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Journal
Environmental Health Perspectives, 131(5)

ISSN
1542-4359

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Publication Date
2023-05-01

DOI
10.1289/ehp12319

A Section 508–conformant HTML version of this article is available at https://doi.org/10.1289/EHP12319.

Investigating the Links between Climate Injustice and Ableism: A Measurement of Green Space Access Inequalities within Disability Subgroups

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https://doi.org/10.1289/EHP12319

Introduction

In the United States, a 2020 study found that ~5,600 annual excess deaths across the country were attributable to heat, which is substantially higher than previously reported.[1] Marginalized populations, such as those with disabilities, are particularly at risk of experiencing negative health outcomes related to heat.[2] Disabled status is a complex classification, with numerous subgroups ranging from physical to cognitive disabilities. Research evaluating the disproportionate risks associated with extreme heat for people with disabilities is limited and often regards disability as a single category, therefore potentially obscuring unique risks for subgroups within the disabled population.[3,4] Further, through compounding social and economic risk factors, structural ableism may exacerbate preexisting health vulnerabilities for some people with disabilities during heat extremes, increasing the number of emergency department visits for individuals with cognitive or physical disabilities.[2,5] By omitting the multitude of disability types in adaptation planning, cities are not adequately prepared for the inevitable future of additional extreme heat days and more people living with different disabilities.[6]

It is well established that public parks are beneficial to human health through various mechanisms, such as reducing local ambient air temperatures through shading, enhancing wind patterns, and evapotranspiration.[7] To the best of our knowledge, evidence regarding potential disparities in access to parks across disability subgroups has not been investigated. Determining disparities of access to parks by disability type can help cities effectively refine extreme heat adaptation policies to enhance equity toward ableism.[3,8]

In this study, we defined access as the percentage of residents living within a proximity of 0.5 mi (0.8 km) to a park, beach, open space, or coastline within each urban census tract in San Diego County. The aim of this study, which we believe to be the first of its kind, was to quantify the extent to which access to public parks varies by overall disability and two broad categories of disability type (physical and cognitive) in San Diego. Determining differences in park access by disability type will help inform how lack of access to such environmental amenities negatively impacts historically marginalized disabled persons.

Methods

This study covered urban census tracts ($n = 628$) in San Diego County as defined by the U.S. Department of Agriculture (USDA; https://www.ers.usda.gov/webdocs/DataFiles/53180/25559_CA.pdf?v=0). Disability data was based on a 5-y estimate (2011–2015) from the American Community Survey (ACS; https://data.census.gov) and contains three categorizations of disability: total, cognitive, and physical. In the ACS data set, total disability is defined as the percentage of individuals within a census tract living with vision, hearing, cognitive, ambulatory, self-care, or independent living disabilities, which we define as overall disability. Access to parks was assessed from the California Protected Areas Database (https://data.cnra.ca.gov/dataset/california-protected-areas-database) from 2016, and we relied on the "estimate" variable, which expressed the percentage of each census tract that was within 0.5 mi (0.8 km) of public parks, beaches, open spaces, or coastlines. To measure differences in park access by disability type, we designated cognitive (those with learning, remembering, or concentration difficulties lasting >6 months), physical (those who are substantially limited in their ability to walk, climb stairs, reach, lift, or carry), and overall disability percentage as predictor variables. We calculated the slope index of inequality (SII; https://CRAN.R-project.org/package=PHEindicatormethods) for the three predictor variables on access to parks using RStudio (version 2021.09.2; RStudio Team). SII is a linear regression model that measures inequality, capturing the difference of a dependent variable between the most and least deprived groups of the predictor variable. In this study, it represents the difference in access to parks between the lowest percentage decile and the highest percentage decile with disability. The main purpose of this analysis was to describe inequalities by disability status and, therefore, we did not adjust on contextual factors, such as unemployment or income.[9] We also created bivariate choropleth maps to explore potential spatial heterogeneity in the distributions of the two types of disability and overall disability, which is the cumulative number of individuals with some type of disability in a population, with access to parks using ArcGIS Pro (version 2.9.3; ESRI). Data used in this analysis, as well as links to the online versions of the data sets, can be found at https://github.com/emlasky/DisabilityParksSanDiego.git.

Results and Discussion

The spatial distribution of cognitive and physical disability and overall disability and access to parks is heterogeneous (Figure 1). Some tracts have a high prevalence of people with cognitive disabilities, whereas others have a high prevalence of physically disabled individuals (Figure 1B). Between census tracts with the lowest and highest percentage decile of overall, cognitive, or physical disability, there was 15%, 13.2% or 10.3% greater access to parks, respectively. There is a greater difference in park access among those with cognitive disabilities than among those with physical disabilities and an even larger difference among overall disability when comparing the lowest to highest deciles (Table 1).

Generally, census tracts with higher proportions of overall disability have less access to public spaces. Our results show that the differences in access to parks is both distinct and heterogeneous by two disability types, meaning there is potential to install parks in areas with a greater disability presence and to develop appropriate accommodations based on the prevalence of specific disability subgroups by census tract. We limited this study to two different

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The authors declare they have nothing to disclose.

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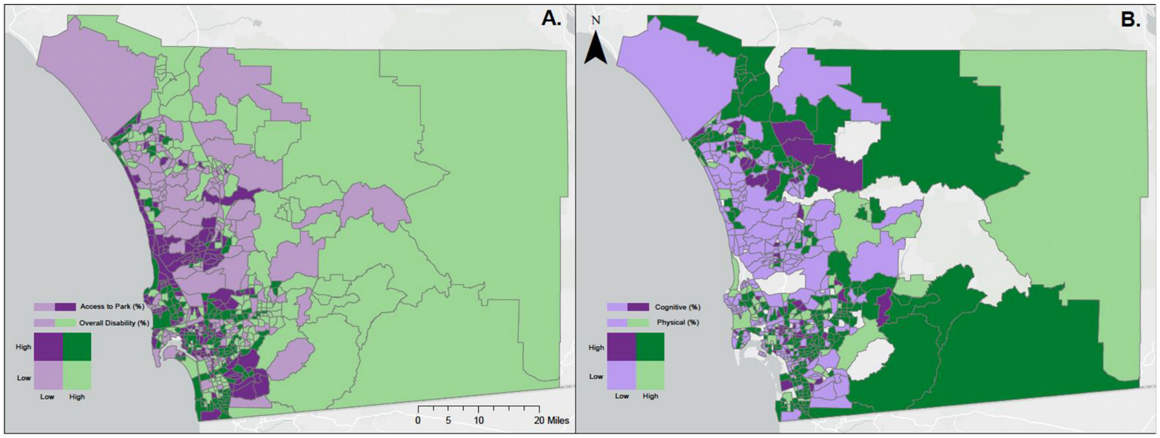

Figure 1. (A) Overall disability and access to parks by U.S. Census tract in San Diego County, 2011–2015. This map depicts urban census tracts in San Diego (https://www.ers.usda.gov/webdocs/DataFiles/53180/25559_CA.pdf?v=0) and access to parks using the California Protected Areas Database (https://data.cnra.ca.gov/dataset/california- protected-areas-database). Overall disability is the percentage of individuals within a census tract living with vision, hearing, cognitive, ambulatory, self-care, or independent living disability based on a 5-y estimate (2011–2015) from the American Community Survey (https://data.census.gov). Areas with high total disability and low access to parks (light green) can be compared with areas with low disability and high access to parks (dark purple). (B) Spatial distribution of cognitive and physical disability by census tract. This map shows the prevalence of cognitive or physical disability by census tract (areas with high physical disability/low cognitive disability are light green, whereas areas with high cognitive disability/low physical disability are light purple). Across the urbanized portions of the county of San Diego, a mean of 4.15% of individuals live with cognitive disabilities and 9.85% with physical disabilities. There are 62 census tracts missing from the cognitive data set, which reduces the total number of census tracts seen in (B) to 566. The maps were created using ArcGIS Pro (version 2.9.3; ESRI).

Table 1. Slope index of inequality (SII) for cognitive, physical, and overall disability in relation to access to public parks in San Diego County, 2011–2015.

Disability type	SII [% (95% CI)]
Cognitive	13.2 (5.0, 21.1)
Physical	10.3 (−0.1, 17.4)
Overall	15.0 (6.4, 22.6)

Note: In this study, the SII is the difference in access to parks between the lowest percentage decile (10%) and the highest percentage decile (100%) of the observed disability subgroup among urban census tracts in San Diego County. Disability data was based on a 5-y estimate (2011–2015) from the American Community Survey (https://data.census.gov). Overall disability percentage was calculated by dividing the population of individuals with vision, hearing, cognitive, ambulatory, self-care, or independent living disability by total population per census tract. CI, confidence interval.

disability subcategories and one adaptive method. Furthermore, although we conceptualized access to parks using distance, additional features such as quantity/quality of parks or accessibility of transport and park information are factors also known to affect access.[10] There are countless groupings of disability and adaptation techniques that can be input into this analysis. In addition, we focused our study only on San Diego and recommend exploring this analysis in other locations.

Including disability type as a vulnerability factor, much like with race and age, illuminates concealed inequalities that may reduce vulnerabilities when designing climate adaptation plans. This study intends to encourage contemplation about how to develop urban adaptation methods to combat the relentless and increasing effects of climate change.

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