

Trends and Correlates of Neighborhood Park Access in Philadelphia

Tiara Halstead¹, Russell McIntire¹

¹Jefferson College of Population Health, Thomas Jefferson University, Philadelphia, PA

ABSTRACT

Background: Studies have shown that exposure to green spaces can positively impact mental and physical health, but access is not distributed equally. Our study aimed to identify the trends and correlates of park access in Philadelphia to highlight demographic groups with less access and provide insight into which health outcomes are associated with park access in Philadelphia.

Methods: Our study was a secondary analysis of the Public Health Management Corporation's Household Health Survey, using both descriptive and analytic methods. We used the 2012, 2015 and 2018 datasets to describe the proportion of adults reporting access to a neighborhood park by Philadelphia planning district. Using the 2018 dataset only, we ran a binary logistic regression model to identify the correlates of park access among adults in Philadelphia.

Results: Our geographic analysis showed that access to neighborhood parks is not equal among Philadelphia planning districts. We found a consistently high percentage of respondents reporting access to parks in the Central, and consistently low access in Upper North, North, and Lower Southwest planning districts. The analytic study showed that women, older age groups, minorities, and those with lower education levels had less access to parks, after controlling for potential confounders. People living in neighborhoods with low social capital reported less access than those living in neighborhoods with medium or high social capital. People with asthma or hypertension had less access than people without these conditions.

Conclusions: Park access is not equitable across all demographic groups and planning districts in Philadelphia. Additionally, people with asthma or hypertension had lower odds of reporting access than people without these conditions, suggesting that parks access may be a protective factor for chronic disease development. The results of this study can be used to advocate for increasing access to parks and green spaces, especially among underserved groups in Philadelphia.

KEYWORDS: Public Health and Public Space, Park Access, Equity, Asthma, Hypertension, Philadelphia

INTRODUCTION

1.0 BACKGROUND

1.1. Parks and Urban Environments

A robust literature has identified the mental and physical health promoting effects of green space (Frumkin et al. 2017). The benefits to health associated with access to green spaces are especially evident in urban environments (Sefcik et al. 2019), which are typically highly developed with less land dedicated to green spaces, such as parks, when compared to non-urban environments. Philadelphia is home to over 300 parks and outdoor recreation facilities (City of Philadelphia 2020). Philadelphia's government expressed support for increasing the number of green spaces in 2008 to benefit city residents' mental and physical health (Pearsall & Eller 2020). Improving the availability and quality of outdoor spaces for marginalized communities could help address health disparities (Beyer et al. 2014), by providing common spaces for people to socialize, exercise, and experience the health promoting effects of exposure to nature. In fact, studies have shown that outdoor green spaces have had a greater impact on those with low incomes, the elderly, and are socially isolated (Beyer et al. 2014). Despite public and private efforts, Philadelphia lacks equitable access to safe parks, which has potential negative impacts on those underserved populations' mental and physical health (Pearsall & Eller 2020).

1.2. Mental Health

Physical neighborhood conditions can impact the mental health of a community. Characteristics like vacant spaces, trash, and poor infrastructure are associated with depression (South et al. 2018). The quality of a person's environment has the power to impact how they feel about themselves and their lives. Public outdoor spaces can facilitate feelings of social support because they create a place to interact with the community (Beyer et al. 2014). Spending time in outdoor spaces can also help people manage feelings of stress. However, people living in neighborhoods with low-quality outdoor spaces may feel more stress instead of less stress when spending time outside (Beyer et al. 2014).

1.3. Physical Activity

Public outdoor spaces like parks can promote physical activity and leisurely outdoor activities (Beyer et al. 2014; Park et al., 2018). Research has revealed positive associations between physical activity and perceived distance to the respondents' closest park (Schipperijn et al. 2017), identifying that each park within 1 km of a person's home added an additional 1.8 minutes of exercise per week (Schipperijn et al. 2017). Access to green spaces promotes physical activity, which can protect against chronic diseases such as obesity, hypertension, diabetes, and cardiovascular conditions (Centers for Disease Control and Prevention 2020).

1.4. Barriers to Park Access

Although access to parks has health benefits, many people in urban areas face barriers to utilizing the parks in their neighborhoods. Qualitative and quantitative research has identified that safety is a main concern for park patrons. In areas with high crime levels, people may feel discouraged from using parks and outdoor spaces in their communities, especially at night (Park et al. 2018; Sefcik et al. 2019). People may not use local parks because of concerns about traffic, low lighting, poor maintenance, and lack of supervision (Sefcik et al. 2019). Also, people may have lifestyle and economic barriers to using parks. People in low-income communities may not have leisure time for using a park because of societal, cultural, or economic constraints (Park et al. 2018). Disparities in park access also exist by geography. Studies have found within-city differences in park size attributed to income (Engelberg et al. 2016; Cohen and Leuschner 2019). In one national study, researchers found that higher socioeconomic status (SES) neighborhoods had larger parks, and lower-SES neighborhoods had smaller parks within the same city—even when they had the same resources (Cohen and Leuschner 2019). A benefit of parks is that they are free to access, which makes them an ideal place for physical activity in low-income communities with less access to other physical activity resources, such as private exercise facilities (Park et al. 2018). However, the public nature of parks does not make them equally accessible, as accessibility might be determined by a range of characteristics including acreage, population density, facilities, maintenance and perceptions of safety.

1.5. Parks in Philadelphia

A study on Philadelphia parks identified that lack of park funding caused some residents to be apprehensive about spending time in parks because of their low quality and poor maintenance (Pearsall and Eller 2020). Philadelphia residents have reported not using local parks because of poor conditions, including trash and the presence of drug paraphernalia (Sefcik et al. 2019). One cluster randomized trial study in Philadelphia investigated the effect of vacant lot interventions on health. In this study, clusters of adults within the vicinity of 110 vacant lots were surveyed in response to the random assignment of lots to three treatment groups: no treatment, trash cleanup, or a “greening” intervention which transformed the lot into a park-like space (South et al., 2018). The authors found that exposure to improved green lots improved their feelings of depression (South et al. 2018).

2.0 RESEARCH OBJECTIVE

2.1. Significance

Studies investigating park inequities in the US have, in general, found that areas with low SES and high proportion of minority residents have lower access to parks. One qualitative study sought to address the reason for disparities in park access and quality by comparing different cities from different US regions (Engelberg et al. 2016). The authors found that park quality predictors depend on the city, as each city has different dynamics surrounding issues such as race, socioeconomic status, public policy, and funding (Engelberg et al. 2016). There is also evidence that parks are underutilized even in areas where the infrastructure exists. Park et al. (2018) found this relationship in Los Angeles, where high-poverty neighborhoods saw less park usage compared to low-poverty neighborhoods. This relationship is important in Philadelphia, as there are many parks in the city, but also high poverty rates among the population.

The existing literature has identified disparities in park access both nationwide and in Philadelphia. While qualitative studies have investigated the public health implications of park access in Philadelphia (Pearsall and Eller 2020; Sefcik et al. 2019), no previous studies have assessed predictors of access based on a population representative, self-reported survey.

2.2. Research Objective

The objective of this study was to provide further insight into the dynamics of park access in Philadelphia by 1) describing changes in self-reported park access over time (2012-2018) by planning district, and 2) identifying the correlates of self-reported park access in Philadelphia from 2018.

3.0 METHODS

This study used responses to the Public Health Management Corporation 2012, 2015, and 2018 Household Health Surveys, focusing on a particular question about respondents' self-reported access to parks. Maps were constructed using ArcGIS Online to show the geographic distribution of adult responses to the park access question, by Philadelphia

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Physical, Social, and Economic Perspectives

planning district. Demographics, risk factors and health outcomes were used to identify correlates of park access among adults in Philadelphia.

3.1. Data

This study used secondary data from the Southeastern Pennsylvania 2012, 2015, and 2018 Household Health Surveys. The Household Health Survey (HHS) is part of the Community Health Database, maintained by the Public Health Management Corporation (PHMC) in Philadelphia. The Community Health Database contains health, social, and demographic information of people living in Pennsylvania. PHMC has collected community health data in Southeastern Pennsylvania via the HHS every two to three years since 1983 (PHMC 2018). The survey data is used to identify public health issues and inform policy in Southeastern Pennsylvania (PHMC 2018). The data covers various health topics, including health behaviors, healthcare access, and chronic diseases. The 2018 HHS was conducted from August 2018 to January 2019 and included Bucks, Chester, Delaware, Montgomery, and Philadelphia counties, reaching 7,501 households. The survey was conducted by telephone and administered in English and Spanish (PHMC 2018).

3.2. Sample and Items

The neighborhood park access item from 2012, 2015, and 2018 is the following: "Is there a park or other outdoor space in your neighborhood that you're comfortable visiting during the day?" In 2012 and 2015, the responses were simply "Yes" or "No," however, in 2018 there were three response options: "Yes, there is a park or outdoor space in your neighborhood that you are comfortable visiting;" "No, there is no park in your neighborhood"; or "No, there is a park in your neighborhood but you are not comfortable visiting it." We dichotomized this variable into "Yes" or "No" categories. Additionally, in 2018, only half of the households surveyed received Form A, which contained the item on neighborhood park access. The sample for the analytic study included adult respondents to the 2018 HHS who answered the park access question, a total of 1,381 respondents.

The demographics chosen for the analysis were the following: gender, age, race/ethnicity, poverty, marriage status, rent/own home, number of children in the household, and education. Risk factors included in the analysis were the following: smoking status, smoking in the home, obesity, exercise, fruit and vegetable intake, regular source of healthcare, and neighborhood social capital. Health outcomes included the following: health status, diagnosed mental health condition, asthma, cancer, binge drinking, high blood pressure (HBP), health insurance, hepatitis C, and diabetes.

4.0 ANALYSIS

4.1. Descriptive Mapping Methods

ArcGIS Online (ESRI n.d.), an online Geographic Information Systems platform, was used to create maps showing the percentage of respondents to the HHS survey who reported park access by planning district, a geographic unit that represents neighborhoods in Philadelphia. Shapefiles for Philadelphia planning district boundaries were downloaded from OpenDataPhilly (OpenDataPhilly n.d.). We downloaded and joined data from the 2012, 2015, and 2018 PHMC HHS to show how self-reported park access has changed over time by planning district in Philadelphia.

4.2. Analytic Methods

The statistical analysis was conducted using IBM Statistical Package for the Social Sciences (SPSS) V. 26 (IBM Corp 2019). Bivariate chi-square analyses of the relationships between each independent variable and the dependent variable were used to identify which variables to include in the final model. Independent variables that were shown to be statistically associated with the dependent variable at a p-value of less than 0.1 were included in the binary logistic regression model. A binary logistic regression model was used to assess the associations between the independent variables and park access.

5.0 RESULTS

5.1. Descriptive Mapping, HHS 2012-2018

The maps identified temporal trends in the percentage of adults reporting access to a neighborhood park access by planning district in Philadelphia (Figures 1-3). The percentage is the proportion of respondents who reported access to a park in each planning district. Overall, the Central district had the highest percentage of reported park access in the city for all three years. Other planning districts that sustained a high percentage of reported access over time included Lower Northwest, Upper Northwest, and Lower South. Residents in the Central Northeast, North Delaware, and Lower Northeast planning districts reported decreased access over time. Areas that sustained a generally low percentage of reported park access over time included the Upper North, North, and Lower Southwest planning districts. Reported access increased in the Lower South, South, University Southwest, West Park, North, and Lower North planning districts between 2015 and 2018. The percentage of reported access changed from 2012 to 2015 and from 2015 to 2018 in many planning districts with no apparent longitudinal trend.

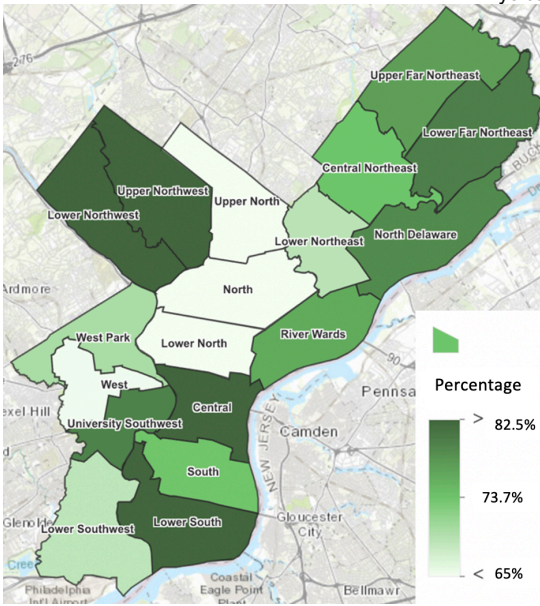


Figure 1. Reported park access percentage by Philadelphia planning district, Public Health Management Corporation 2012

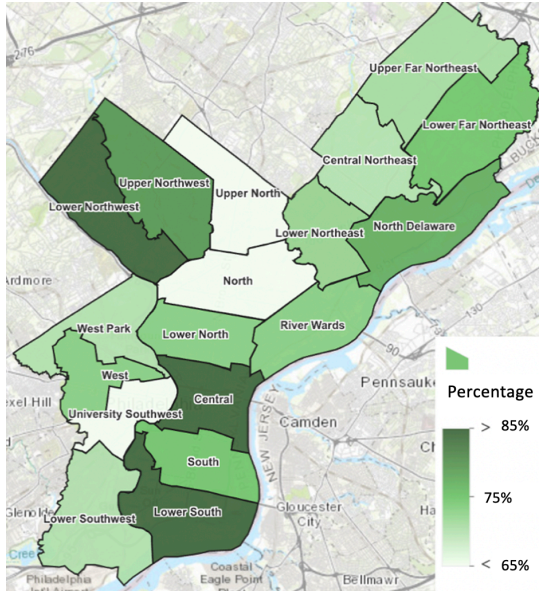


Figure 2. Reported park access percentage by Philadelphia planning district, Public Health Management Corporation 2015

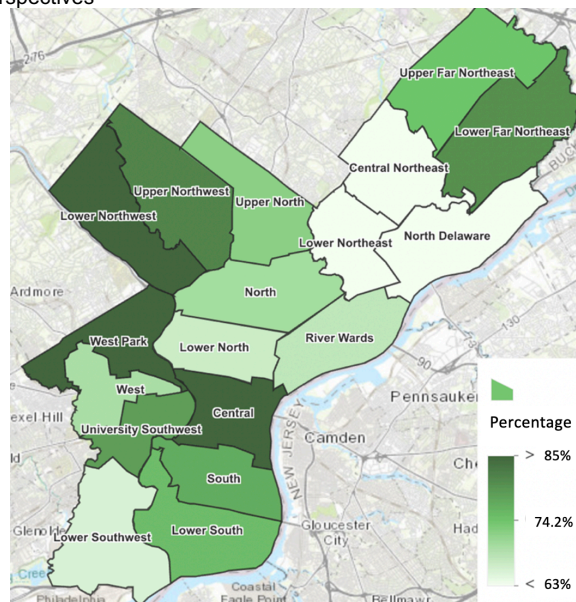


Figure 3. Reported park access percentage by Philadelphia planning district, Public Health Management Corporation 2018

5.2. Analytic Sample, HHS 2018

In 2018, 74.6% of the sample reported having access to a park or outdoor space, while 25.4% of the sample reported not having access to a park or outdoor space. The sample was 45.7% male and 54.3% female. The racial breakdown of the sample was 38.9% White (Not Latino), 36.8% Black (Not Latino), 12.4% Latino, and 10.8% other (which includes multiracial, Asian, and unidentified race). Of the sample, 38.5% attained an education of college graduate or higher, and 61.2% of the sample's highest attained education level was less than college graduate.

Bivariate chi-square analyses were conducted between the dependent variable (park access) and each independent variable separately (gender, age, health status, education, social capital, race, smoking status, number of children in the household, mental health condition diagnosis, asthma, cancer, regular source of healthcare, rent, binge drinking, HBP, health insurance, hepatitis C, diabetes, marriage status, smoking in the home, poverty, obesity, exercise, and fruit and vegetable intake) to reveal potential relationships (Data not shown). Variables with p-values of less than 0.1 were chosen for inclusion in the final model. Independent variables showing an association with having access to a park included: gender ($p < .001$), age ($p < .001$), health status ($p < .001$), education ($p < .001$), race ($p < .001$), mental health condition diagnosis ($p = .001$), asthma ($p < .001$), HBP diagnosis ($p < .001$), hepatitis C diagnosis ($p = .003$), diabetes ($p = .052$), poverty ($p < .001$), social capital ($p < .001$), obesity ($p = .025$), marriage status ($p = .025$), exercise per week ($p = .008$), and fruits and vegetables per week ($p < .001$).

5.3. Binary Logistic Regression Model

A binary logistic regression model was performed using the variables from the bivariate analyses that showed an association with park access at $p < 0.1$ (Table 1). Although there were many variables that made it into the logistic regression model, we are only reporting the statistically significant associations with park access. The measures of effect below were calculated after controlling for each of the variables included in the model simultaneously. We identified the following variables to be associated with self-reported park access: gender, age, race, education, social capital, asthma, and HBP.

Gender: Women had 46% lower odds of having access to a park compared to men (Adjusted Odds Ratio (AOR) = 0.54, 95% C.I. 0.46, 0.88).

Age: Compared to the 18–34-year-old age group, people aged 35–49 had 49% lower odds of having access to a park (AOR = 0.51, 95% C.I. 0.32, 0.82). People aged 50–64 had 51% lower odds of having access to a park compared to people aged 18–34 (AOR = 0.49, 95% C.I. 0.32, 0.77). People aged 65+ had 77% lower odds of having access to a park compared to people aged 19–34 (AOR = 0.23, 95% C.I. 0.13, 0.40).

Race: Latinx people had 61% lower odds of having access to a park compared to White, non Latinx people (AOR = 0.39, 95% C.I. 0.23, 0.66). People of “other” race had 73% lower odds of having access to a park compared to White, non Latinx people (AOR = 0.27, 95% C.I. 0.15, 0.46). “Other” includes Asian, multiracial, and biracial individuals.

Education: Overall, those with a post-graduate education had the highest access to parks. Those whose highest education was college graduate, some college, high school graduate, and less than high school had lower odds of reporting having access to a park compared to those who had a post-graduate education. People whose highest level

of education was college graduate (AOR=0.45, 95% C.I. 0.24, 0.84) had 55% lower odds, some college (AOR=0.50, 95% C.I. 0.27, 0.92) had 50% lower odds, high school graduate (AOR=0.33, 95% C.I. 0.19, 0.60) had 67% lower odds, and less than high school (AOR= 0.37, 95% C.I. 0.17, 0.79) had 63% lower odds of having access to a park compared to people whose highest level of education was post-graduate.

Social Capital: Adults who reported living in neighborhoods with low social capital had 78% lower odds of having access to a park compared to those who lived in neighborhoods with medium or high social capital (AOR=0.22, 95% C.I. 0.16, 0.32).

Asthma: Adults who reported ever being diagnosed with asthma had lower odds of reporting access to a park compared to those who were not diagnosed with asthma (AOR=0.66, 95% C.I. 0.45, 0.96)

Social Capital: Adults who reported ever being diagnosed with HBP had lower odds of reporting access to a park compared to those who were not diagnosed with HBP (AOR=0.51, 95% C.I. 0.35 , 0.74)

Table 1. Binary logistic regression model for predicting access to a neighborhood park in Philadelphia, Public Health Management Corporation Household Health Survey 2018.

	AOR ¹	95% C.I. ² for AOR	
		Lower	Upper
Gender (Ref: Male)	0.64**	0.46	0.88
Age (Ref: 18-34)			
35-49	0.51**	0.32	0.82
50-64	0.49**	0.32	0.77
65+	0.23***	0.13	0.40
Race (Ref: White, not Latinx)			
Black (Not Latinx)	0.69	0.47	1.01
Latinx	0.39***	0.23	0.66
Other	0.27***	0.15	0.46
Education (Ref: Post-graduate)			
College graduate	0.45**	0.24	0.84
Some college	0.50*	0.27	0.92
High school graduate	0.33***	0.19	0.60
Less than high school	0.37**	0.17	0.79
Social capital (Ref: Medium or high)	0.22***	0.16	0.32
Asthma (Ref: No)	0.66*	0.45	0.96
High blood pressure (Ref: No)	0.51***	0.35	0.74

Variables included in the model but did not show an association with park access included: mental health condition diagnosis, hepatitis C, diabetes, poverty, obesity, daily fruit and vegetable intake, and weekly exercise.

*p < 0.05; **p < 0.01; ***p < 0.001

¹ Adjusted Odds Ratio

² Confidence Interval

6.0 DISCUSSION

This study used data from the PHMC HHS to identify temporal trends and correlates of self-reported access to parks in Philadelphia. The results show that park access was not equitable across all sociodemographic groups in Philadelphia, with some groups having lower odds of access to a park. Women had lower odds of access to a park than men. This difference may be attributed to the social climate in which women feel less safe in urban areas, especially if they are alone. Women who use urban parks in Philadelphia may not use them after dark out of fear, especially if the park has little to no surveillance and is in a neighborhood they perceive as less safe (Sefcik et al., 2019). Age was also a factor associated with access. Compared to the 18-34-year-old age group, the 35-49, 50-64, and 65+ age groups all reported lower odds of having access to a park or outdoor space, with those aged 65+ reporting the lowest odds overall. More research could provide insight into why people in the 35-49 and 50-64 age groups reported lower odds of access compared to 18-34-year-olds. The relationship seen among 65+ year-olds may be because people who are elderly may not feel safe using outdoor spaces alone, or also may not be able to physically access the parks, due to disability or characteristics of the built environment, such as lack of sidewalks or traffic.

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Physical, Social, and Economic Perspectives

Recent analyses have shown Philadelphia to be a heavily segregated city by race (Shukla and Bond 2021). Our results show that this segregation is also reflected in racial and ethnic disparities in park access. We found that Latinx, and those in the "Other" category, including Asian, multiracial, and biracial individuals have less access to a park, compared to White people. While the GIS maps from this study do not show race by planning district, those planning districts with low access to parks are also composed of a high proportion of minorities.

Education levels also were associated with park inequity in Philadelphia. Respondents whose highest level of education was college graduate, some college, high school graduate, and less than high school reported less access to parks than people whose highest education level was post-graduate. In Philadelphia, similar to other major cities in the US, there is much inequity in the distribution of resources. We expected that people with the highest education would live in wealthier neighborhoods with more resources. Additionally, this aligns with our finding that people with low neighborhood social capital reported lower odds of having park access compared to people with medium or high neighborhood social capital. The SES factors in the analysis suggest that having access to individual or neighborhood resources increases the likelihood of self-reporting access to a park in Philadelphia.

HBP diagnosis was correlated with lack of park access among adults in Philadelphia. Studies have identified associations between HBP and low access to greenspace among low income people (Grazuleviciene et al. 2020), and in aggregate by census tract (Knobel et al. 2021) but studies have not always shown significance (Morita et al. 2011). In general, healthy blood pressure among those with access to parks could be attributed to increased physical activity due to park patronization, however, our model controlled for physical activity. It is likely that accessing neighborhood parks lowers stress and relaxes residents who use parks as a form of leisure activity, as studies have shown these relationships among adults (Razani et al. 2018).

Similarly, asthma diagnosis was associated with lack of park access. Studies have identified inconsistent relationships between asthma and urban vegetation, but the majority of studies focus on asthma development in children or acute asthma events among adults, and not adult asthma diagnoses. A study in New York City found that tree canopy cover was positively associated with asthma and allergic sensitization due to pollen exposure (Lovasi et al. 2013). However, other studies show that the air purifying effects of living proximal to parks were beneficial to prevent acute asthma events. A study based in Los Angeles assessed the relationship between asthma emergency department visits, air pollution from diesel particulate matter, and parks and public outdoor spaces. Their findings suggest that increasing the amount of available parks and outdoor spaces while decreasing air pollution could help improve asthma outcomes for low-income communities in Los Angeles (Douglas, Archer, and Alexander 2019).

The utilization of GIS mapping highlighted geographic disparities in reported access and how these disparities changed over time. A notable decrease in park access over time was present in the Central Northeast, Lower Northeast, and North Delaware planning districts. It is unlikely that the number of parks in these planning districts changed, so the change in perception of access is likely socially constructed. The current opioid crisis may have impacted perceptions of public safety in 2018 in these planning districts, contributing to the change. Also, crime rates may have contributed to a feeling of decreased safety. In addition to the large number of parks in Central Philadelphia, it is likely that this planning district had the highest proportion of reported park access due to the walkability of the streets, quality, and size of the parks. Also, many parks are tourist attractions in Central Philadelphia, which draw people to the area, and these areas are comparatively safe and well-maintained.

6.1. Limitations

This study has several limitations to consider. First, the data were self-reported, so there could be information biases that affect outcomes. However, the PHMC HHS has a protocol to educate respondents about the confidentiality of their responses so that their survey information will not be linked to their identity. Second, the PHMC HHS is cross-sectional, so it is impossible to identify temporal relationships between exposure and outcome variables. Thus, our results are limited to those of association or correlation only. Third, the park access variable was measured by the item "Is there a park or other outdoor space in your neighborhood that you are comfortable visiting during the day?" Although this item identifies self-reported access to a neighborhood park, it does not specify the reasons for access (or lack of access), nor does it measure if and how much participants use parks. Fourth, gender was a binary variable in the dataset, and did not identify those reporting non-binary genders. Finally, a limitation of the GIS analysis was the difference in sample sizes between years. Among Philadelphia respondents who answered the parks question, there were 3,438 respondents in 2012, 3,601 respondents in 2015, but only 1,381 respondents in 2018. There were fewer responses in 2018 because only half of the original sample was asked Form A, which included the question on neighborhood park access. Despite these limitations, our analysis makes an important contribution to the literature. The study is the first to explore temporal trends and associations with park access among a population representative survey of adult Philadelphians and provides important information that can be used to advocate for increased access to Philadelphia parks.

7.0. CONCLUSION

Park access is not equitable between demographic groups and by geography among adults in Philadelphia. We identified that women, older age groups, minorities, those with lower educational attainment, and those living in neighborhoods with lower social capital had lower self-reported access to parks in Philadelphia. We identified that asthma and HBP were associated with lower self-reported access to parks, suggesting that park access may benefit

health. The relationships identified between park access and health can inform advocacy for more high-quality, parks in Philadelphia, especially for those who currently do not have access.

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