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Educational Opportunity Dashboard: Technical Appendix

This technical appendix is intended to provide readers with information about data sources, samples, and methods used to construct key educational opportunity measures that were included in RFA's Educational Opportunity Dashboard.

Data and Samples

The analytic sample for this project consists of a set high schools that were commonly found in two nation-wide school surveys from the 2015-16 school year: Civil Rights Data Collection (CRDC) and Common Core of Data (CCD).

Civil Rights Data Collection

The Civil Rights Data Collection (CRDC), administered by the U.S. Department of Education, is a biennial survey of public schools, including juvenile justice facilities, charter schools, alternative schools, and schools serving only students with disabilities. The CRDC data are used by the Office of Civil Rights to ensure that recipients of federal financial assistance do not discriminate on the basis of race, color, national origin, sex, or disability status.[1]

The CRDC collects data on leading civil rights indicators related to access and barriers to educational opportunity, which include school characteristics, programs, services, and student outcomes. While most of the CRDC's student data are disaggregated by race/ethnicity, sex, English-learner status, and disability status at the school level, the disaggregated student data are not available at the grade level. Also, the CRDC does not include a measure of student poverty.

Common Core of Data

The Common Core of Data (CCD) is the Department of Education's primary database on public elementary and secondary education in the United States. CCD is a comprehensive, annual, national database of all public elementary and secondary schools and school districts.[2] CCD are unique in that student enrollment data are disaggregated by grade, race, and gender, and include student eligibility for free/reduced-price lunch programs.

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[1] U.S. Department of Education Office of Civil Rights. (2018). 2015-16 Civil Rights Data Collection Public-Use Data File User's Manual. Washington, DC: U.S. Department of Education. Retrieved from https://ocrdata.ed.gov/DataFileUsersManual

[2] Common Core of Data (CCD). (n.d.). Retrieved from https://nces.ed.gov/ccd/aboutccd.asp

Analytic Sample

The analytic sample of this study includes a total of 21,292 schools serving grades 9-12 in the 2015-16 school year, which were found in both the CRDC and the CCD. Of the 22,870 schools identified as serving grades 9-12 in the CRDC, we dropped 1,157 schools that were not found in the CCD. An additional 421 schools were dropped because they were missing free/reduced-price lunch (FRPL) eligibility data. The combined dataset enabled us to assess the level of access to various educational opportunities for students in grades 9-12 as a whole and for specific student subgroups defined by race/ethnicity and FRPL-eligibility status. Additionally, these data allow us to examine disparities between student race/ethnic groups within schools of similar levels of student poverty. Table 1 displays the number of schools included in the analytic sample and the distribution of schools by school poverty level for all 50 states.[3] Table 2 presents the race/ethnic composition of 9th-12th grade students in the analytic sample and the percent that are eligible for FRPL.

Table 1. Number of Schools in the Analytic Sample and Distribution of Schools by School Poverty Level: 50 States 2015-16.

State	Total	Percentage of Schools by Poverty Level		
		High-Poverty	Mid-Poverty	Low-Poverty
AK	214	38%	32%	30%
AL	361	8%	85%	6%
AR	244	25%	74%	1%
AZ	387	26%	50%	23%
CA	2,048	35%	52%	13%
CO	458	12%	62%	26%
CT	251	16%	46%	38%
DE	47	2%	68%	30%
FL	883	21%	61%	18%
GA	449	37%	53%	10%
HI	64	17%	70%	13%
IA	337	4%	72%	24%
ID	194	9%	80%	10%
IL	755	21%	60%	19%
IN	400	10%	74%	16%
KS	349	5%	84%	10%
KY	352	28%	68%	5%
LA	328	23%	73%	4%
MA	371	16%	46%	38%
MD	250	16%	57%	28%

[3] Following the U.S. Department of Education's definition, high-poverty schools are those with at least 75% of students eligible for FRPL; mid-poverty schools are those with between 25% to 75% of students eligible for FRPL; and low-poverty schools are those with 25% or fewer students eligible for FRPL. *The Condition of Education 2019* (NCES 2019-144). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2019144.

ME	119	2%	84%	14%
MI	1,028	15%	70%	15%
MN	614	17%	63%	20%
MO	572	19%	70%	11%
MS	236	47%	53%	0%
MT	165	14%	57%	29%
NC	598	28%	61%	11%
ND	158	7%	59%	34%
NE	267	6%	75%	19%
NH	90	0%	58%	42%
NJ	446	11%	46%	43%
NM	187	48%	47%	5%
NV	126	21%	63%	16%
NY	1,227	22%	59%	20%
OH	881	23%	47%	30%
OK	431	20%	77%	3%
OR	269	9%	84%	7%
PA	653	22%	60%	18%
RI	60	15%	57%	28%
SC	229	33%	57%	10%
SD	169	11%	62%	27%
TN	353	24%	67%	9%
TX	1,864	26%	64%	10%
UT	138	12%	72%	16%
VA	319	6%	67%	27%
VT	60	0%	83%	17%
WA	550	11%	74%	15%
WI	513	6%	69%	25%
WV	139	11%	86%	3%
WY	89	9%	63%	28%
Total	21,292	21%	62%	17%

Table 2. Characteristics of 9th – 12th Grade Students Enrolled in Schools in the Analytic Sample: 50 States 2015-16.

State	Distribution of Race/Ethnicity					FRPL-Eligible
	White	Black	Hispanic	Asian	Other[4]	
AK	48%	4%	7%	7%	34%	38%
AL	57%	34%	5%	1%	2%	47%
AR	64%	23%	9%	2%	3%	58%
AZ	41%	6%	44%	3%	7%	40%
CA	25%	6%	52%	12%	4%	55%
CO	55%	5%	32%	3%	4%	37%
CT	60%	13%	20%	4%	2%	34%
DE	49%	32%	14%	3%	2%	28%
FL	41%	22%	30%	3%	3%	53%
GA	43%	38%	13%	4%	3%	55%
HI	12%	2%	7%	37%	42%	45%
IA	79%	6%	10%	2%	3%	39%
ID	77%	1%	17%	1%	4%	41%
IL	52%	17%	23%	5%	3%	44%
IN	73%	11%	9%	2%	4%	41%
KS	67%	7%	17%	3%	6%	43%
KY	81%	11%	4%	2%	3%	53%
LA	47%	44%	5%	2%	2%	52%
MA	66%	9%	16%	6%	3%	36%
MD	41%	35%	13%	6%	4%	37%
ME	91%	3%	2%	2%	2%	41%
MI	70%	18%	6%	3%	3%	40%
MN	72%	10%	8%	6%	4%	34%
MO	75%	15%	5%	2%	3%	43%
MS	46%	49%	3%	1%	1%	70%
MT	82%	1%	4%	1%	12%	34%
NC	52%	26%	14%	3%	5%	49%
ND	81%	4%	4%	2%	10%	28%
NE	70%	7%	17%	2%	4%	40%
NH	89%	2%	4%	3%	2%	24%
NJ	51%	15%	23%	9%	1%	32%
NM	24%	2%	59%	1%	13%	63%
NV	35%	10%	40%	7%	8%	50%

[4] Includes students who identified as American Indian or Alaskan Native, Native Hawaiian or Pacific Islander, or two or more races.

NY	47%	18%	24%	9%	2%	47%
OH	74%	16%	4%	2%	4%	40%
OK	52%	9%	14%	2%	23%	52%
OR	65%	2%	21%	4%	8%	44%
PA	71%	14%	9%	4%	2%	43%
RI	62%	8%	23%	3%	4%	42%
SC	54%	35%	6%	1%	3%	53%
SD	79%	3%	4%	2%	11%	35%
TN	66%	23%	7%	2%	2%	51%
TX	31%	13%	51%	4%	2%	52%
UT	69%	2%	20%	2%	6%	42%
VA	53%	23%	13%	6%	5%	33%
VT	90%	2%	2%	2%	3%	34%
WA	59%	5%	20%	8%	9%	42%
WI	74%	9%	10%	3%	3%	34%
WV	91%	5%	1%	1%	2%	44%
WY	79%	1%	13%	1%	5%	31%
Total	51%	16%	24%	5%	4%	46%

Composite Indices and Scoring of Access to High-Opportunity Schools

Below we describe how we used CRDC indicators to construct composite indices representing high school student access to educational opportunities.

Construction of Composite Indices

In total, we used 14 CRDC indicators to construct state-level indices capturing the following three broad domains of access to educational opportunity:

1. Access to Quality Educators Index
2. Access to College and Career Readiness Curriculum Index
3. Access to Positive School Climate Index

As shown below in Table 3, we included five indicators in the Access to Quality Educators Index, five indicators in the Access to College & Career Readiness Curriculum Index, and four indicators in the Access to Positive School Climate Index.[5] We constructed the overall Average Opportunity Score by averaging these three indices.

Table 3. Access to Educational Opportunity Indicators and Definitions

Educational Access Indicators	Definition
Average Opportunity Score	An average score for access to educational opportunity was created by averaging the scores across the three composite indices, as described below. **(Access to Quality Educators Index % + Access to Positive School Climate Index % + Access to College and Career Readiness Curriculum Index %) / 3 = Average Opportunity Score %**
Access to Quality Educators Index	A composite index for access to quality educators created by averaging the scores across the five indicators listed below.
Certified Teachers	Percentage of students who attend a high school in which all teachers have met all applicable state teacher certification requirements.
STEM Certified Teachers	Percentage of students who attend a high school in which all science and math courses are taught by teachers certified in math and science.
Experienced Teachers	Percentage of students who attend a high school in which the percentage of teachers with more than two years of experience is at or above the U.S. median of 90.9%.
Low Student/Teacher Ratio	Percentage of students who attend a high school with a student/teacher ratio at or below the U.S. median of 14.4:1.
Low Student/Counselor Ratio	Percentage of students who attend a high school with a student/counselor ratio at or below the recommended ratio of 250:1.
Access to Positive School Climate Index	A composite index for access to a positive school climate created by averaging the scores across the four indicators listed below.
Low Suspension Rate	Percentage of students who attend a high school with a suspension rate that is at or below the U.S. median of 5%.
Low Chronic Absenteeism Rate	Percentage of students who attend a high school with a chronic absenteeism rate that is at or below the U.S. median of 17.4%.

[5] Additional CRDC indicators were considered, but excluded because they were duplicative, not applicable across states, or did not meet methodological standards for inclusion (e.g., low internal consistency with other indicators) in the composite indices. See national report for additional discussion of the rationale for choosing these three domains and the 14 indicators. Available at https://www.researchforaction.org/educational-opportunity/.

Teacher Chronic Absenteeism Rate	Percentage of students who attend a high school with a teacher chronic absenteeism rate that is at or below the U.S. median of 21%.
Low Grade Retention Rate	Percentage of students who attend a high school with a grade retention rate that is at or below the U.S. median of 1.1%.
Access to College and Career Readiness Curriculum Index	A composite index for access to college and career readiness curriculum created by averaging the scores across the five curriculum indicators listed below.
Advanced Math	Percentage of students who attend a high school that offers Advanced Math (i.e., trigonometry, analytic geometry, probability and statistics, precalculus).
AP Courses	Percentage of students who attend a high school that offers AP courses.
Calculus	Percentage of students who attend a high school that offers Calculus.
Chemistry	Percentage of students who attend a high school that offers Chemistry.
Physics	Percentage of students who attend a high school that offers Physics.

Scoring Indicators of Access to Opportunity

Scores for each indicator represent the percentage of students in each state who attended a school that provided the specific educational opportunity. We computed this percentage in each state as follows:

$$\frac{(\text{number of } 9^{\text{th}} - 12^{\text{th}} \text{ graders attending schools offering the educational opportunity in a state})}{(\text{total number of } 9^{\text{th}} - 12^{\text{th}} \text{ graders in a state})} \times 100$$

For each indicator, we computed the percentage scores for all 9th-12th grade students in a state as well as scores for student subgroups defined by race/ethnicity and free/reduced-price lunch eligibility status. We also calculated percentage scores separately for students in high-, mid-, and low-poverty schools.

Summary statistics for state-level indicator scores using all schools are reported in Table 4. All indicators under each access to education opportunity domain are positively correlated with a Cronbach's Alpha value exceeding 0.70, indication for a high level of internal consistency among the indicators. The state-level composite index score for each domain was computed by averaging its indicator scores. Table 5 reports summary statistics for the three educational opportunity composite scores.

Table 4. Summary Statistics for Access to Education Opportunity Indicator Scores: 50 States 2015-16

Indicator	N	Mean	Std. Dev.	Min	Max
Access to Quality Educators					
Access to Certified Teachers	50	67.7%	23.6%	8.3%	99.2%
Access to STEM-Certified Teachers	50	60.2%	22.0%	0.8%	95.2%
Access to Experienced Teachers	50	50.0%	11.5%	25.4%	71.6%
Access to Low Student/Teacher Ratio	50	36.5%	28.4%	2.0%	99.2%
Access to Low Student/Counselor Ratio	50	28.0%	25.6%	2.4%	91.7%
Access to College and Career Readiness Curriculum					
Access to Advance Math	50	91.9%	5.6%	77.8%	99.6%
Access to Calculus	50	82.3%	11.2%	29.8%	98.6%
Access to Chemistry	50	96.4%	3.8%	83.0%	100.0%
Access to Physics	50	89.0%	7.5%	66.8%	99.1%
Access to AP	50	85.6%	9.7%	64.7%	98.4%
Access to Positive School Climate					
Access to Low Suspension Rate	50	44.3%	16.1%	11.0%	90.9%
Access to Low Chronic Absenteeism Rate	50	45.3%	15.7%	11.5%	78.5%
Access to Low Teacher Chronic Absenteeism Rate	50	37.9%	13.6%	1.0%	73.8%
Access to Low Grade Retention Rate	50	42.1%	22.1%	0.5%	83.3%

Table 5. Summary Statistics for Access to Education Opportunity Composite Indices: 50 States 2015-16

Composite Index	N	Mean	Std. Dev.	Min	Max
Access to Quality Educators Index	50	48.5%	16.1%	14.5%	83.6%
Access to College & Career Readiness Curriculum Index	50	89.0%	5.5%	77.2%	97.6%
Access to Positive School Climate Index	50	42.4%	12.7%	20.8%	73.9%