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ParkIndex: Validation and application of a pragmatic measure of park access and use

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ABSTRACT

Composite metrics integrating park availability, features, and quality for a given address or neighborhood are lacking. The purposes of this study were to describe the validation, application, and demonstration of ParkIndex in four diverse communities. This study occurred in Fall 2018 in 128 census block groups within Seattle(WA), Brooklyn(NY), Raleigh(NC), and Greenville County(SC). All parks within a half-mile buffer were audited to calculate a composite park quality score, and select households provided data about use of proximal parks via an online, map-based survey. For each household, the number of parks, total park acreage, and average park quality score within one half-mile were calculated using GIS. Logistic regression was used to identify a parsimonious model predicting park use. ParkIndex values (representing the probability of park use) were mapped for all study areas and after scenarios involving the addition and renovation/improvement of parks. Out of 360 participants, 23.3% reported visiting a park within the past 30 days. The number of parks (OR = 1.36, 95% CI = 1.15–1.62), total park acreage (OR = 1.13, 95% CI = 1.07–1.19), and average park quality score (OR = 1.04, 95% CI = 1.01–1.06) within one half-mile were all associated with park use. Composite ParkIndex values across the study areas ranged from 0 to 100. Hypothetical additions of or renovations to study area parks resulted in ParkIndex increases of 22.7% and 19.2%, respectively. ParkIndex has substantial value for park and urban planners, citizens, and researchers as a common metric to facilitate awareness, decision-making, and intervention planning related to park access, environmental justice, and community health.

1. Introduction

Quality parks provide significant benefits to individuals and communities (Sallis et al., 2012; Bedimo-Rung et al., 2005; Lee and Maheswaran, 2011; Kaczynski and Henderson, 2007; Thompson et al., 2012); but their availability and quality vary substantially (Vaughan et al., 2013; Kamel et al., 2014; Rigolon et al., 2018; Rigolon, 2017; Hughey et al., 2016; Bruton and Floyd, 2014; Jones et al., 2015) and considerable heterogeneity exists in the way park access has been evaluated in both research and practice. For example, researchers have applied diverse metrics related to distance, facilities, amenities, condition, and accessibility to examine the impact of park access on various health behaviors and outcomes (Kaczynski and Henderson, 2007; Lachowycz and Jones, 2011; Sugiyama et al., 2010; James et al., 2014; Talen and Anselin, 1998; Higgs et al., 2012), with dissimilar measurement techniques often yielding inconsistent results. Moreover, the term 'park desert' has received increasing attention (Bashir, 2013), but consensus is needed on how park metrics may be combined to create a practical measure that identifies disparities in park access and quality (Sugiyama et al., 2010; Kaczynski et al., 2008, 2014; Paquet et al., 2013; Hughey et al., 2017; Rundle et al., 2013; Rigolon and Németh, 2018). Some research and practice efforts have focused on ecological metrics

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intended to quantify park access, such as the Trust for Public Land's ParkScore®, which provides a city-level score (for the 100 largest cities in the U.S.) based on select variables related to park acreage, investment, amenities per capita, and access (Trust for Public Land, 2019). However, until recently, no metric had been developed that parsimoniously incorporates detailed elements related to park features and quality with more nominal measures of park access and exposure, that had been derived empirically, and that could be represented numerically and spatially with a simple 0–100 score for a particular point (e.g., address) or area (e.g., neighborhood, census tract, planning district).

ParkIndex is a multi-phase effort to empirically develop and validate a multi-dimensional park access metric for use by diverse stakeholders. A previous pilot study described the creation of a prototype measure based on data from a single city and resident reports of overall park use that incorporated measures related to the number of parks, total park area, and an average park quality index for all parks within 1 mile (Kaczynski et al., 2016). ParkIndex values in Kansas City, MO were found to range from 17 to 77 (in addition to many "0″ areas where no parks were present) and could be documented at the park, point, or census tract/neighborhood level (Kaczynski et al., 2016). To aid in refining ParkIndex, another recent study enumerated local and national key informants' perspectives on the content, value, feasibility, and dissemination of such a tool (Oliphant et al., 2019). Subsequently, the primary purpose of the present study is to describe the extension and validation of ParkIndex in four additional diverse locations across the U. S. In doing so, we leverage an innovative map-based survey system to collect participants' reports of having visited specific parks within their neighborhood, and we also refine ParkIndex values based on the availability and attributes of parks located within one-half mile, a distance more universally embraced by researchers and practitioners (Oliphant et al., 2019; Harnik and Martin, 2016; Besenyi et al., 2016; Schipperijn et al., 2017; Parsons et al., 2015; Hughey et al., 2019). The secondary objective of this paper is to demonstrate how ParkIndex can be applied in diverse scenarios involving park addition and renovation to increase the probability of park visits within a neighborhood.

Development of such a metric and tool could engage and assist citizens and professionals in understanding and using information about community park access in the same way that Walk Score® has operationalized, standardized, and simplified the concept of walkability for personal lifestyle and residential selection decisions, as well as for research purposes (Stowe et al., 2019; Koohsari et al., 2019; Hirsch et al., 2013; Brown et al., 2013; Boyle et al., 2014; McCormack et al., 2018; Hall and Ram, 2018). A ParkIndex scoring system for addresses or neighborhoods can also provide concrete information to advocacy groups, urban planning professionals, and policy makers to inform not only where new parks are needed, but also where improvements to existing parks (e.g., addition or renovation of a playground or court) would be most beneficial (Greer et al., 2015; Floyd, 2012). Further, it could facilitate methodological comparability across studies about parks and health that can accelerate progress in using research evidence to inform public health practice and policy. Finally, a measure such as ParkIndex can have substantial implications for health-related environmental justice by facilitating the identification of park access disparities within and across communities and by providing a transparent tool through which researchers, citizens, and other key stakeholders can work towards the remediation of such inequities.

2. Methods

2.1. Study setting

This study was conducted in four locations – Seattle, WA, Brooklyn, NY, Raleigh, NC, and Greenville County, SC – that were selected for their geographic diversity, variation in park resources, and existing university-community partnerships. For each location, geographic information systems (GIS) park files were obtained from local parks agencies. In this study, parks were defined as public parks or greenways designed for active or passive use at least 0.25 acres in size. To identify specific study areas within each city, census block groups were classified into quartiles for both park availability (based on the number of parks intersecting the block group) and income (based on American Community Survey 2011–2015 five-year estimates). Subsequently, using methods similar to other studies (Schipperijn et al., 2017), out of all available block groups, 32 were selected within each location – 8 that were in the lowest quartile for income and the lowest quartile for park availability, 8 that were low income and high park availability, 8 high income and low park availability, and 8 that were high income and high park availability. This resulted in 128 census block groups comprising the study area across the four cities. Table 1 describes characteristics of the 32 selected block groups in each community.

2.2. Data collection and measures

From June to October 2017, data were collected about all parks within each block group and from select households therein. To understand residents' park use and other related information and behaviors, with the assistance of a survey research firm (Survey Sampling International, Shelton, CT), 100 addresses were identified using simple random selection out of all available residential addresses in each study block group. Three waves of postcards were mailed to each household that contained a link to the study website and a unique personal identification number (PIN) designating their city, block group, and address. One adult per household was asked to complete the survey. Upon completion, participants could enter an email address for the chance to win a $50 gift card. All study procedures were approved by the University of South Carolina Institutional Review Board and voluntary completion of the survey implied participants' informed consent.

The survey was developed using an online, map-based platform (www.Maptionnaire.com) designed for geo-located data collection and research (Kahila-Tani et al., 2019; Brown and Kyttä, 2018; Luz et al., 2019; Bubalo et al., 2019; Møller et al., 2019). After entering their PIN, the survey zoomed in to display the participant's census block group (including a half-mile buffer) and all associated parks. Participants were asked to click on any park used within the past 30 days and a standardized set of questions about that park appeared. This process was then repeated if the participant reported using more than one park until responses had been provided about all parks visited. The primary outcome variable for the current analyses was whether the participant reported using a park within a half-mile network buffer from their home in the past 30 days (Walker et al., 2009). A half-mile buffer for parks was selected based on recommendations from key informant interviews (Oliphant et al., 2019), national organizations (Harnik and Martin, 2016), and past research (Besenyi et al., 2016; Schipperijn et al., 2017; Parsons et al., 2015). The survey also collected participant demographic information, including gender, age, race/ethnicity, and education level.

All parks within a half-mile buffer of the perimeter of each study block group were audited in person by trained research assistants using

Table 1
Characteristics of study area block groups.

Block Group characteristic	Brooklyn mean (SD)	Greenville mean (SD)	Raleigh mean (SD)	Seattle mean (SD)
N	32	32	32	32
Median Household Income	74,870.16 (54,674.96)	54,686.06 (37,129.40)	59,155.72 (35,133.41)	84,010.19 (49,575.16)
Race/Ethnicity (% non-white)	41.04 (40.68)	39.43 (25.65)	44.75 (36.25)	43.06 (24.87)
Number of parks	8.34 (3.89)	4.06 (8.86)	6.09 (5.02)	10.41 (5.69)
Park acres	17.38 (14.96)	47.94 (75.00)	452.01 (1282.14)	127.49 (132.41)

the electronic Community Park Audit Tool (eCPAT) (Besenyi et al., 2016; Kaczynski et al., 2012); which has demonstrated excellent inter-rater reliability and been used extensively in past research (Vaughan et al., 2013; Kamel et al., 2014; Hughey et al., 2016, 2019; Kaczynski et al., 2014; Besenyi et al., 2016; Parsons et al., 2015; Greer et al., 2015). In total, 275 parks were audited across the study areas (Seattle = 94, Brooklyn = 64, Raleigh = 71, Greenville County = 46).

For all participating households, several measures related to park access were created. Using ArcGIS Pro, we ascertained the total number of parks within a half-mile network buffer of the household address. Likewise, total park acreage was calculated by summing the area of all parks within the half-mile buffer. Finally, a park quality score was calculated for each park (Kaczynski et al., 2016) and the average obtained for all parks within the half-mile buffer. This park quality score was created using data from eCPAT audits and comprises six key components: i) sum of six park access amenities (e.g., adjacent sidewalk, transit stop), ii) sum of 14 park facilities (e.g., playground, sports field), iii) sum of three key park amenities (i.e., restroom, drinking fountain, lighting), iv) sum of seven park aesthetic features (e.g., landscaping, historical/educational feature), v) sum of eight park quality concerns (e.g., graffiti, excessive litter), and vi) sum of ten neighborhood quality concerns (e.g., poor lighting, heavy traffic) (Kaczynski et al., 2016). For each of these six variables, a standardized sub-score (0–100) was created (with the latter two variables reverse-coded); all six variables were then averaged to obtain the park quality score for each park (0–100).

2.3. Analyses

Several park and individual predictor variables were included in the main analyses to understand participant park use or non-use. For parks, these included the number of parks, the total park acreage, and the mean park quality score within the half-mile residential buffer. Individual demographic characteristics included gender (male, female), age (<34 years, 34–55 years, >55 years), race/ethnicity (White, non-White), income level (< $50,000, $50,000-$99,999, $100,000 or more), education level (less than college degree, college degree, advanced degree), block group income and park availability category (e.g., low income/high park availability), and city (Brooklyn, Greenville County, Raleigh, Seattle).

Logistic regression was used to identify a parsimonious model predicting park use among respondents. Specifically, backward selection was used on the three park characteristics and seven individual-level demographics described above (retaining only variables with $p < .05$). Hosmer-Lemeshow tests were used to assess model fit. ParkIndex represents the probability of park use (0–100) for a given point/address and is calculated using values for the three key park access variables – number of parks, total park acreage, and average park quality score within one-half mile – multiplied by their respective coefficients predicting park use as derived from data collected from participating households. Then, to extrapolate and demonstrate the concept of an empirically-derived and spatially-represented metric, ParkIndex values were calculated for the centroid of all 100 m × 100 m cells on a raster surface for all block groups in the study areas (as well as the entire city of Raleigh where data were available for all public parks). Finally, to illustrate how the probability of park use (i.e., ParkIndex) may change and ParkIndex's value as an intervention planning tool, we describe two hypothetical scenarios involving adding a park or renovating a park(s) in one neighborhood in Brooklyn. All analyses were conducted in ArcMap™ (ESRI, Redlands CA) and SAS 9.4 (Cary, NC). Tests were considered significant at $p < .05$.

3. Results

3.1. Sample characteristics

In total, 360 participants completed the ParkIndex survey (response rate = 2.8%). As shown in Table 2, over one-third of the sample was from Seattle (37.8%). The majority of participants were female (58.1%), White, (71.1%), between 34 and 55 years of age (57.5%), and had earned a 2–4 year degree (46.6%). Participants resided in 114 of the 128 study block groups (M = 3.16, s.d. = 1.95). As well, participants were split relatively evenly across the four categories for block group income and park availability. Approximately 23.3% reported using any park within one half-mile within the past 30 days.

Table 3 displays the association between park characteristics and park use. All three park-level variables were significantly associated with park use in the final model: number of parks within one half-mile (OR = 1.36, 95% CI = 1.15–1.62), total park acreage within one half-mile (OR = 1.13, 95% CI = 1.07–1.19), and average park quality score (OR = 1.04, 95% CI = 1.01–1.06). No socio-demographic characteristics were significantly associated with park use. The final model had good fit (X = 4.24, p = 0.75), the three park variables were only moderately correlated with each other (r = 0.44–0.62), and there was minimal evidence of multicollinearity (VIF = 1.41–1.85). In addition, only total park acreage significantly interacted with city in predicting park use ($p < .05$). Finally, one-third of the variation in park use was predicted using the number of parks, total park acreage, and average park quality score within one half-mile ($R^2 = 0.33$).

Using the regression coefficients from the final model, a raster surface was calculated for each 100 m × 100 m cell based on the probability of using a park at least once per month as a function of the number of parks, total park acreage, and average park quality score within one half-mile. Fig. 1 displays ParkIndex values (representing the probability of park use) for all cells in Raleigh, which ranged from 0 to 100 with a mean of 29.9 (s.d. = 43.1).

Fig. 2 illustrates ParkIndex values for a neighborhood in Brooklyn at present (Fig. 2a) and under two hypothetical intervention scenarios –

Table 2
Participant sample characteristics.

Participant characteristic	N (%)
Total	360 (100)
Location	
Brooklyn	46 (12.8)
Greenville County	82 (22.8)
Raleigh	96 (26.7)
Seattle	136 (37.8)
Gender	
Male	130 (41.9)
Female	180 (58.1)
Age	
<34 years	83 (23.1)
34–55 years	207 (57.5)
>55 years	70 (19.4)
Race	
Non-White	98 (28.9)
White	241 (71.1)
Education	
Less than college	53 (17.3)
2–4 year degree	143 (46.6)
Advanced degree	111 (36.2)
Income Level	
Less than $50,000	82 (31.1)
$50,000-$99,999	85 (32.2)
$100,000 or more	97 (36.7)
Block Group Income/Park Availability	
Low income, low park availability	78 (21.7)
Low income, high park availability	76 (21.1)
High income, low park availability	111 (30.8)
High income, high park availability	95 (26.4)
Neighborhood Park Use within Past 30 Days	
Yes	84 (23.3)
No	276 (76.7)

Table 3
Association between park characteristics and park use (n = 360).

Variables	Estimate (Std. Error)	OR (95% CI)	P value
Intercept	−4.26(0.63)		<0.001
Park Characteristics			
Number of parks	0.31 (0.09)	1.36 (1.15, 1.62)	<0.001
Total acreage	0.12 (0.03)	1.13 (1.07, 1.19)	<0.001
Average park quality score	0.03 (0.01)	1.04 (1.01, 1.06)	0.002
Fit Statistics			
R-squared	0.33		
Hosmer Lemeshow chi square (p)	4.24 (0.75)		

one with a park added (Fig. 2b) and one with two parks renovated/improved (Fig. 2c). In Fig. 2b, a park (Park A) of moderate size (2.31 acres) and average park quality score (60) was added to the northeast part of the neighborhood where a vacant lot was located and where proximal ParkIndex values were relatively low. The addition of this park improved ParkIndex values 22.7% from a mean of 28.6 (s.d. = 11.1) to 35.1 (s.d. = 12.6) for all cells in the displayed area. In Fig. 2c, rather than add a park, two existing parks on the eastern half of the neighborhood – labeled Park B (0.19 acres) and Park C (2.27 acres) – were improved from park quality scores of 48 and 37 to 65 and 70, respectively. In this scenario, ParkIndex values for all cells in the displayed area improved from a mean of 28.6 (s.d. = 11.1) to 34.1 (s.d. = 10.8), representing a 19.2% increase in the likelihood of park use.

4. Discussion

This study represents a key phase in the ongoing development and refinement of ParkIndex, a standardized metric representing the probability of park use and associated health benefits for a given location based on the availability and quality of proximal parks. With its solid empirical foundation, ParkIndex endeavors to be an evidence-based measure with value to both research and practice in public health and related fields. The final ParkIndex formula was composed of three key variables that were all significantly associated with respondents' use of neighborhood parks. One of these was the number of parks within one half-mile, with each additional park associated with over a one-third increase in the probability of park use. This is similar to past research showing that number of nearby parks is an important factor for understanding behaviors such as park use and physical activity (Kaczynski et al., 2014, 2009; Schipperijn et al., 2017; Veitch et al., 2016). Likewise, the total amount of park space within one half-mile was a significant element of the ParkIndex formula, which is also supported by past research (Kaczynski et al., 2014, 2009). Finally, the average park quality score was an equally important component (albeit measured on a different scale than the other two park variables), as is buttressed by a growing body of research employing GIS metrics, audit tools, or survey measures to document how particular park features or quality are related to various health outcomes (Stewart et al., 2018; Edwards et al., 2015; Roberts et al., 2019; Kaczynski and Havitz, 2009; Costigan et al., 2017; Bai et al., 2013). Few, if any, prior studies have created a composite metric of overall park quality using detailed and comprehensive observational data about park facilities, amenities, aesthetic features, and quality concerns (both within and surrounding the park) and shown it to be a key predictor of park use. This is a key innovation in advancing community-based park access metrics and was highlighted as vital by

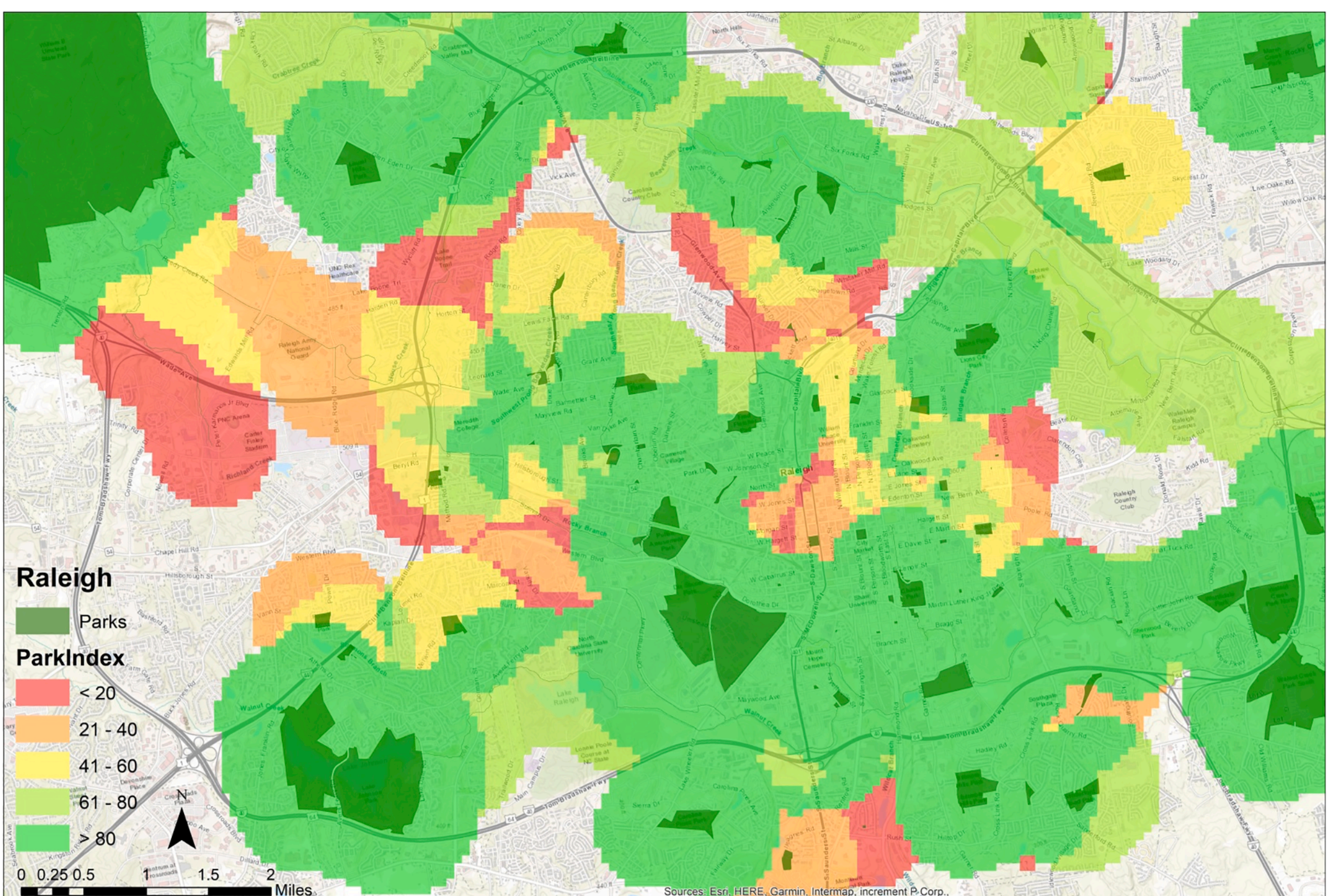

Fig. 1. Map of ParkIndex values for Raleigh, NC.

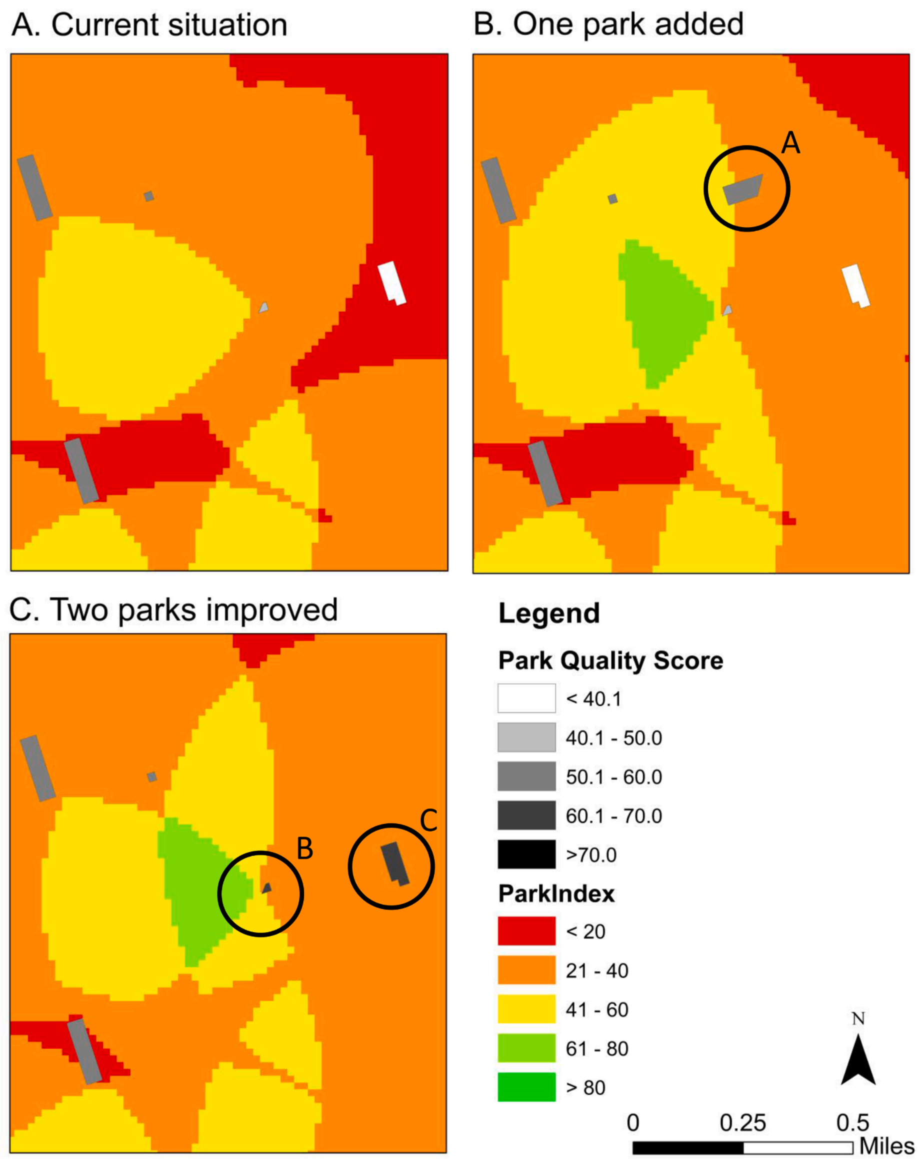

Fig. 2. ParkIndex value increases with park addition and improvement.

key informants in an earlier phase of the study (Oliphant et al., 2019).

Estimates from the ParkIndex formula were used to create raster-based maps illustrating calculated park use probabilities for all 100 m × 100 m grid cells in the study areas. At this small scale, ParkIndex values could be assigned for an individual address or aggregated to administrative boundaries (e.g., block group, census tract, council district) to understand the park use probability for a family or neighborhood (Fig. 1). Such visualizations (e.g., Fig. 2) can advance understanding of how changes in the number, acreage, or quality of nearby parks may impact the probability of park use and related benefits for a given location. In the first scenario presented (Fig. 2b), a relatively small park was added to a vacant lot in a neighborhood in Brooklyn, NY. This addition increased ParkIndex values, or the likelihood of park use, for individual cells within one half-mile of the park, as well as the overall neighborhood ParkIndex score. This type of analysis can be useful to inform siting of future parks and green spaces to mitigate 'park deserts' and maximize diverse health, economic, and environmental benefits. Indeed, numerous studies have indicated that many places across the U. S. have an inequitable distribution of quality parks, contributing to environmental injustice and health disparities in low-income neighborhoods (Vaughan et al., 2013; Hughey et al., 2016, 2018). Increasing particular built environment spaces, like parks, has been recommended to promote population-level physical activity (Community Preventive Services Task Force, 2016). When local health needs assessments identify neighborhoods that disproportionately suffer from chronic disease, obesity, lack of physical activity, or mental health concerns, the ParkIndex tool and visualization could be used to identify where a park might benefit residents in the greatest need.

In the second scenario presented (Fig. 2c), the quality of two existing parks was improved, by 17 and 33 points (out of 100 total). As part of the ParkIndex formula, eCPAT audit data are used to calculate a comprehensive park quality score for each park within one half-mile comprising six key components: park access amenities, facilities, amenities, aesthetic features, quality concerns, and neighborhood quality concerns (Kaczynski et al., 2016). As such, there are many improvements that would increase the overall score, presenting a variety of viable park renovation scenarios. In Fig. 2, Park B had an existing park quality score of 48, including one park facility (a sport field), four park access amenities (adjacent sidewalk, car parking, bike lane, public transit stop), one aesthetic feature (trees throughout), and no park amenities, quality concerns, or neighborhood quality concerns. To increase this score by 17 points, one option would be the addition of two park facilities (e.g., playground, tennis court), two park amenities (e.g., drinking fountain, lighting), and two park aesthetic features (e.g., landscaping, artistic feature). Much prior research, including our key informant interviews and natural experiment studies, support that park and playground renovations as well as improved park aesthetics (e.g., landscaping, art, water features) can have positive impacts on park use and park-based physical activity (Oliphant et al., 2019; Veitch et al., 2014; Hunter et al., 2015; Schipperijn et al., 2013). The flexible ParkIndex formula also presents a myriad of other possibilities for increasing park quality scores in order to positively affect the desirability and use of parks for proximal residents.

In addition to these practical implications for park renovations, ParkIndex also has potential for advancing research efforts related to parks and health. This still maturing field could benefit from increased agreement and standardization about how to quantify park access for individual households, neighborhoods, or communities (Koohsari et al., 2015). Such a metric could then be monitored as natural experiments occur (e.g., New York City's Community Parks Initiative (New York City Department of Parks & Recreation, 2019; Huang et al., 2016) or as individuals relocate within or between cities, thereby providing critical longitudinal evidence and advancing the field towards the latter phases of the behavioral epidemiology framework (Koohsari et al., 2015; Sallis et al., 2000). Similarly, environmental justice has been a major emphasis of park researchers, with the exposures examined ranging from open space acreage to specific features to diverse quality metrics (Kamel et al., 2014; Lotfi and Koohsari, 2011; Crawford et al., 2008; Mavoa et al., 2015; Macintyre et al., 2008; Hashem, 2015; Hoffimann et al., 2017; Shen et al., 2017). Employing a common metric of park access that accounts for both availability and attributes would increase comparability over time and across locations in monitoring improvements in the equitable distribution of green space. Finally, relating park access to diverse behaviors and outcomes (e.g., physical activity, mental health, chronic disease, real estate prices) has also been a prominent focus in diverse disciplines (Kaczynski and Henderson, 2007; Crompton, 2005; McCord et al., 2014; Astell-Burt et al., 2014a, 2014b; Besenyi et al., 2014; Bancroft et al., 2015), but this important area of research has arguably been retarded by substantial heterogeneity in the exposures examined (Bancroft et al., 2015). Applying ParkIndex consistently may aid researchers in parks, health promotion, urban planning, and other fields in better understanding the contribution of parks to public health.

4.1. Limitations

This study had several limitations. Although we included four diverse metropolitan areas, parks and participants were drawn from only select neighborhoods (128 block groups) within each of those cities. As well, responding participants tended to be college-educated and White. Further, our sample size was smaller than desired and future studies may explore more direct methods of participant recruitment beyond mail/online surveys. Likewise, we employed an innovative map-based survey platform, but collecting data on park use via objective measures (e.g., GPS) would be advantageous. It is also possible that respondents visited parks outside their block group and half-mile buffer. Besides park use, ParkIndex should also be examined relative to other measures, such as health behaviors like physical activity or outcomes like obesity and mental health. Additionally, another park access variable that was not included was distance (e.g., distance to the closest park or mean distance to all nearby parks), a decision supported by the lack of variability in park distances (i.e., all parks were located within the designated one half-mile buffer) and the inconsistent (often counterintuitive) relationship between distance and park use or physical activity in past research (Kaczynski et al., 2008, 2014, 2009; Koohsari et al., 2013; Witten et al., 2008). As well, participant demographics were not part of the final ParkIndex model because none were significantly associated with park use, but future research may identify other individual or environmental variables that are key to predicting park use and could be incorporated.

5. Conclusions

Developing and validating ParkIndex and demonstrating its value for park research and planning represent significant advancements in a metric long sought by diverse local and national agencies. Ascertaining ParkIndex scores for parks, addresses, or neighborhoods requires the use of CPAT and GIS resources, but such tools are increasingly common in research and practice. Future goals include the dissemination of ParkIndex nationwide, continual refinement of its components within particular locations and populations, further exploring and demonstrating its utility as an intervention planning tool, and leveraging ParkIndex to best improve individual and community health.

CRediT authorship contribution statement

Andrew T. Kaczynski: Conceptualization, Methodology. **S. Morgan Hughey:** Data curation, Project administration. **Ellen W. Stowe:** Data curation, Project administration. **Marilyn E. Wende:** Data curation. **J. Aaron Hipp:** Conceptualization, Methodology, Supervision. **Elizabeth L. Oliphant:** Data curation. **Jasper Schipperijn:** Conceptualization, Methodology.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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