

The Child Opportunity Index 2.0

Clemens Noelke (cnoelke@brandeis.edu)

Research Director diversitydatakids.org

ACS User Conference, Washington DC

May 14-15, 2019

Team, Partners, and Funders

Team at Heller/Brandeis

PI: Dolores Acevedo-Garcia

Professor of Human Development and Social Policy, and Director of the Institute for Child, Youth and Family Policy, Brandeis University

Erin Hardy, Nancy McArdle, Nick Huntington, Clemens Noelke, Rebecca Huber

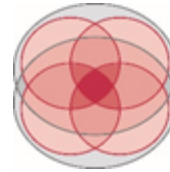
Team at Kirwan/OSU

Mikyung Baek, Jason Reece

BRANDEIS UNIVERSITY

The Heller School

FOR SOCIAL POLICY AND MANAGEMENT



KIRWAN INSTITUTE
for the Study of Race and Ethnicity

**Funding from the W.K. Kellogg and
Robert Wood Johnson Foundations**

Inequality of Neighborhood Opportunity

- Children are growing up in vastly different neighborhood environments
- Based on 28 indicators of child-related neighborhood features, the Child Opportunity Index 2.0 (COI) captures multiple dimensions of neighborhood opportunity in a single aggregate metric
- The COI allows you to
 - Quantify the effect of neighborhoods on children's outcomes
 - Compare neighborhoods, and patterns of neighborhood inequality (for example, by race/ethnicity) across US and over time
 - Explore (potentially policy-amenable) mechanisms

Based on COI 1.0 (2014)

- Examples of academic research using the COI:
 - Roubinov et al. “Family Socioeconomic Status, Cortisol, and Physical Health in Early Childhood: The Role of Advantageous Neighborhood Characteristics.” *Psychosomatic Medicine*, 2018
 - Beck et al. “The Child Opportunity Index and Disparities in Pediatric Asthma Hospitalizations.” *Journal of Pediatrics*, 2017
 - Kersten et al. “Neighborhood Child Opportunity and Individual-Level Pediatric Acute Care Use and Diagnoses.” *Pediatrics*, 2018
- Other users
 - Departments of Public Health
 - Children’s Hospitals
 - State (e.g., housing) and local (e.g., child welfare) agencies
 - Community organizations

Child Opportunity Index (COI) vs. Opportunity Atlas

Child Opportunity Index

- Census-tract level composite index based on 28 indicators covering three domains
 - Education
 - Health and Environment
 - Social and Economic
- Focus on measuring contemporary features of neighborhoods theorized to influence healthy child development
- Neighborhood conditions as of 2010 and 2015

Opportunity Atlas (Chetty et al. 2018)

- Census-tract level indicators of long-term outcomes associated with growing up in different neighborhoods
 - Household income rank
 - Marital status
 - Incarceration
- Effects of neighborhoods as they were 15-20 years ago
- No information about features of neighborhoods generating these effects

The Child Opportunity Index 2.0

- Goal: Measure multiple neighborhood features related to healthy child development , choosing input over proxy/ outcome measures whenever possible
- COI 2.0 composite Index based on **28 neighborhood-level indicators** grouped into three domains
 - Education
 - Health & Environment
 - Social & Economic
- **Comparable data for all census tracts in 2010 and 2015**

Education Domain

Context

- **Adult educational attainment.** Percent with college degree or higher. American Community Survey (ACS).
- **College enrollment.** Percent enrolled in college, Ages 18-24. ACS.
- **School poverty rates (not yet included).** Percent students eligible for free- and reduced-price lunch. NCES.

Early Childhood Education

- **ECE centers of any type within a five-mile radius.** Own data collection from state and federal sources.
- **NAEYC accredited ECE centers within a five-mile radius.** Own data collection from state and federal sources.
- **ECE Enrollment.** Percent 3- and 4-year olds enrolled in nursery school, preschool, or kindergarten. ACS.

Outcomes (not yet included)

- **Fourth-grade reading proficiency.** Own data collection plus GreatSchools data.
- **Fourth-grade math proficiency.** Own data collection plus GreatSchools data.
- **High school graduation rate.** Own data collection plus GreatSchools data.

Health and Environment Domain

Health Care Access

- **Health insurance coverage.** Percent population aged 0-64 with health insurance coverage. ACS.

Healthy Environments

- **Access to healthy food.** Percent household without vehicle access living more than 0.5 miles from the nearest supermarket. USDA.
- **Access to green space.** Percent developed imperviousness. CDC.
- **Walkability.** EPA Walkability Index.
- **Housing vacancy rates.** Percent of housing units that are vacant. ACS.

Toxic Exposures

- **Heat exposure.** Days with maximum temperatures above 90F. CDC.
- **Exposure to toxic substances.** RSEI Index. EPA.
- **Exposure to superfund sites.** EPA.
- **Microparticle concentration.** PM 2.5. CDC.
- **Ozone concentration.** CDC.

Social & Economic Domain

Family structure

- **Single parenthood.** Percent families with a single parent. ACS.

Economic Opportunities

- **Prime-age unemployment rate.** Percent unemployed in active civilian labor force, ages 25-54. ACS.
- **Prime-age employment to population ratio.** Percent population ages 25-54 employed in civilian labor force. ACS.
- **Percent with long commute.** Percent employed traveling 60 minutes or more to workplace. ACS.

Economic Resources

- **Poverty rate.** Percent population living in families/households below 100% of the FPL. ACS.
- **Public assistance rate.** Percent population receiving SNAP benefit. ACS.
- **High skill employment.** Percent employees in professional, technical, and managerial occupations. ACS.
- **Median household income,** in 2017 US Dollars. ACS.

→ Combined into *economic resources* index using principal component analysis.

Index Construction

- Spatial indicators calculated at block-level and aggregated to census tract level
- All indicators standardized using 2010 national means and standard deviations
- Sign-reversed (if applicable) and top-/bottom-coded at four standard deviations above/below mean
- Aggregated to domain scores using weights that are a hybrid of
 - **Unity weights.** Each indicator counts equally within each domain
 - **Empirical weights** calculated from the bivariate correlation between 2010 indicator values and tract-level outcome data from the Opportunity Atlas and the CDC 500 Cities Project
- Domain scores averaged into aggregate COI score using similar approach

Weighting and Predictive Validity

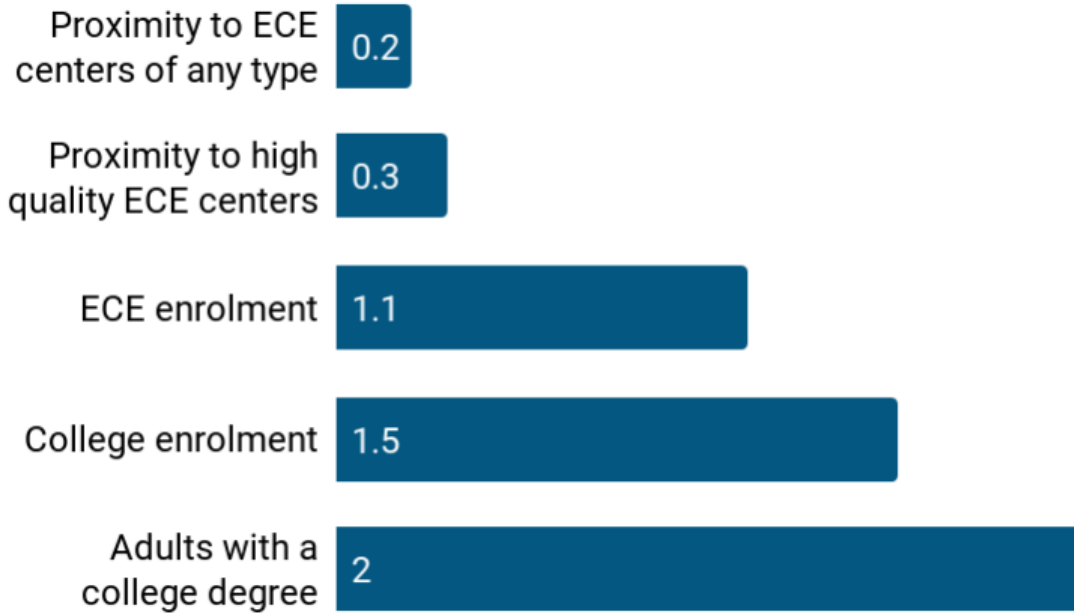
- **Unity weights: Each indicator is equally important**
 - Least bad solution if you have no idea what weights should be (Haggerty and Land)
- **“Empirical weights” a function of how well indicators predict outcomes (→ predictive validity)**
 - Need: Average causal effect for 28 indicators
 - Have: Bivariate correlation between every indicator and tract-level SES and health outcomes in representative/recent data
- **Hybrid weights: Average of empirical and unity weights**
 - Shrinks large weights and inflates small empirical weights
 - Guards against bias in empirical weight estimates

Outcomes for Constructing Weights

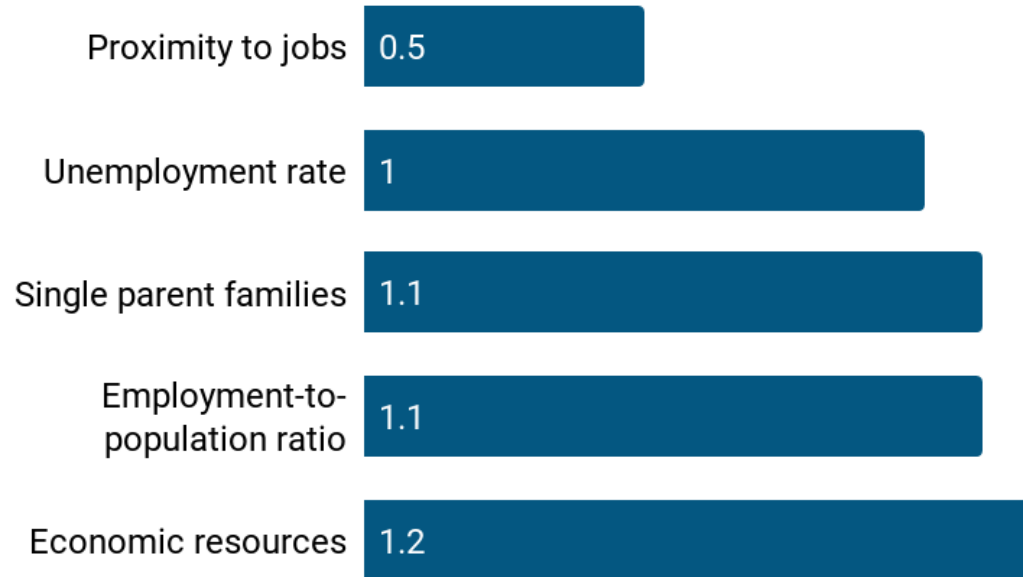
- Tract-level adult outcome data from 500 Cities and Opportunity Atlas
- Socio-economic long-term outcomes from Opportunity Atlas (Chetty et al.)
 - **Mean household income rank** at age 35 for individuals with parents at the median of the parent income distribution
 - **Probability of living in a low poverty census tract** at age 35 for individuals with parents at the median of the parent income distribution
- Summary health outcomes from 500 Cities Project (CDC, RWJF)
 - **Mental health** not good for 14 or more days among adults aged 18 years and older
 - **Physical health** not good for 14 or more days among adults aged 18 years and older

Hybrid Weights

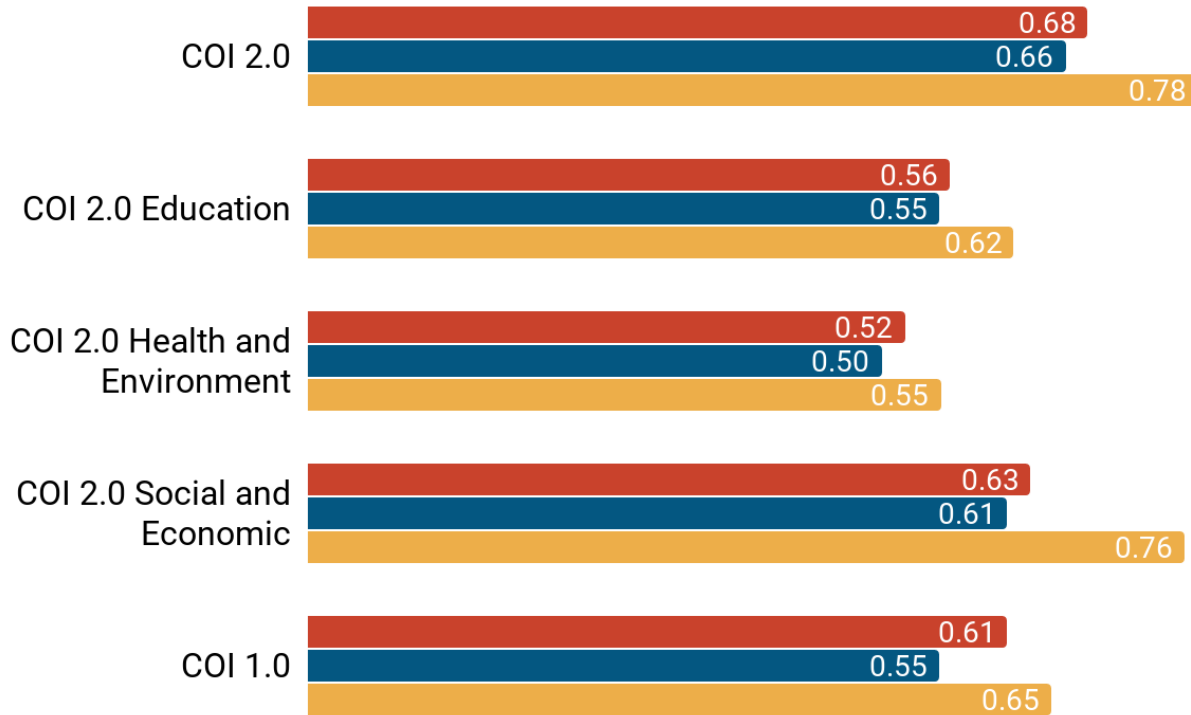
1. Calculate hybrid weight for indicator j as $w_j = (\rho_j + 1) / 2$
 - a. Calculate bivariate correlation (Pearson's ρ) with each of the four outcomes and all 2010 indicator z-scores.
 - b. Average ρ s for each indicator j across outcomes
 - c. Rescale averaged ρ s within domains so that their sum equals the number of indicators in the respective domain ($= \rho_j$)
2. Sensitivity analyses
 - a. Re-estimate correlations with county fixed effects and controlling for economic resources and population density
 - b. Relative magnitudes of hybrid weights within domains quite robust







■ Opportunity Atlas
 ■ Life Expectancy (CDC USALEEP)
 ■ 500 Cities



2015 data, only outcomes not used for constructing weights

OA indicators: HH income rank (p25), HH in low poverty neighborhood (p25), in top 20% of HH income distribution (p25, p50)

500 Cities indicators: Obesity, diabetes, smoking, limited physical activity, asthma

■ Opportunity Atlas ■ Life Expectancy (CDC USALEEP) ■ 500 Cities



2015 data, only outcomes not used for constructing weights

OA indicators: HH income rank (p25), HH in low poverty neighborhood (p25), in top 20% of HH income distribution (p25, p50)

500 Cities indicators: Obesity, diabetes, smoking, limited physical activity, asthma

Empirical weights = rescaled average bivariate correlations

Summary

- COI 2.0 captures multidimensional neighborhood effects
- COI 2.0 is highly correlated with adult SES and health indicators
- Provides current information on specific neighborhood features that shape opportunities for children
- Next steps
 - Data/visualizations to be launched on redeveloped website, summer 2019
 - Sign up for our mailing list on diversitydatakids.org for updates