The Gap within the Gap: Finding A Better Measure of Student Disadvantage

We develop an alternative measure of economic disadvantage that can allow researchers, policymakers, and schools to better understand achievement gaps and target interventions to the neediest students.

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Key Findings

1. In Michigan, 60% of students are eligible for free or reduced-price lunch at least once by 8th grade and 14% receive meal subsidies every year they are in school.

2. Students who receive free or reduced-price lunch every year perform nearly a full standard deviation below their peers who never receive meal subsidies on standardized math tests, a gap that is between 35% and 40% larger than the achievement gap between those who receive free or reduced-price lunch in a given year and those who do not, even after accounting for student and school characteristics.

3. Among students traditionally classified as low-income, there is an achievement gap of nearly a quarter standard deviation between those receiving meal subsidies every year and those who receive subsidies only in some years.

Background

Researchers and policymakers devote considerable effort to measuring gaps in academic achievement between economically disadvantaged students and their wealthier peers. And rightly so: the income-based achievement gap is an important and growing source of educational inequality in the United States. The gap is 40% wider today than it was 25 years ago.[1]

One widely-used marker for poverty in schools is free or reduced-price lunch eligibility, a meal subsidy given to students with household income below 185% of the poverty line. In recent years, nearly half of grade-school students nationwide met this broad definition of disadvantage.[2] When using this measure, researchers and policymakers typically evaluate eligibility at a single point in time. For example, when the National Assessment of Educational Progress (NAEP) reports scores by family income, it uses subsidized meal eligibility in the year the student is being assessed as its proxy for family income. Thus, when the National Center for Education Statistics reports the 8th grade NAEP performance of economically disadvantaged students and their more affluent peers, it simply compares test scores of students eligible for subsidized meals in 8th grade to those who are not. This intuitive approach does not take into account changes in family income over time. It also includes half of all school children, a group much larger than the 22% of children in the United States who were in poverty in 2014.[3] Taken together, these facts suggest that the way we currently use meal subsidy rates to measure poverty produces a crude proxy for poverty that makes targeting the neediest students for support difficult. By using just one year of a student's free or reduced-price lunch status, we ignore useful information about the duration of disadvantage that a student experiences.

Fortunately, many states now maintain data systems that record a student's subsidized lunch status throughout school. By taking advantage of this historical information, we can group students into categories based not only on whether they were ever eligible for subsidized meals, but also how long they were eligible. Incorporating this historical information changes how we assess achievement gaps between the most advantaged and the least advantaged students. Using administrative data from the state of Michigan, we classify students into three groups: those students who never receive subsidized lunch, those who cycle in and out of free or reduced-price lunch eligibility, and those who are always eligible for the subsidies.

The last two types of students compose the group we traditionally consider economically disadvantaged and perform at quite different academic levels (see Figures 1 and 2). Examining gaps between students who cycle in and out of poverty and those who always receive meal subsidies reveals an achievement gap of just over a quarter of a standard deviation. What's more, this gap within the gap obscures the true size of the achievement difference between the best and worst off students. When we compare students who receive free or reduced-price lunch every year they are in school to students who never do, we find that this achievement gap is 40% larger than the achievement gap measured using only a single year's worth of information.

A Fresh Look at Patterns of Poverty with Student Histories of Meal Subsidy[4,5]

Among 8th graders in Michigan public schools between the 2010-11 and 2012-13 school years, 60% received free or reduced-price lunch in at least one year between starting school and 8th grade. Measured in their 8th grade year alone, just under half of students received free or reduced-price lunch. This discrepancy shows that the traditional measure of economic disadvantage understates the share of 8th graders who ever experience disadvantage by roughly 20%. Additionally, the fact that well over half of all students received free or reduced-price lunch for some part of their time in school suggests that the group of students who meet this criterion may be more diverse than the single label of "free or reduced-price eligible" can adequately describe.

Using a student's history of receiving free or reduced-price lunch, we can more accurately pinpoint the extent of disadvantage she experiences. This more detailed measure yields a number of important insights about the experiences and challenges facing students who receive subsidized meals. The most basic finding is that some students spend a great deal of time receiving meal subsidies.

Figure 1: Achievement Gaps Widen When Measured Using a Student's History of Disadvantage
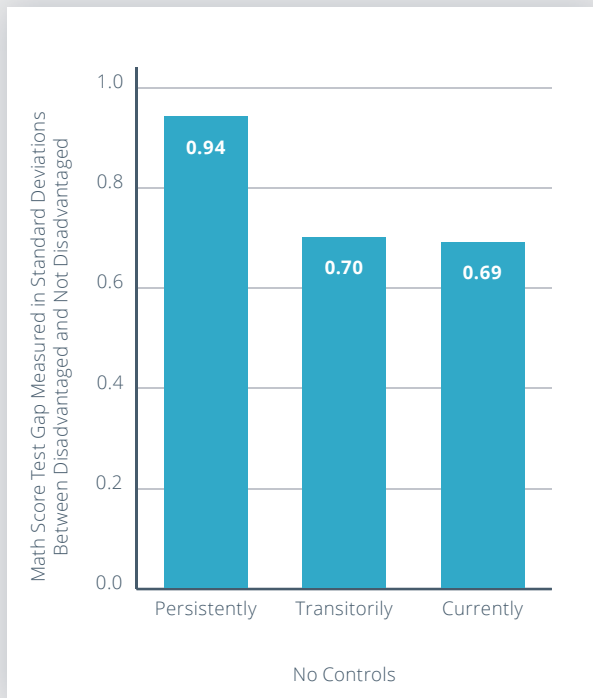
Source:
Data from the Michigan Educational Assessment Program (MEAP) from the Michigan Department of Education. 8th grade standardized math tests for 8th graders between the 2010-11 and 2012-13 school years.

Table 1: Student and Family Characteristics Differ Greatly by History of Meal Eligibility

	Never Eligible	Sometimes Eligible	Always Eligible
MI			
Race			
White	88%	64%	46%
Black	5%	26%	39%
Hispanic	2%	7%	12%
Test Scores			
Standardized Math Score	0.471	-0.209	-0.483
ECLS-K 1998-99			
Race			
White	77%	35%	19%
Black	4%	23%	38%
Hispanic	7%	22%	35%
Ratio of Kindergarten Family Income to Poverty Line Income	1.99	1.66	1.41
Parents' Education			
Less than HS	0%	15%	29%
HS degree	12%	29%	41%
Some College	31%	32%	27%
College Degree	57%	24%	2%

The typical student who ever qualifies for free or reduced-price meals receives the support for more than 6 years, or about 70% of their time in school.

Within the group of students who ever receive a meal subsidy, roughly a quarter have incomes low enough to qualify for free or reduced-price lunch during every year they are in school, a group we term "the persistently disadvantaged." The remaining students have incomes that fluctuate, with income low enough to qualify them for subsidies in some years, but not in others ("the transitorily disadvantaged"). On average the transitorily disadvantaged spend about

60% of their time in school receiving meal subsidies, considerably less than the 100% experienced by the persistently disadvantaged.

But economic disadvantage is not the only dimension along which there is inequality within the group of students who ever qualify for free or reduced-price lunch. As shown in Table 1, the persistently disadvantaged and transitorily disadvantaged also differ from one another in their racial makeup. Students who have spent the entirety of their schooling receiving subsidized lunch are disproportionately black and Hispanic, making up 51% of all students who always receive a subsidy. Contrast this with the fact that black and Hispanic students represent just 37% of the students who ever receive meal subsidies, 24% of 8th graders overall, and 7% of the never-disadvantaged and it becomes clear that traditionally underserved minorities are disproportionately at risk for long spells of economic disadvantage.

To gain more insight into the characteristics of students with different meal eligibility histories, we also analyzed data from the nationally representative Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K). Using this data, we find a very similar pattern of black and Hispanic students being overrepresented in the group of students who are either sometimes or always eligible for subsidized meals.

However, the ECLS-K allows us to extend the analysis to the family income and parental education of students in each group. As seen in Table 1, in terms of family income (evaluated in a student's Kindergarten year) as a percentage of the poverty line, students who are never eligible for subsidized meals have the highest average income, with a mean income of nearly twice the poverty line. By comparison, students who were sometimes but not always eligible for meal subsidies had incomes roughly 1.7 times the poverty line, while students who always receive meal subsidies in the data have family income of just 1.4 times the poverty line, on average.

Figure 2: The Diversity of Disadvantage
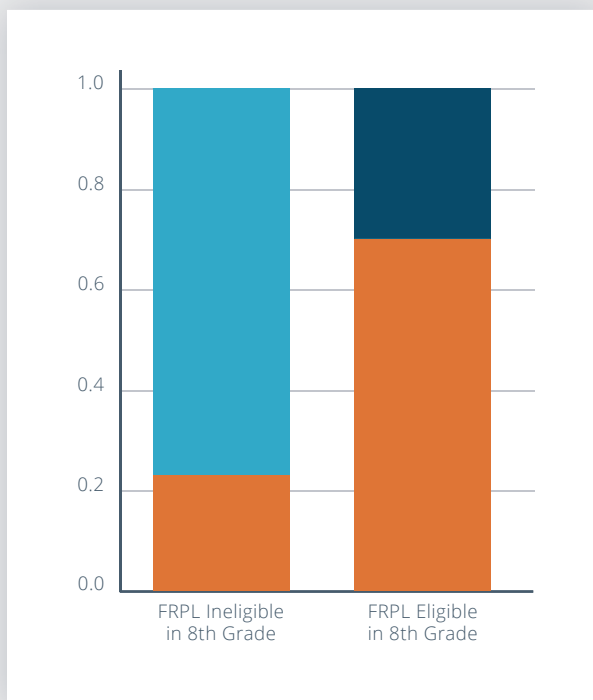
Never FRPL Eligible
Always FRPL Eligible
Sometimes FRPL Eligible

Source:
Data from the Michigan Educational Assessment Program (MEAP) from the Michigan Department of Education. 8th grade standardized math tests for 8th graders between the 2010-11 and 2012-13 school years.

Figure 3: Each Additional Year of Disadvantage is Associated with a Roughly Constant Increase in the Achievement Gap
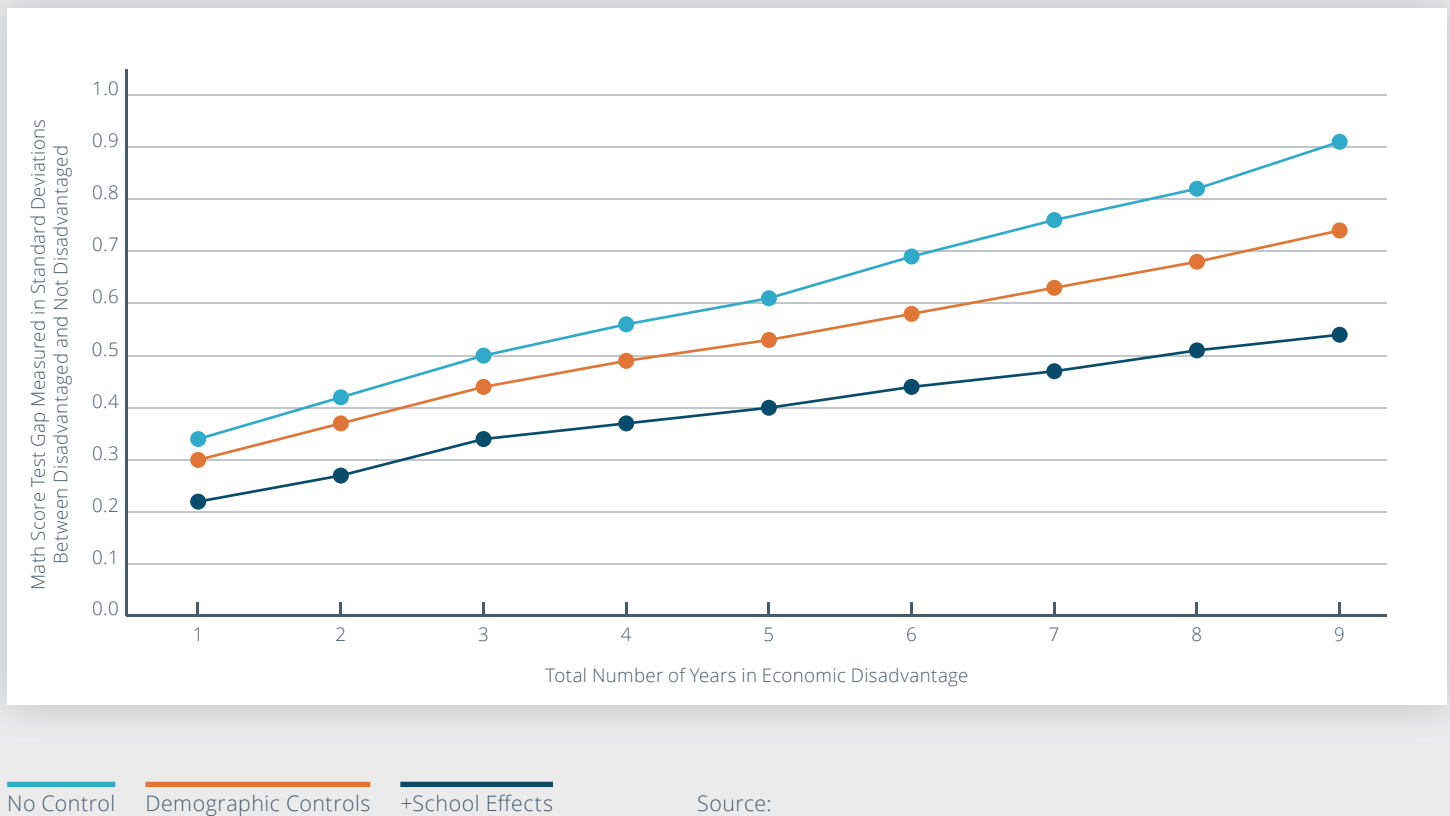
No Control   **Demographic Controls**   **+School Effects**

Source:
Data from the Michigan Educational Assessment Program (MEAP) from the Michigan Department of Education. 8th grade standardized math tests for 8th graders between the 2010-11 and 2012-13 school years.

A corresponding pattern is found in our analysis of parental education by eligibility group. Among students who are never eligible for free or reduced-price meals, none of their parents have less than a high school education, compared with 29% of students who are always eligible for meal subsidies. On the other end of the educational attainment distribution, just 2% of students who are always eligible for free or reduced-price meals in every wave of the study have parents with a college degree, while 57% of their peers who never receive meal subsidies have parents who completed college.

Perhaps not surprisingly, students who are always eligible for subsidized meals perform significantly worse on standardized math tests than their peers who are never eligible. Measured with the conventional approach for our sample of Michigan students (using only 8th grade eligibility for subsidized meals), the math test score gap between students receiving free or reduced-price lunch in 8th grade and their peers not receiving meal subsidies is two-thirds of a standard deviation. Using our historical measure, a comparison of students who receive meal subsidies every year to those who never qualify reveals a test score gap that is 40% larger than the gap measured the conventional way, with the never-disadvantaged students scoring 0.94 standard deviations higher than the always-disadvantaged students.[6]

Why such a large difference between the gaps measured in these two different ways? The traditional measure fails to isolate the neediest students when measuring the achievement gap. As Figure 2 demonstrates, the groups of subsidy-eligible and subsidy-ineligible students in a given year each comprise two types of children. In the case of those receiving free or reduced-price lunch, roughly 30% received subsidized meals in every year leading up to 8th grade, while the remaining 70% of students cycled in and out of meal subsidy eligibility. In the other group, of those not eligible for subsidized meals in 8th grade, roughly 23% have received free or reduced-price lunch in the past. These differences mean that meal subsidy rates in a given year fail to fully separate students who experience the most economic disadvantage from those whose families never face life with a low income. As a result, our usual method understates the degree of difference between the best and worst off.

In our sample, students who receive free or reduced-price lunch in some (but not all) years scored on average 0.23 standard deviations higher on standardized math tests in 8th grade than their persistently disadvantaged peers. This difference is lost when we fail to differentiate between the transitorily and persistently disadvantaged. Because the transitorily disadvantaged make up a larger share of the ever-disadvantaged population, their higher scores raise the average for the group of students we usually consider disadvantaged. As a result, we obscure just how far behind the students experiencing the deepest poverty are compared to their peers who never receive meal subsidies.

Because the transitorily and persistently disadvantaged are different in many ways beyond their exposure to poverty, from their racial

backgrounds to the types of schools they attend, it is useful to explore how our estimate of the achievement gap changes once we control for these other factors. To do this, first we control for student demographic characteristics. Demographic controls reduce the gap between the persistently disadvantaged and the never-disadvantaged from 0.94 to 0.76 standard deviations, a gap that is still larger than the gap measured the conventional way. We then account for the possibility that chronically disadvantaged students may attend worse schools than never-disadvantaged students by only comparing students of each income category within the same school. In results not pictured, we find that accounting for the school a student attends reduced the gap by another 0.2 standard deviations, leaving the gap at 0.55 standard deviations. Even with this set of controls, a considerable gap remains between students at the top and bottom of our measure of economic disadvantage.

Another informative exercise is to make our measure of poverty even finer-grained. Rather than classifying students into the never, transitorily, or persistently disadvantaged categories, we can simply express their degree of disadvantage through the number of years they spend receiving free or reduced-price meals. Framed in this way, we observe the relationship between student test scores and each additional year spent in poverty. As Figure 3 illustrates, our calculations reveal that students who spend just one year qualifying for subsidized meals score 0.35 standard deviations lower on standardized math tests than their peers who never receive free or reduced-price meals. There is a strikingly consistent increase in the test score gap with each additional year spent in economic disadvantage, such that each additional year widens the test score gap by 0.08 standard deviations.

Conclusion

Given the tremendous variation within the population of students we conventionally categorize as experiencing economic disadvantage, state longitudinal data systems provide an important opportunity to get a clearer picture of student poverty. Our analysis reveals a sizable proportion of students facing persistent disadvantage and a much larger achievement gap than the one measured between subsidy eligible and ineligible students in a given year. In an era that couples rising inequality with limited public resources, a better measure of disadvantage can provide much-needed guidance for targeting interventions to our neediest students.

End Notes

1. Reardon, S. F. 2011. The widening academic achievement gap between the rich and the poor: New evidence and possible explanations, in Greg J. Duncan and Richard J. Murnane (Eds.) Whither Opportunity?: Rising Inequality, Schools, and Children's Life Chances New York: Russell Sage Foundation.

2. Common Core of Data (CCD). Retrieved March 2, 2016, from https://nces.ed.gov/ccd/tables/2000_schoollunch_01.asp

3. Children in poverty (100 percent poverty) | KIDS COUNT Data Center. Retrieved February 22, 2016, from http://datacenter.kidscount.org/data/Tables/43-children-in-poverty.

4. This research is supported by the Institute of Education Sciences, U.S. Department of Education, through Grants R305B110001 and R305E100008 to the University of Michigan. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education. Longitudinal data utilized is the result of the Michigan Consortium for Educational Research, a collaboration between the Michigan Department of Education, Center for Educational Performance and Information, University of Michigan and Michigan State University.

5. For a more academic treatment of this topic, please see the full working paper accompanying this brief, "The Persistence of Poverty: Using Longitudinal Data to Understand Gaps in Educational Outcomes" that can be found here: http://edpolicy.umich.edu/publications/#working-papers.

6. For context, we estimate that the black-white achievement gap for this sample is also about two-thirds of a standard deviation.

About the Authors

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· Facilitate interactions between students and faculty from different schools and/or departments who share an interest in education reform.