, and frequent users reported fewer mental health issues compared to those who rarely or never used their local park. The study also found that, for residents concerned about local safety, the park proximity had no effect on park use, indicating the importance of offering more programming and fostering more welcoming spaces.

Sources: Wood et al. (2017); Tennant et al. (2007).

Notes: Better identification of mental health issues could also lead to increased service utilization. For more, check "Community Wellness Hubs," National Recreation and Park Association, June 2, 2022, https://storymaps.arcgis.com/stories/53045b41ea204719a6aace92481f99ee.

[a] See also Stephanie L. Orstad and Melanie R. Jay, "Mental Health Benefits of Parks Dimmed by Safety Concerns," news release, NYU Langone Health, July 7, 2020, https://nyulangone.org/news/mental-health-benefits-parks-dimmed-safety-concerns.

Dig Deeper into the Data

MENTAL HEALTH SURVEYS

1. Kessler 6 psychological scale. This self-administered scale includes questions on psychological distress that have been used in a parks context. A study examining residential green space quantity and quality and symptoms of psychological distress paired this scale with a Likert

scale question: “there are good parks, playgrounds and play spaces in this neighbourhood” (Feng and Astell-Burt 2018)

2. Harvard Flourishing Index. An online survey method aligned with three levels of nature exposure; indoor, neighborhood, and municipal level. It has a domain on mental and physical health and a question on perceived health (rated from 0 to 10).
3. Patient Health Questionnaire-4. This is a screening tool to assess anxiety and depression, but it is also being used during pre/post outdoor recreational activity to measure the mental health impacts of participation.

PLANNING APPROACH

1. Nature and mental health: An ecosystem service perspective**.** This is a framework to begin measuring the mental health benefits of nature at the city level while helping municipal planners and policymakers integrate nature into their new public space projects.

Social Health

Spending time in parks and green space and having a positive experience can contribute greatly to a person’s health and well-being. Social cohesion, which describes social connections and sense of belonging, play a key role in mental health and well-being. People and groups with higher social capital, connectedness, and sense of belonging had better psychological wellness; fewer health concerns; and increased preventative health care, such as less smoking and alcohol use (Jennings and Bamkole 2019). Parks serve as spaces where people experience diverse interactions and can contribute to feelings of happiness, comfort, social cohesion. The diversity of park amenities was also associated with higher rates of use (Kaczynski et al. 2014), and having amenities that appeal to a diversity of users can create a more welcoming environment (MacCleery et al. 2021; NRPA 2021b).

HOW TO MEASURE SOCIAL HEALTH

Research indicates that proximity to and use of parks is associated with (1) increased community attachment and (2) increased public safety. Consult the tables below to measure the social health contributions of your park system and local context.

TABLE 6

Increased community attachment

Community

Definition	Community attachment is associated with the degree to which a resident's routine activities are involved in community-oriented actions (Lee and Maheswaran 2011). The amount of time and money that residents devote to their parks can demonstrate their commitment, stewardship, and sense of ownership. These contribute to social connectedness which is the emotional and social investment neighbors have in their surroundings and in each other (Bogle, Edmonds, and Gourevitch 2018).
Metric(s)	▪ Number of friends of parks ▪ Financial contributions made to friends of parks groups
What data can show	Park's contribution to ▪ Greater time invested in parks ▪ More money for community efforts invested in parks
Data snapshot	**In your county:** ▪ Sources for county-level measures of social capital and social capital variables (2014) **In your state:** ▪ Find Your Park: Friends Groups
Examples of metrics in use	A team at Arvada Colorado created an index on community cohesion that asked questions such as if community members felt hopeful for the future and how often neighbors sought support for one another. Other measures including collecting data on community programming like bike rides, block parties, movies, etc. Data was collected on a biannual basis. These measures were collected alongside publicly available information on social capital from the US Census and ESRI pulled from the disaster resilience field. See table C1 for a list of 19 indicators linked to social capital (Kyne and Aldrich 2019). Older data on county-level measures of social capital also exist and can be used as a comparative baseline (Rupasingah et al. 2006). For the city of Wilmington, the Trust for Public Land calculated all the financial contributions made to "friends of parks" groups and park-oriented community organizations and park agencies.[a] They added the hours of volunteer time donated to park organizations and multiplied this number by the value assigned to volunteerism in Wilmington by the nonprofit organization Independent Sector.

Sources: Harnik and Welle (2009); Kyne and Aldrich (2019).

Notes: Friends of the Park data are only available for national park systems, which cover some but not all park systems in the US. Where not available, you will need to examine the Dig Deeper tools.

[a] See the Wilmington evaluation report (Trust for Public Land 2009). For computations and methodology, see the calculators report at "Wilmington Park Value Report," the Trust for Public Land, accessed November 15, 2022, https://www.tpl.org/resource/wilmington-park-value-report.

TABLE 7

Increased public safety

Community

Definition

Generally, public safety is referred to as the protection of the general public, including physical and social welfare. Park practitioners can assess how violence is impacting parks. Using local crime reports with public data can lead to insights about whether this is a problem and strategies to address key issues.

Metric(s)

- Violent crime rate (incidents per 100,000)
- Rates of juvenile arrests
- Perception of safety
- Residential/ property crime rate

What data can show

Park's contribution to

- Fewer reports of violence
- Perceived community/ neighborhood safety

Data snapshot

In your police district and state:

- Federal Bureau of Investigation Crime Data Explorer
  Metrics: crime, homicides, property crime, use of force

Examples of metrics in use

The Parks After Dark (PAD) program in LA County, a strategy to promote safety and community well-being, used data from the Los Angeles Sherriff's Department (LASD), Los Angeles Police Department (LAPD), and Census population data to explore trends in crime rates. LAPD and LASD crime data provide crime numbers and type of reporting district (RD) surrounding parks with PAD programming. To calculate crime rates per population, the RDs were spatially merged with Census block information and then then combined with LASD and LAPD data to calculate rates of Part I and Part II crimes per capita for each park. Part I crimes are serious property and violent crimes that include homicide, aggravated assault, rape, larceny theft, robbery, grand theft auto, burglary, and arson. Part II crimes include nonviolent and violent low-level offenses such as narcotics, disorderly conduct, non-aggravated assaults, and vandalism, among others. Part II crime rates are subject to underreporting and therefore trends presented in this report may underestimate rates of these crimes. Daily crime rate was used as the unit of analysis to account for the variation in length and time of PAD by park group and year.

Dig Deeper into the Data

DATA FROM LOCAL REPORTS

Local data from parks agencies, police and sheriff's departments, friends of the parks, and other places can be used to better understand users and their experience in parks. These data can help determine how welcoming a park system is and offer an assessment of social health.

1. Friends of parks reports
2. National Park and Conservation Association best practices for a friends of the parks group.
3. Public safety or police department reports
4. Community needs assessments

SOCIAL PROXY DATA

1. Socioeconomic proxy data: Opportunity Insights research uses anonymized Facebook data to create community and social capital metrics for the US. This is a new social capital metric determined by the ratio of a person's Facebook friends with higher socioeconomic status to their Facebook friends with lower socioeconomic status. This is emerging research that uses the main variable (economic connectedness) as a ratio value contingent on one's own socioeconomic background. The approach assumes that people's Facebook friendship circles can serve as a proxy of how much interconnectivity there is, by location, between people from different economic backgrounds. These data can be measured at the zip code level and neighborhood level. It will also analyze education, age, and primary language to shape social capital in a given space.
2. Perception of crime surveys: The two primary sources of government crime statistics—the Federal Bureau of Investigation and the Bureau of Justice Statistics—offer an incomplete look of public safety. How park users feel in the park and surrounding neighborhood is best understood through perception of crime surveys. This can help determine how someone feels in the space regardless how the crime statistics for the zip code appear, and it provides a proxy for how welcoming the park is.

COMMUNITY ASSET MAPPING

1. Community Asset Map (AARP 2022, 38). This identifies local stakeholders and organizations and suitability of public space activities.

2. Community Asset Map (Community First Toolkit). This provides guidance for understanding which community assets exist around park systems.
3. Power Sharing Tool. This documents organization's governance and decisionmaking process to reveal who is overrepresented and who is missing.
4. Community Engagement Resource Guide. This highlights the essential steps to performing meaningful engagement around neighborhood-level and park-system planning projects.

AUDITING TOOLS

1. AARP developed a guidebook that includes auditing tools to examine park equity and its contribution to social wellbeing.
    a. Public Space Audit (AARP 2022, 28): Question 3 has a set of questions that explore community attachment within a park and quality of facilities
    b. Walk Audit Tool (AARP 2022, 24): A separate guide with several surveys for assessing and reporting on the safety of a park, measuring walkability, the lighting available, emergency devices available, and other factors)
    c. Public Space Field Study (AARP 2022, 32): This can be used to identify activities in the park inclusive social interactions by demographics
2. NRPA developed "Elevating Health Equity Through Parks and Recreation: A Framework for Action"[7] to help park and recreation professionals audit practices, policies, and other structures within their departments through exercises, worksheets, and other guidance.

COMMUNITY SAFETY TOOLS

1. Public Open Space Tool (page 30). This includes a section on safety, including the visibility of houses and roads from the green space.
2. SAGE Site Audit Tool (page 45). This includes three questions on safety: Are there emergency telephones? Is there security on the site? Is there staff on site?

MEASURING SOCIAL CAPITAL AND COMMUNITY POWER

Two key outcomes of community connectedness and of people finding each other in a public space are building social capital and community power. These are important for encouraging equity for marginalized groups as they begin to see and find each other in the park setting. This has further

implications on improving the perception of public safety, because people are engaged in activities and community members have pride and ownership of the space.

1. Community First Toolkit developed by the High Line Network provides tools and resources for addressing inequities caused by infrastructural racism and assessing equitable impacts that shape of parks and public spaces. The Share Power tool outlines how to assess an organization's governance and decisionmaking process to reveal who is overrepresented and who is missing.
2. Love Your Block evaluation provides the methodology for interviewing and coordinating focus groups with local government and neighborhood leaders to examine outcomes related to social cohesion, social capital, and perception of change in the neighborhood. They also provide examples of how undergoing social network analysis can emphasize where social capital and connections are being formed.

Environmental Health

Parks can contribute to environmental health, including improvements to water management, flood mitigation, air quality, urban heat island effect, and wildlife habitation. They provide natural ways to increase hazard resiliency and promote well-being during and after disasters. Parks also help combat rising heat in cities. The tree canopy within parks and green spaces significantly improves air quality and reduces heat island effects (Akbari, Pomerantz, and Taha 2001; Paoletti et al. 2011). Places located within a 10-minute walk of a park can be six degrees cooler than places further from a park (Trust for Public Land 2020).

HOW TO MEASURE ENVIRONMENTAL HEALTH

Research indicates that proximity to and use of parks is associated with (1) increased climate resiliency and (2) improved environmental quality leading to improved health outcomes. Consult the tables below to measure the environmental health contributions of your park system and local context.

TABLE 8

Increased climate resiliency

Population

Definition

This includes flood prevention, stormwater and flood management, urban heat reduction, wildfire danger mitigation, and reduced atmospheric carbon. Park practitioners can use data on climate resiliency to understand how parks are supporting community adaptation and mitigation. For example, tree canopy data can inform whether a park is contributing to stormwater management and improved water quality.

Metric(s)

- tree canopy or shade cover
- heat intensity
- impervious surface coverage within the park

What data can show

Park's contribution to:

- reduced heat island effect
- supporting stormwater management

Data snapshot

In your neighborhood (Census tract), city, and county:

- US Department of Agriculture Forest Service i-Tree canopy

  Web application: estimates tree cover and other cover classes (e.g., grass, building, roads, etc.) in given area using Google Earth Imagery.

In your city:

- Trust for Public Land Urban Heat Island Severity for US Cities

  GIS layer: Contains the relative heat severity for every pixel for every city in the United States and show where certain areas of cities are hotter than the city's average temperature. Severity is measured on a 1-5 scale with 5 being the hottest/ most severe heat.

At the national level:

- Multi-Resolution Land Characteristics Consortium National Land Cover Database

  Dataset type: Urban Imperiousness represents urban impervious surfaces as a percentage of developed surface over every 30-meter pixel in the United States. The data can tell you about land cover and land cover change per year or over a time period.

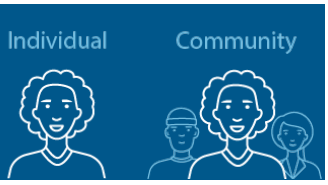
Examples of metrics in use

In Davis California, the U.S. Forest Service Western Research Station developed a model to estimate the value of retained stormwater runoff due to green space in parks. They used two types of data for their analysis: 1) land cover data from aerial photographs to show forested areas and impervious surfaces in parks (e.g. building, hard courts, and roadways), 2) perviousness outside the park area within the city from aerial photographs, and 3) the U.S. weather data amount and type of rainfall to estimate the costs of managing each gallon of stormwater. The model estimated that increasing urban tree cover by 50 million trees nationwide over 15 years could save 6,100 gigawatt hours of energy and save consumers $1 billion a year.

Source: Gies (2009).

TABLE 9

Improved environmental quality



Definition	Safe air, land, and water are fundamental to a healthy environment. A healthy environment, free of hazards, such as air pollutants and toxic chemicals, helps prevent illnesses and other medical issues related to physical health and mental well-being. There is a correlation between how people experience their environment and their health outcomes. Examining the ways greenery – such as tree canopy – contribute to people's physical health and wellbeing offering another benefit.
Metric(s)	▪ Number of days per year air was rated unhealthy for ozone ▪ Relative disparity in pollution exposure ▪ Current asthma prevalence among adults aged ≥18 years ▪ Average daily density of fine particulate matter in micrograms per cubic meter (PM2.5).
What data can show	Park's contribution to: ▪ Lower asthma rates ▪ Improved air quality
Data snapshot	**In your neighborhood (Census tract):** ▪ CDC PLACES Dataset *Metric: Current asthma prevalence among adults aged ≥18 years* ▪ 2020 EPA EJScreen *Air toxics respiratory hazard index: Ratio of exposure concentration to health-based reference concentration using EPA Hazardous Air Pollutants data* **In your county:** ▪ County Health Rankings *Metric: average daily density of fine particulate matter in micrograms per cubic meter* ▪ Environmental Protection Agency Patient Exposure and the Air Quality Index *Collect real-time air quality data and next data air quality forecasts through the AirNow Website, AirNow App, and text message notifications from EnviroFlash*
Examples of metrics in use	In order to quantify the contribution of park vegetation to air quality in Washington DC, the Trust for Public Land used an air pollution calculator that is location specific to estimate pollution removal and value for urban trees. This calculator was designed by the Northeast Research Station of the US Forest Service in Syracuse, New York, designed. First, land cover information is obtained through aerial photography and then the calculator determines pollutant flow to an area in a given time period known

as "pollutant flux." Finally, the calculator uses hourly pollution concentration data from the US Environmental Protection Agency. The total pollutant flux is multiplied by tree-canopy coverage to estimate pollutant removal.

Note: Health environment data is part of Healthy People 2030; the Office of Disease Prevention and Healthy Promotion develops the Leading Health Indicators. See "Environmental Quality," HealthyPeople 2020, HealthyPeople.gov, accessed November 15, 2022, https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Environmental-Quality.
Sources: Harnik and Welle (2009); NRPA (2017).

Dig Deeper into the Data

LOCAL ENVIRONMENTAL ASSESSMENT DATA

1. Environmental Protection Agency local environmental assessment data can be a rich source of information on the relationship between parks (and other green spaces) and environmental quality, examining, for instance, the effects of stormwater runoff on local water quality and the capacity of green spaces to handle runoff.[8]
2. The Quality of Public Open Space Tool has a section on "environmental quality" that considers water features, tree cover, gardens, etc. This tells the user about access to environmental amenities in the green space.

DETAILED ENVIRONMENTAL ANALYSIS BY FEATURE

1. i-Tree Eco takes a bottom-up approach. It provides a broad picture of the entire urban forest. It is designed to use field data from randomly located plots throughout a community along with local hourly air pollution and meteorological data to quantify urban forest structure, environmental effects, and value to communities.
2. Also available is a database of permeable surfaces: the National Land Cover Database, hosted by the United States Geological Survey, divides the United States into 9 billion parcels sorted into 16 land cover classes. This allows the user to identify permeable and nonpermeable surfaces.

Step 4: Estimate Economic Benefits

What Are the Benefits?

The steps needed to translate the health benefits of parks into economic terms vary widely depending on the sort of health indicator we're looking at, the level of data available on that indicator, and the rigor of extant research. Table 2 below shows a number of health benefits from parks and how those benefits can be quantified economically. This also indicates the importance of using an equity frame for this analysis: many measured health benefits, particularly environmental ones, are framed in terms of systemwide benefits. Although that makes sense on an aggregate level, benefits from, say, reduced heat island or air quality improvements are going to be larger for those closer to parks than for those further away.

TABLE 10

Economic Value of Health Contributions

Health indicator	Population	Park benefit	Economic benefit	Cost savings / avoidance	Data source
Physical health	All	Increased health from active use	Energy use and illness savings	$735m to $1.416b	Rosenberger and Dunn (2018), for Oregon Parks and Recreation
	All / People under 65 / 65 or older	Increased physical health from active use[a]	Health care savings cost / average annual medical care cost difference between active and inactive	▪ Mecklenburg County, North Carolina: $351 overall / $702 for those over age 65 ▪ Cleveland Metroparks: $344 overall / $688 those age 65 or older ▪ Florida: $1,230 under 65 / $2,406 for those age 65 or older	Trust for Public Land for Mecklenburg County and Cleveland Metroparks, and Florida, using Trust for Public Land methodology: https://www.frpa.org/calculator/healthsavingsresources.
Mental health	All	Improved mental health from being in parks leading to less mental health costs	Decreased mental health care use/costs; decreased days lost to work		(Nutsford, Pearson, and Kingham (2013); Taylor et al. (2015)
	Parent/child	Improved mental health as measured by Strengths and Difficulties Questionnaire (SDQ)	Decreased mental health care use/costs	Second-level computation needed that estimates economic systems-level impact of increased SDQ	Hazlehurst et al. (2022).
Environmental health	All	Pollution removal by trees on public parkland	Externality value for each pollutant removed based on local pollutant concentration	Savings per ton vary by Carbon Dioxide; Nitrogen Dioxide; ozone; Particulate matter; and Sulfur dioxide; dollar amounts based on local air quality	Trust for Public Land (2010), based on Northeast Research station of US Forest Serve; Urban Forest Effects model (Trust for Public Land 2013).
	All	Reduction in local heat island effect	Increased physical health, decreased local energy consumption, etc.	Smart surfaces benefits model	Smart Surfaces Cost-Benefit Analytic Engine: https://smartsurfacescoalition.org/costbenefit-analytic-tool; Kate Sjovold, "The Urban Heat Island Effect: Sao Paulo, Brazil," ArcGIS StoryMaps, December 3, 2019, https://storymaps.arcgis.com/stories/e7edc8b871d94b418b16797b5782a30c
Social health	We recommend readers review the Dig Deeper tools on social health, which explain the difficulty in measuring social health bene*fits from parks in economic terms: party due to measurement limitations, partly due to still-developing models, and partly due to multi-causal pathways in issues around, say social cohesion, safety, and social capital.				

Note:

[a] Research also indicates mental health benefits from exercise. See Roland Sturm and Deborah Cohen, "Proximity to Urban Parks and Mental Health," Journal of Mental Health Policy and Economics 17, vol. 1 (2014): 19–24. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4049158/.

Who Benefits and How?

It is important to recognize that different sociodemographic groups access parks at different rates. Groups also use parks differently and therefore gain comparative benefits from their use. After you select the health domain and measure the outcomes in Step 3, you will want to examine the associated economic value in table 10 and disaggregate by different population groups to understand how benefits might differ. If children and young people benefit from active recreation, then they will need features like playgrounds and fields; social benefits are experienced by everybody but may be particularly salient for older adults: in this domain, smaller park spaces may be fully able to provide benefits in a way that they would not for active users. It also means some parks and park features may be more welcoming to some groups than others.

Moreover, individuals who use or live close to parks are more likely to benefit from health contributions and realize the economic benefits, cost savings, and cost avoidance. You can learn this from identifying your park characteristics (Step 1) and examining who is accessing the park (Step 2). Comparing economic value between one group and another (e.g., high-income versus low-income, youth versus older adults, white people versus people of color) can help you determine who is using the park and who has the most need and should be targeted for investments. Furthermore, this underscores the disparities in health and how parks' design, location, and development can impact equity.

Why Does This Matter?

The process for estimating the benefits of parks varies by health equity dimension. Some of this is because the nature of the benefits are different. To take one example, estimating the contribution of parks to reducing negative externalities of urban heat island effects can incorporate the effects on local residents whether or not they actually use the parks in question (provided they are close enough to receive benefits); but measures estimating aggregate effects of parks on physical or mental health either require direct observation of who is actually using the parks (and ideally, how they are doing so) or need to rely on a proxy based on existing research that estimates how different groups use parks at different rates. Measuring social health is particularly complicated: as we discussed, although promising research has investigated these effects, those findings are often more speculative and less concrete, and social health benefits are more subject to questions about the influence of other social forces on observed outcomes.

Take physical health as an example. As noted, physical exercise can improve health and reduce certain illnesses and therefore reduce associated medial costs to people *and* decrease the rate of use of health care facilities. So by estimating who is likely to actively use parks (through, as discussed, estimating groups within a 10-minute walking proximity), and identifying where people live in relation to parks, you can get to a general measure of overall benefits by aggregating across groups of interest. The equity frame of this analysis (using different groups as building blocks) lets you get beyond overall systemwide benefits and to a better understanding of differences between how different groups experience those benefits. This, in turn, lets you identify existing disparities and potential opportunities to promote greater equity of use and distribution of benefits within a community.

How to Estimate Economic Value

You can use the following process to estimate the economic value of the health outcomes are you are examining.

1. Determine who you want to estimate the economic value for; a specific subgroup to determine park and health equity or all park system users (Step 2)
2. Identify a given dimension of health equity to estimate park benefits (Step 3).
3. Using data available in table 10, estimate the benefits from a particular health attribute of parks and for a given subgroup.
4. Compare benefits between different group to identify who is attaining the economic value of the health benefits from park systems.

Step 5: Drive Equity through Action Steps

Using this framework to assess the health benefits of parks cannot happen in a vacuum. It must be coupled with a clear understanding of who is accessing the park and what their experiences have looked like. After conducting Steps 1 through 4, the final phase of the framework includes a set of action steps to ensure equity is at the center of understanding the health benefits of parks and any associated economic value that can be derived from these benefits. The following represent actions that you should take in communicating your health benefits in inclusive, comprehensive, and thoughtful ways.

- **Identify the disparities in how people access your park system and champion efforts to combat inequities.** Not everyone receives health benefits of parks equally, so you should understand who is benefiting and why**.** Research has shown that Black people, Indigenous people, other people of color, and low-income residents often frequent parks the least, and these groups also have high health risks (e.g., high rates of obesity, asthma, and feeling the least safe in public spaces). This is coupled with unmet health needs because of disparities widened from systemic racism, where some people have inadequate and lower-quality access to health care and park space. These disparities might look different across park systems, health systems, neighborhoods, and densities. Park practitioners must examine the demographic characteristics of the communities served by the park system and assess whether these are mirrored in park system users (e.g., is the community majority low income but park users are disproportionately high income?).
- **Forge data-sharing agreements with your local hospitals and health care organizations.** Hospitals and health care organizations have rich data on the health and well-being of communities and individuals. These data can be tremendously valuable in identifying the implications for people living close to and utilizing a park system. Data on the adverse health conditions for specific demographic groups can also inform where to make park investments, how to engage with community members on designing and programming park spaces, and communicating with community members on using the park.
- **Liaise with your local hospitals and health care organizations as they conduct their community health needs assessment.** Every three years, hospitals and health care organizations must create and adopt an implementation strategy to meet the community health needs. The community health needs assessment is conducted to understand health priorities and represent the broad interests of the community. To combine resources and

reduce duplicative efforts, parks practitioners can weigh in on how parks and green spaces contribute to health and well-being, and in turn they will benefit from understanding emerging areas of community need.

- **Learn and share local histories to elevate more intentional and comprehensive community priorities.** Parks often reflect the spatial history of a place as key features of the built environment. In places where residents of color have been traditionally disconnected from amenities—whether through explicit racist policies (e.g., redlining), exclusionary urban design decisions (e.g., highway development), or the relationship between undesired land uses and economic power and wealth—public space must be rethought to be more inclusive and equitable. Such an honest assessment and shift in strategy must be accompanied by robust engagement with the community in decisionmaking. Without this, park investments may not match community needs and therefore, investments, even those made in good faith to address limited park access, may not have maximum impact.
- **Keep informed of health equity measures, data, and assessments.** This framework is just the beginning of examining how parks contribute to health equity; new research is emerging frequently to determine the role the built environment plays in improving health. Adjacent health equity research can provide useful data points to determine health outcome in equitable parks. Similar evidence exists in other fields that can be leveraged to better understand the vast contributions parks and green spaces make to the well-being of people and broader communities.

Appendix A: Methodology

Urban conducted a research summary to explore the evidence for health benefits associated with parks and green space (Cohen et. al 2022). The research reviewed focused on who can access parks and how that access can be made more equitable for the benefits to be shared. This framework is built from the evidence underpinning the research summary.

We reviewed the literature in the research summary to identify the health outcomes park users can gain. We began by examining citations from the parks literature review as well as papers that cited them. We then developed a table to identify outcomes in the literature and how they were measured for each dimension. We reviewed academic literature, practitioner reports, analyzed existing tools in the field, and categorized data by level of geography and public access.

The research pointed us to two outcomes under each dimension of health—physical, mental, social, and environmental—and the literature connects them to metrics quantifying the health benefit. The health outcomes include the following:

- Increased physical activity
- Improved physical health outcomes
- Increased sense of well-being
- Decreased use of mental health services
- Increased community attachment
- Increased public safety
- Increased climate resiliency
- Improved environmental quality

These outcomes are connected to one or more data sources that demonstrate how to assess within a park practitioners' locality. The data sources are divided into low engagement (i.e., publicly available), medium engagement (using local data that exists), and high engagement (i.e., requires park practitioners to do their own data collection. We determined these categorizations from the origination of the evidence, the effort required to collect the data, and capacity to analyze the data.

We also assess the metrics for equitable parks to determine who was receiving the health outcomes. Derived from evidence, these findings include proximity, usage, size, and access. The equity outcomes cut around all health outcomes to situate the framework to examine equity.

We discussed preliminary findings and methodology with an advisory council of park experts from the field, staff at the National Recreation and Park Association, and senior Urban advisors.

Appendix B: Limitations of Health Data Sources

The data on health outcomes has various levels of robustness; some are from established sources with consistent ongoing data collection; others are more nascent or piloted data tools that have demonstrated value for quantifying health benefits. This section discussed the limitations for data within each health dimension and provides considerations for using these data.

Physical Health

- The Center for Disease Control's PLACES data is the best available physical health data that breaks down to health condition. But it has limitations because it uses models that estimate local-level data based on demographic patterns and relationships found in national and other larger-scale surveys rather than using actual local-level data. This means that actual patterns at the local level, if estimated directly, may diverge considerably from model estimates.
- The Behavioral Risk Factor Surveillance System data is based on self-reported information, which cannot be validated with medical records. In addition, these model-based estimates were created by borrowing information from the entire system, which may or may not accurately reflect those counties' local contexts and experiences.
- Built environment features are also correlated with physical activity but these are costly to measure at scale. These can include amenities/facilities (size); proximity; trails; and programming. One study finds that a neighborhood park's contribution to moderate-to-vigorous physical activity may depend less on size and facilities than on "demand goods" like programing and activities (Han et al. 2014).
- It can be challenging to get reliable and current health data from hospital and health care systems. It is also difficult to get health data at the individual level.
- There is a general lack of awareness of the information that other agencies are already collecting that would be of interests to park practitioners. Hospitals and local health departments often have useful health equity data to bolster make a strong case. Establishing a partnership between parks and health departments can support deeper work and data sharing.

- Physical health data show practitioners the possible benefits parks demonstrate by correlating health care needs with park user benefits. Establishing clear causation would require deeper analysis of individual health data and their intersection with use of park systems.

Mental Health

- Because client-level data can be sensitive, several data resources are limited to aggregated estimates at the county and state levels.
- Literature on the mental health benefits of green space tend to be qualitative or from grey literature sources, the quality of which vary. Generally, it is difficult to quantify nonphysical health evidence, which leads to a lack of rigorous evidence for the link between mental health, well-being, and green space (Lee and Maheswaran 2011).

Social Health

- It is difficult to measure the economic value of social capital directly, because such values vary by person and park use. For instance, youth might derive more value from a playground than a passive park, but this does not discount the other health values, including environmental and mental, despite the park programming.
- Friends of parks data can vary especially because of sample size, which can lead to little change over time even though park practitioners might be measuring community attachment in other ways.
- Collecting local data on perceptions of safety can draw a more accurate locally based understanding. People's perception of safety in public spaces can vary. As park practitioners analyze how their park systems influence public safety, they should not feel limited by only using measures leveraging crime rate statistics and other police data. There is much more to what makes someone feel safe in their community; safety can involve access to affordable housing, health care, food education, and safe and working infrastructure. Measures of safety can also utilize homelessness data and park users' perception of safety.
- Understanding belonging and identity, or social cohesion, is important in assessing equitable parks. Social cohesion is difficult to measure with publicly available data, so park practitioners are encouraged to use the "dig deeper" tools in this report to collect local data through

satisfaction surveys and local audits to tell the story of who identifies and uses the space. Evidence in the field is evolving on how to measure attributes of welcoming and social cohesion in public space, and as data and measures become more refined, park practitioners will have access to more tools for making the case that parks offer community attachment and wide social benefit.

Environmental Health

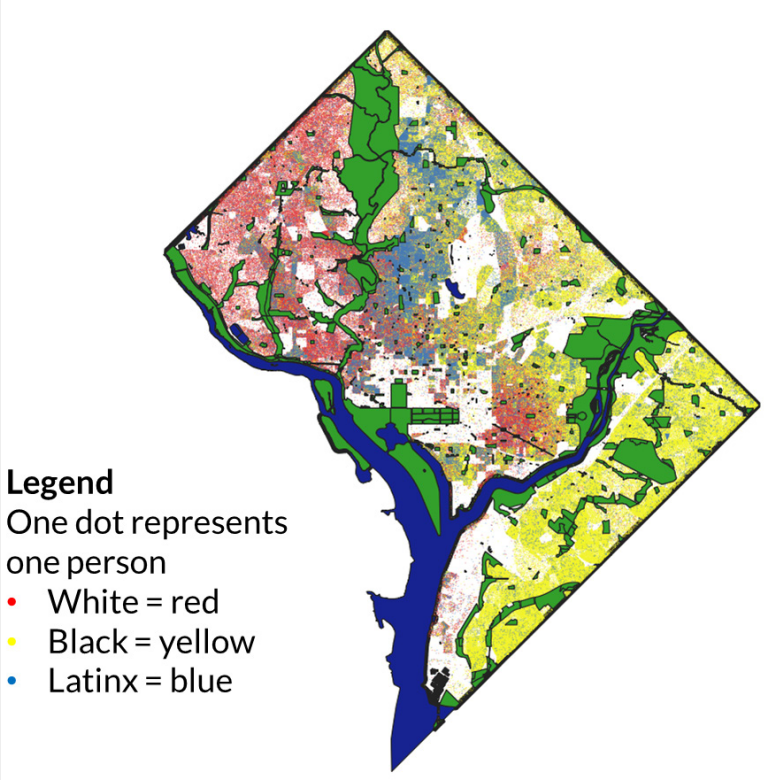
- Not every park has trees or shade cover (for example, active parks with playgrounds and courts). The lack of green space does not negate the health benefits (especially physical health), so practitioners have to think critically about framing environmental health.
- The benefits of tree canopy are beyond a specific catchment area, meaning it would be difficult to attribute a causal relationship between green space and health benefits.
- Addressing climate issues, such as stormwater management and air quality monitoring, can be an expensive endeavor for park practitioners. Moreover, doing so requires a causal methodology for rigorous evaluation, not just a "pre and post" assessment. This will help determine the relationship between rising temperatures or increased sea-level rise or surface flooding and the park system's ability to impact these.

Appendix C: Understanding Equity in a Washington, DC, Park System

Let's look at Washington, DC, and physical health benefits as an example. The map in figure C-1 shows where people live in relation to the city's parks, with white people in red, Black people in yellow, and Latinx people in blue. The District is known for its broad distribution of parks and is consistently measured among the systems with the most parkland and most equitable access to parkland in the United States. Overall, 97 percent of the District's population lives within a quarter mile of a park, and about 64 percent of the District's population lives within a quarter-mile of a park of five acres or more. Black residents are relatively more likely to live near a larger park, with 71 percent of Black residents in such proximity (versus 58 percent for white residents and 61 percent for Latinx residents).

FIGURE C-1

Parks and Racial and Ethnic Groups in Washington, DC



Source: American Community Survey 2015-2019 five-year data.

This is just a starting point to understanding park characteristics and who has access. Wards 7 and 8, east of the Anacostia River, have extensive parkland, for instance, but the characteristics of that parkland need to be examined, as significant portions consist of ribbon-like parkways with limited potential uses. There may be a trail or bike path, for instance, but any assessment needs to account for the condition and accessibility of a trail to people in the neighborhood. Use of this sort of park space may also be lower than assumed abstractly, given the negative effects of close proximity to a parkway with busy automotive traffic. A recreational trail like this may be more likely to be used – and to provide health benefits - to some populations more than others: perhaps used by adults, but not by children or older residents given concerns around safety, traffic, and ease of access.

Neighborhood density illustrates another tension: people living in dense neighborhoods (such as in central DC) are more likely to live in apartment buildings without private outdoor space.[9] This makes the space parks provide particularly valuable for those neighborhoods. But, because denser neighborhoods generally have less greenspace and smaller parks (though there are exceptions), there tends to be more competition for and potential conflict over the limited green space that does exist. This means that parks professionals need to account for the needs of all groups within a community when assessing design and programming.

This goes to illustrate the importance of really assessing the specifics of what's happening on the ground. What may look like robust park access for all may not be fully contributing to equitable impacts. Thus, knowing who lives where and what specifically they have access to helps identify needs, challenges, and potential solutions for building more equitable access to parks.

Notes

[1] See also Allison Colman, "Keeping It Real: A Different Approach to Discussing the Social Determinants of Health," November 26, 2019, https://www.nrpa.org/parks-recreation-magazine/2019/december/keeping-it-real-a-different-approach-to-discussing-the-social-determinants-of-health/.

[2] "About Us | Our Mission," 10-Minute Walk, accessed November 4, 2022, https://10minutewalk.org/about-us/.

[3] For example, see the US Parks shapefile layer distributed by ESRI, which is a file including park location and dimensions for parks, gardens, and forests across the United States: https://www.arcgis.com/home/item.html?id=578968f975774d3fab79fe56c8c90941

[4] Our framework does not examine specific park features or other measures of park quality. We do not have access to the level of park characteristics necessary to tease out features (such as playgrounds, athletic fields, nature trails, pavilions and picnic areas), maintenance and upkeep, or activation and programming. This makes the medium- and high-engagement resources in the framework especially useful: practitioners with access to spatial data on park features could select park features of interest for a more targeted analysis.

[5] Ajjit Narayanan, Alena Stern, Graham MacDonald, and Amy Rogin, "Spatial Equity Data Tool," Urban Institute, last updated November 18, 2021, https://apps.urban.org/features/equity-data-tool/.

[6] Park administrators can consider using local data to capture park use. Linking park use and park-based physical activity with individual health requires identifying how much time a user spends at parks as well as the percentage of the user's total physical activity that occurs in parks. At the population level, park practitioners can measure the percentage of residents who use local parks and how much of their total physical activity occurs there. The input is the number of park users who indulge in a sufficient amount of physical activity to make a difference. (Rand 2014).

[7] "Elevating Health Equity through Parks and Recreation: A Framework for Action," National Recreation and Park Association, accessed November 4, 2022, https://www.nrpa.org/our-work/Three-Pillars/equity/elevating-health-equity-through-parks-and-recreation-a-framework-for-action/.

[8] For example, see "DC Utilizes Green Infrastructure to Manage Stormwater," which presents ongoing work in the District of Columbia, stemming from a consent decree, that uses data to monitor progress and local conditions: https://www.epa.gov/arc-x/dc-utilizes-green-infrastructure-manage-stormwater

[9] Mark Treskon, Kimberly Burrowes, Matthew Eldridge, Gabi Velasco, and Katie Fallon, "'Not All Parks Are Created Equal': How Communities Can Ensure Parks Are Accessible for All Residents," *Housing Matters*, August 18, 2022, https://housingmatters.urban.org/feature/not-all-parks-are-created-equal-how-communities-can-ensure-parks-are-accessible-all.

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