A New Index to Estimate Playspace Inequity

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Abstract

Playspace inequity refers to the systemic lack of access to quality playspaces near where kids live and learn. Although literature points to systemic racial and economic disparities in access to playspaces, no high-quality national dataset of playspace inequity currently exists. Entities like park systems and school districts tasked with building and maintaining playspaces sometimes have incomplete or outdated data on their locations and quality. The playground-focused nonprofit KABOOM! created the Playspace Inequity Prioritization Index, which is a geospatial tool that helps estimate where playspace inequity is most likely occurring to better inform investment, maintenance, and programming decisions.

Background

A large body of literature points to systemic disparities in access to high-quality green space, parks, and playgrounds along racial, economic, and geographical lines (Huang et al., 2022). Populations that live in rural areas, racial and ethnic minority groups, and those with lower socioeconomic status tend to have limited access to playspaces in neighborhoods, parks, and schools compared with wealthier, White, and urban groups. Beyond the mere presence of playspaces, their size and quality also tend to vary based on these demographic characteristics.

Playspaces are part of the fabric of neighborhoods, which means that adverse physical and social conditions may limit access to playspaces. These factors include limited public and active transportation opportunities, personal safety concerns, lack of inclusion, and low public awareness of existing playspaces. Disparities in access to and quality of playspaces may also result from historical and contemporary forms of systemic racism, such as discriminatory land use and housing policies or historical segregation and exclusion.

Taken together, these discrepancies in playspace access and quality limit opportunities for all children to fully experience the physical, mental, social, and emotional health benefits of play. Play has important physical benefits, such as helping children develop strength and dexterity while also encouraging physical activity and exercise (Sutterby and Frost, 2002). Play also helps children develop communication skills, resiliency, and various executive functioning skills such as conflict resolution (Ginsburg, 2007). Play can also help children develop self-regulatory behaviors and coping skills to help deal with toxic stress (Bodrova and Leong, 2015; Yogman et al., 2018).

No high-quality national dataset of playground locations and playground quality currently exists, and local entities sometimes have incomplete or outdated data on playground locations and quality. In response, KABOOM! developed the Playspace Inequity Prioritization Index (PIPI) to help meet the need for a data-informed estimate of where playspace inequity is most likely occurring for every census tract in the United States. PIPI incorporates 21 data elements to create a single numerical score that can be used to estimate playspace inequity. With PIPI, data users can identify census tracts experiencing the greatest estimated playspace inequity in any given geography, from local to national.

The overall PIPI score is a value between negative 7.0 (-7.0) and positive 7.0, where a score of 0 represents the estimated mean level of playspace equity across the entire United States. Census tracts with PIPI scores between 0 and 7 are likely to experience playspace inequity, with higher scores representing areas that lack adequate playspaces and, therefore, present greater opportunities for playspace investment. Negative PIPI scores between 0 and -7 are census tracts with less opportunity for investment because there is less estimated playspace inequity.

PIPI consists of three subindexes, which, in turn, consist of several data elements (exhibit 1).

Each data element is standardized for every census tract in the United States, weighted, and combined into a single score (Z-score), which roughly represents the number of positive or negative standard deviations from the mean (zero). In other words, if a census tract has a PIPI score of 1.0, it means that its level of estimated playspace inequity based on the underlying data elements is roughly 1 standard deviation of inequity worse than the average census tract in the United States. Similarly, a census tract with a Z-score of negative 2.0 (-2.0) is roughly 2 standard deviations better than the average census tract in the United States.

Exhibit 1

Playspace Inequity Prioritization Index (PIPI) Subindexes

Population Characteristics Subindex	Inequity Indicators Subindex	Park Access and Built Environment Subindex
• Percentage of Black, Indigenous, and other people of color (non-White) population • Income ≤ 80% of Area Median Income • Population under 18 years of age • Language isolation (Household Language by Household Limited English-Speaking Status) • Children under 18 with disability • Residential properties with two or more units	• Life expectancy at birth • Percentage children receiving public benefits • Excessive owner housing costs • Excessive renter housing costs • HUD subsidized housing units • Unemployment rate	• Number of parks • Percentage of area covered by parks • Number of schools • Commute means of transportation • Pedestrian road network density • Vehicles per occupied housing unit (no vehicles for residents) • Traffic proximity and volume • Children with low access to healthy food • Households without computers or internet

PIPI Data Sources: American Community Survey 5-year estimates 2018–2022; USDA ERS Food Access Research Atlas 2019; OpenICPSR National Neighborhood Data Archive 2018; CDC National Center for Health Statistics 5-year estimates 2010–2015; National Center for Education Statistics school year 2022–2023; HUD Picture of Subsidized Households 2021; EPA Smart Location Database 2019; EPA EJScreen: Environmental Justice Screening and Mapping Tool 2020

Analysis

PIPI has been used in a variety of ways, with the most common use being the identification of neighborhoods that may be experiencing playspace inequity. Exhibit 2 shows how PIPI maps can visually identify higher-need census tracts, which are indicated in progressively darker shades. These visualizations provide a valuable basis for conversations with city agencies to prioritize areas for playspace investments.

The overall PIPI map of Philadelphia reflects the well-known geography of inequity in the city, with North and West Philadelphia—to the lower left and center of the map, respectively—appearing in darker shades than the predominantly White and higher-income communities in far Northeast and suburban census tracts.

The census tract highlighted in exhibit 2 is in the Harrowgate neighborhood, which has an overall PIPI score of 4.0. Looking at the underlying conditions driving this high score, nearly 46 percent of the people living in this area are children, 95 percent of whom live in poverty. Most households in this area also rent their homes, and all spend at least 30 percent of their incomes on rent. In addition, 52 percent of households that rent homes do not have access to a vehicle.

Exhibit 2

Overall Playspace Inequity Prioritization Index (PIPI) Score Map for Philadelphia, Pennsylvania, by Census Tract, with Harrowgate Neighborhood Highlighted

**Harrowgate
Tract 42101018801
PIPI Score: 4.0**
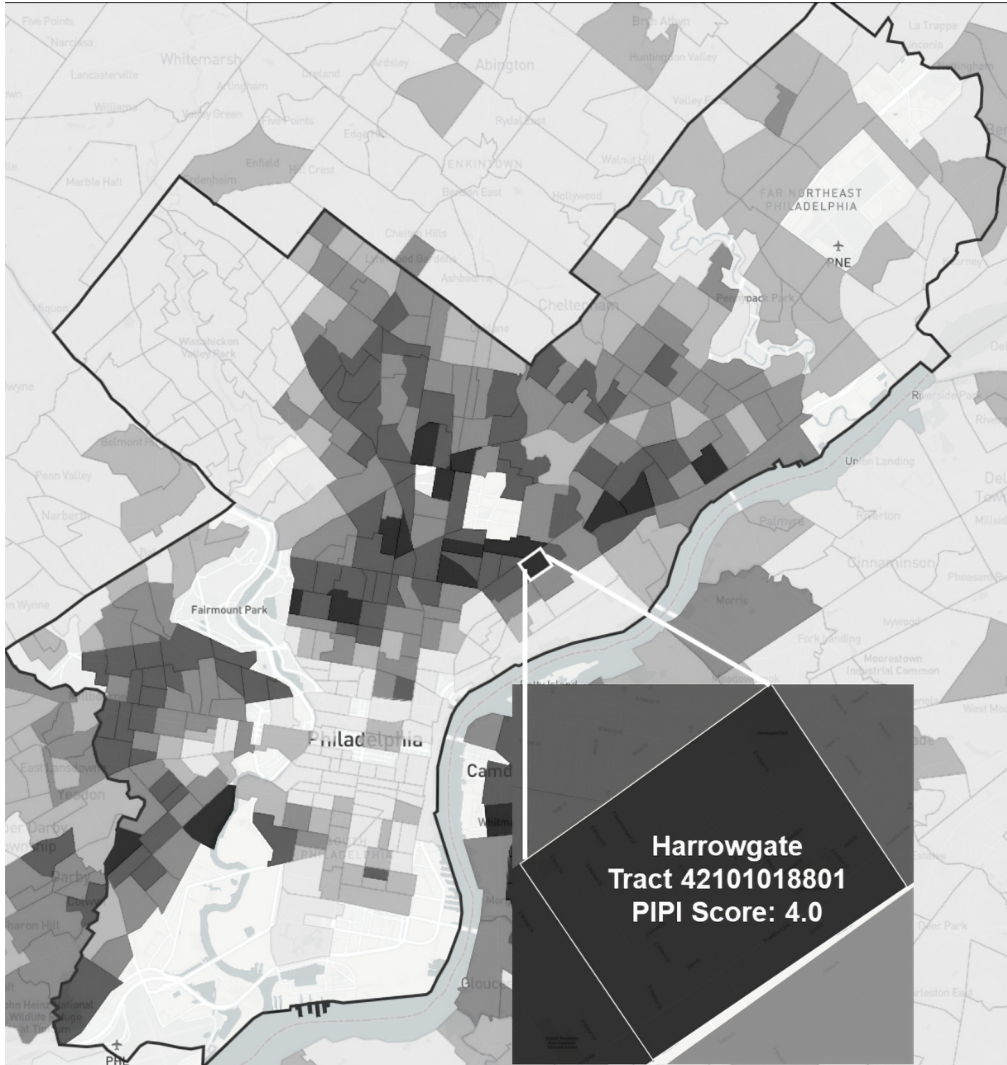
Source: Authors' research

The authors also combined PIPI with additional data on the locations of early childcare providers and neighborhood walkability, which enabled local leaders to focus on playspace needs for 0- to 5-year-olds. Exhibit 3 shows how these combined data were used to identify 15 priority neighborhoods for playspace investment focused specifically on this population.

Exhibit 3

Priority Neighborhoods for Early Learning Playspace Investments in Philadelphia, Pennsylvania
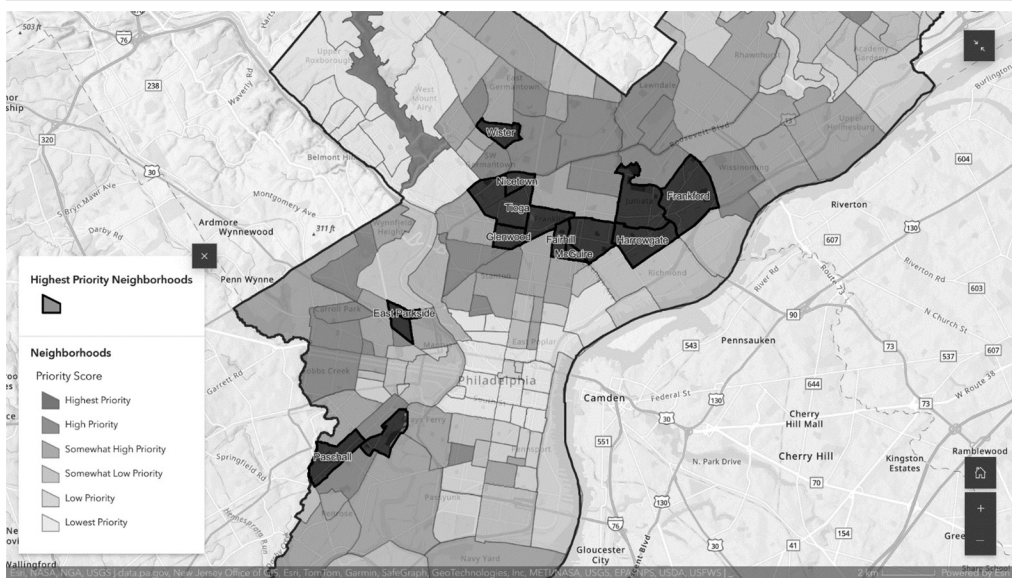
Source: Cooper et al. (2023)

Data Limitations

PIPI is only an estimate of where playspace inequity is believed to be occurring. The authors cannot get a true determination of playspace inequity within a city or community without having verified playground location and quality data to combine with PIPI. The underlying data used to create PIPI are also several years old and, therefore, cannot capture or reflect playspace inequity in real time. Despite these limitations, the authors believe that PIPI and similar indexes provide valuable data-based methods to inform conversations focused on how and where to prioritize investments in playspaces across the United States.

Future Research

Looking forward, the authors hope to complete research that confirms a correlation between PIPI scores and urban heat islands. Prior research found that outdoor areas experiencing high temperatures are used less frequently and that children in those areas participate in less vigorous physical activity (Vanos, Herdt, and Lochbaum, 2017). Quality and safety are two other elements the authors will explore on the municipal level, given prior research demonstrating that lower-income neighborhoods and those of predominately Black, Indigenous, and other people of color have playgrounds that are less safe (Arroyo-Johnson et al., 2016; Cradock et al., 2005; Powell, Ambardekar, and Sheehan, 2005).

Acknowledgments

Authors

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