

Mapping the Link between Life Expectancy and Educational Opportunity | *Limitations*

As with all research studies, this study has a number of limitations that users should consider when interpreting its findings. These limitations relate to the available data and the study design.

Data limitations

In working with the various datasets used to create this tool, we had to address several limitations, including:

Imperfect indicators. Ideally, we would have collected data from every high school in the country about educational opportunity indicators of our choosing. Unfortunately, collecting our own data was outside the scope of this project; therefore, when we constructed the measure of educational opportunity, we were limited to what was included in the Civil Rights Data Collection (CRDC). Some of the constructs that the research suggested are important indicators of educational opportunity were not included in the CRDC. For instance, the literature pointed to student participation in extracurricular activities at school as a useful indicator, but the CRDC did not collect data on participation in extracurricular activities (Zaff et al., 2017).

Wherever possible, we selected indicators that rigorous research has clearly linked to educational attainment. We did not include some other possible indicators of educational opportunity from the CRDC in this study because the evidence of their link with educational attainment is mixed. At the same time, in order to include a broad range of indicators, we selected several indicators that were not ideal. Some that we included were less than ideal because of variations in the quality of the opportunities they measure. For example, although Advanced Placement (AP) exams are standardized, research has shown that the quality of AP classes themselves varies; therefore, the availability of AP classes might itself not be a consistent measure of educational opportunity (Warne, 2017). However, while not a perfect indicator, the availability of AP classes does offer some insight into the availability of high-level courses at a given school.

Alternatively, some indicators were excluded due to their lack of internal consistency with other conceptually related indicators. Because indicators were grouped into conceptual domains by averaging the scores of the included indicators, all indicators within a domain needed to be reasonably correlated with one another to ensure that the measure would not yield misleading domain scores that would demonstrate a potential “middle ground” between higher and lower indicator scores (i.e., the average of a score of 5 and a score of 1 is 3, but 3 does not accurately represent either score). We measured internal consistency within domains with Cronbach’s alpha to ensure that this issue did not problematically affect domain scores. These values are presented in the methodological appendix. Based on this analysis, we dropped some indicators because they did not share both conceptual and statistical relationships with the other indicators within the domain.

Interrelationships between educational opportunity and school resources. Due to unequal distributions of school resources along racial/ethnic and socioeconomic lines, there is a risk that measures of educational opportunity can merely reflect the demographics of a school (U.S. Department of Education, 2011; U.S. Commission on Civil Rights, 2018; Logan, 2011). For our indicators of educational opportunity, we aimed to

select indicators that measure educational opportunity itself, rather than reflecting community demographics. To do this, we relied on malleable indicators of inputs, rather than outputs like test scores. We then tested whether our indicators measure community demographics by examining the correlations between our measure of educational opportunity and community demographics. We found that our educational opportunity measure was not problematically correlated with high percentages of people living under the poverty line, nor high percentages of any particular race/ethnicity group in a given census tract. The strongest correlations were between educational opportunity and the percentage of Black residents (-0.29), the percentage of White residents (0.29), and the percentage of residents living under the poverty level (-0.28). All other correlation coefficients were less than 0.1.

Census tract size disparities. Census tracts are not of uniform size; tracts ranged in population from 1,200 to 8,000 residents (U.S. Census Bureau, n.d.). We did not weight census tracts based on their population size, but instead allowed each census tract to contribute equally to the model. We chose not to weight the tracts for two reasons: (1) The unit of analysis is census tract rather than individuals, and (2) weighting tracts based on the number of young people ages 15 to 24 living in each tract would disproportionately weight tracts that contain residential colleges, which are fundamentally different from the vast majority of neighborhoods in the country.

Missing data in USALEEP. The USALEEP data contain life expectancy estimates for 88.7 percent of U.S. census tracts (Arias et al., 2018). All high schools located in tracts without life expectancy data were necessarily excluded from analyses. In addition, Maine and Wisconsin were excluded from the USALEEP data, so we were not able to examine life expectancy in these two states.

Study design limitations

Limitations in the design of this study are also important. These limitations include challenges related to:

An assumption of stability of educational opportunity and residence over time. Educational opportunity was measured simultaneously with life expectancy; however, the life expectancy estimate is a lagging indicator based on all deaths occurring after age 14, while the educational opportunity measure developed for this tool is a current indicator based on the most recent years of data. Therefore, any inferences rest on the assumption that educational opportunity has been consistent over time, and that residents continued to live where they attended high school.

At the same time, educational opportunity should not be viewed as an immutable characteristic of a given area. Neighborhoods have the potential to improve their educational opportunity over time.

The findings of this study **do not** represent a causal relationship between educational opportunity and life expectancy, as the study did not measure the effects of educational interventions on the population's life expectancy estimates.

An assumption of attendance at neighborhood schools. Magnet schools, virtual schools, charter schools, alternative schools, juvenile justice facilities, private schools, and schools in the Bureau of Indian Education (BIE) school system do not necessarily operate like neighborhood schools that draw students from their surrounding neighborhoods. These other types of schools likely draw students from a wider geographic area, so their connection to the health of the population in their surrounding neighborhoods may not be very direct. Two cases were particularly problematic for connecting residence to school location: (1) Schools with no physical location, such as virtual schools, may be erroneously assigned the latitude and longitude of the center of a city, whether or not students attending the school live there; and (2) juvenile justice facilities may be allocated the coordinates of the court house or another related facility. Juvenile justice facilities can also draw from very wide geographic areas relative to other schools. For these reasons, we removed these two types of schools from our analysis. Because private schools were not included in the CRDC, they were also excluded from our analyses. To address the other school contexts listed above, we ran sensitivity

analyses at three levels of data restriction: including all high schools; excluding only juvenile justice and virtual schools; and excluding juvenile justice schools, virtual schools, magnet schools, charter schools, and alternative schools. We found little difference in the explanatory power of educational opportunity among the three models and chose the second model due to its conceptual strength. More details about the sensitivity analysis can be found in the methodology section.

A focus on between-school differences. This project focused exclusively on between-school differences in educational opportunity. Within-school differences, however, are very relevant to discussions of educational opportunity, particularly when considering differences in students' experiences based on their race and/or ethnicity. Future research should consider within-school differences to understand the fuller picture of educational opportunity and disparities in life expectancy.

Incomplete visual portrayal of all contributing factors. There is a possibility that inferences drawn from the visualization may be related to a confounding variable (e.g., a lack of opportunity beyond education). It is critical to understand this research within the broader societal context. Of the factors that we examined, poverty was most strongly related to life expectancy. Poverty is also highly related to educational opportunity. Racial inequity is a systemic problem that is integrally tied to both educational opportunity and life expectancy. Demonstrating the importance of these factors in a way that makes sense visually is a challenge for which there is not a perfect solution. The visualization tool was created to capture these effects as accurately as possible while avoiding visually unclear results. We have also contextualized findings with text in certain cities to avoid misinterpretation.

References

- Arias, E., Escobedo, L. A., Kennedy, J., Fu, C., & Cisewski, J. (2018). U.S. small-area life expectancy estimates project: Methodology and results summary. National Center for Health Statistics. *Vital Health Stat* 2(181). Retrieved December 9, 2019 from: https://www.cdc.gov/nchs/data/series/sr_02/sr02_181.pdf
- Logan, J. R. (2011). *Whose Schools Are Failing?* US2010. Retrieved December 9, 2019 from: <https://s4.ad.brown.edu/Projects/Diversity/Data/Report/report5.pdf>
- U.S. Census Bureau (n.d.). Glossary. Retrieved December 9, 2019 from: https://www.census.gov/programs-surveys/geography/about/glossary.html#par_textimage_13
- U.S. Commission on Civil Rights. (2018). Public Education Funding Inequity in an Era of Increasing Concentration of Poverty and Resegregation. U.S. Commission on Civil Rights Briefing Report. Retrieved December 9, 2019 from: www.usccr.gov/pubs/2018/2018-01-10-Education-Inequity.pdf
- U.S. Department of Education. (2011). More Than 40% of Low-Income Schools Don't Get a Fair Share of State and Local Funds, Department of Education Research Finds. Retrieved December 9, 2019 from: www.ed.gov/news/press-releases/more-40-low-income-schools-dont-get-fair-share-state-and-local-funds-department-
- Warne, R. T. (2017). Research on the academic benefits of the advanced placement program: Taking stock and looking forward. *SAGE Open*, 7(1). <https://doi.org/10.1177/2158244016682996>
- Zaff, J.F., Donlan, A., Gunning, A., Anderson, S. E., McDermott, E., & Sedaca, M. (2017). Factors that Promote High School Graduation: A Review of the Literature. *Educational Psychology Review*, 29(3), 447-476. <https://link.springer.com/article/10.1007/s10648-016-9363-5>