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2006 ISAT Reading and Math Scores

In Chicago and the Rest of the State

John Q. Easton
Stuart Luppescu
Todd Rosenkranz

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ISAT Report Brief

When the 2006 Illinois Standards Achievement Test (ISAT) scores were finally released in March 2007, there were many questions about the comparability of the 2006 test to earlier ISATs. The 2006 ISAT was a new test—with new items, a new format, new timing requirements, and new scoring procedures. Understandably, many people were skeptical about whether it was appropriate to compare 2006 results to prior ones, especially given the dramatic improvements.[1]

Because this controversy drew so much attention, perhaps less attention was paid to a careful analysis of the 2006 results in their own right. This data brief looks more thoroughly into the 2006 test results for Chicago Public Schools (CPS).[2]

First, we look at Chicago results compared to those for all other students in the state of Illinois. To do this, we take the statewide data and remove Chicago students so that we get a mutually exclusive comparison.

We find that the gaps between Chicago students and other students in the state of Illinois are much smaller in upper grades than in lower grades. In reading, the difference between Chicago and the rest of the state is one-half as big at eighth grade as it is at third grade. This suggests that students get progressively stronger going from lower to upper grades in Chicago Public Schools, relative to the rest of Illinois.

Second, we examine these test scores within racial/ethnic groups, comparing African-American, Latino, White, and Asian students in CPS to their counterparts in the rest of the state. No Child Left Behind (NCLB) has made reducing the achievement gap between minority and nonminority

students a national goal. It also has heightened our awareness of differences between demographic groups, and it has suggested the utility of comparing students with similar characteristics to each other.

> Our findings show that the big gaps between students in CPS and in the rest of the state disappear when we compare racial/ethnic groups in CPS to their counterparts in the rest of the state. In fact, some groups in CPS consistently outperform their counterparts in the rest of the state. There are still large differences in performance, however, between African-American and Latino students on the one hand and White and Asian students on the other.

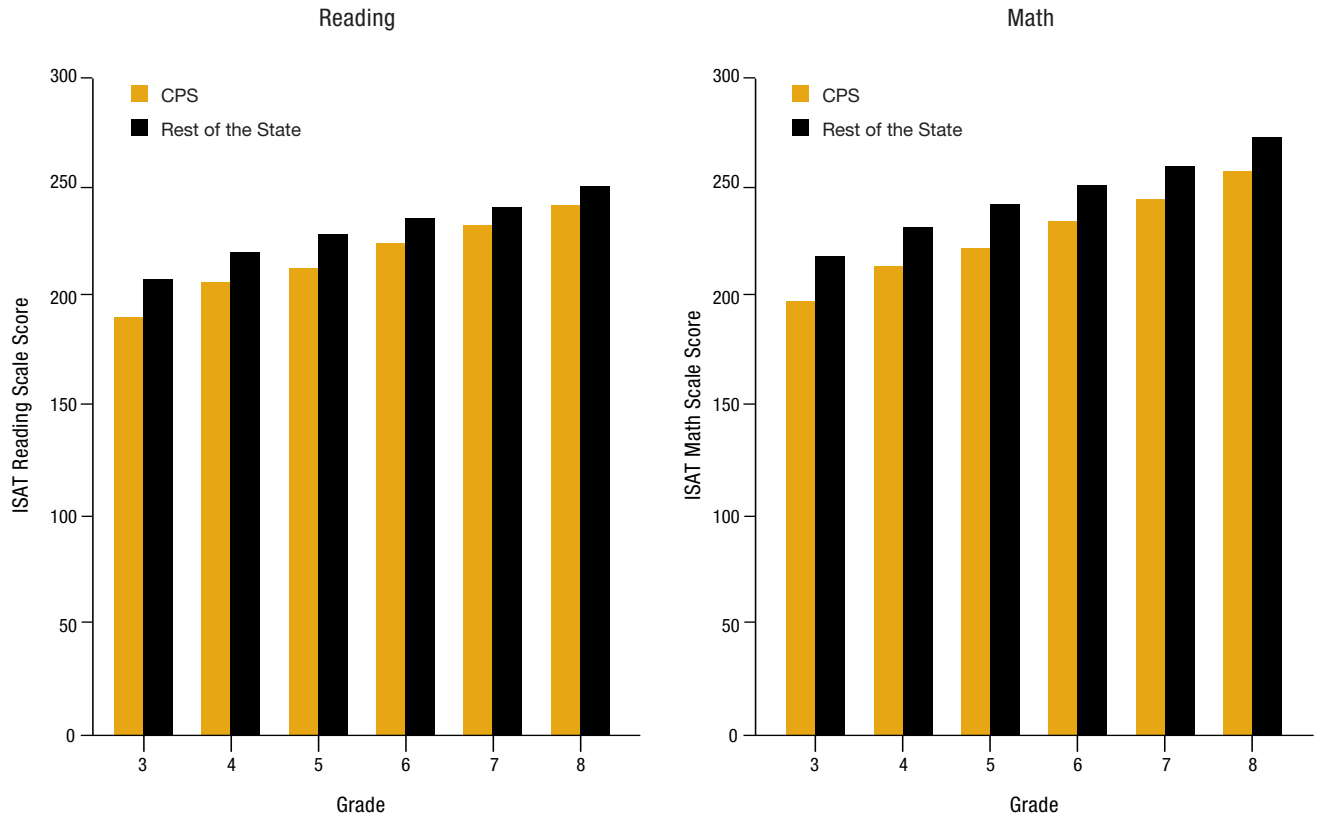
The 2006 ISAT was created with a "vertical" or cross-grade scale, so that all students from grades three through eight are measured on the same underlying scale. Although reading and math have separate scales, they both range from a minimum score of 120 to a maximum score of 340 to 411, depending on subject and grade level. One of the most important benefits of the vertical scale is that in the future, when subsequent ISAT results become available, we can measure the amount of achievement growth that students make from one grade to the next because the underlying scale is constant and spans the grade levels. Although the Iowa Tests of Basic Skills used in CPS until 2005 had this feature, the old ISAT did not.[3]

Figure 1 shows the average scale scores in reading and math for CPS students compared to the rest of the students in public schools in Illinois for grades three through eight. A quick glance shows, as expected, that scores increase with the grades. A second glance shows, also as expected, that Chicago students score lower—often one full grade or more—than other Illinois students. For example, note that the average third-grade student outside of Chicago scored higher in reading than the average Chicago fourth-grader.

A more careful look reveals another pattern. In the upper grades, the gap between Chicago students

FIGURE 1

Chicago 2006 ISAT Average Scale Scores Compared to the Rest of the State



and other students in Illinois is considerably smaller than it is in the lower grades. In third-grade reading, Chicago students trail the rest of the state by 17 scale score points (191 vs. 208). This is equal to a difference of 0.62 standard deviation units. (See Tables 1 and 2 in the Appendix for detailed statistics, including mean values, standard deviations, number of cases, medians, and scores for the 25th and 75th percentile on the distribution for each grade and subject. Table 3 shows group differences in standard deviation units.) By sixth grade, the difference is down to 12 points (224 vs. 236), or 0.46 SDs. By eighth grade, the difference is 9 points (242 vs. 251), or 0.36 SDs. This is still a sizable difference, but the gap in eighth-grade reading is about one-half the size of the third-grade reading gap.

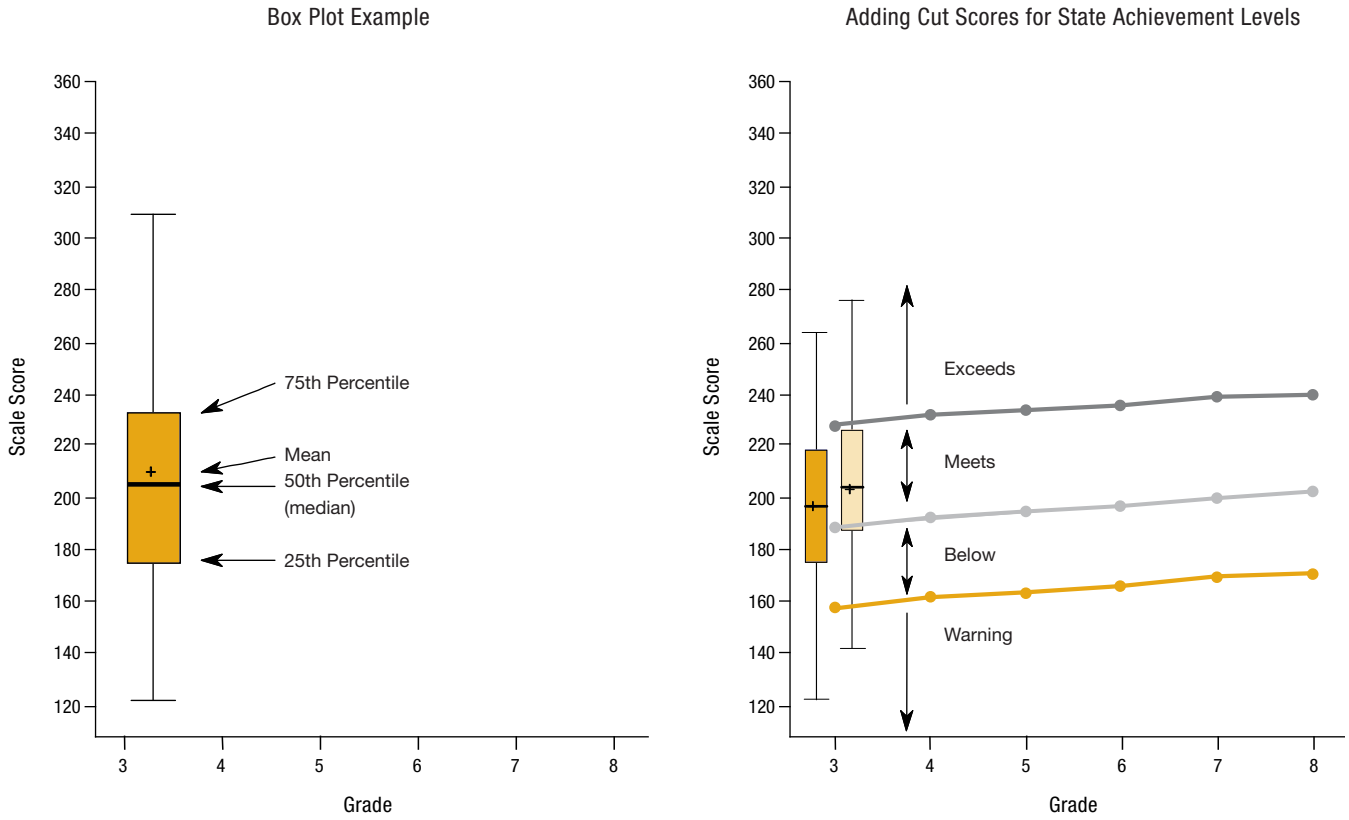
Although it is not quite so strong, the same pattern holds in math. There is a 21 point difference between Chicago students and students in the rest of the state in grade three (0.72 SDs), an 16 point difference in grade six (0.60 SDs), and a 15 point difference in grade eight (0.52 SDs).

In the past, it had been common for observers to claim that students fell further behind the longer they were enrolled in CPS. The evidence suggests the contrary, at least relative to Illinois: on the whole, students in upper grades are not as behind as students in lower grades. Rather than showing that CPS students are doing better in the upper grades, this could also mean that students in the rest of the state are doing worse. Although a full test of either assumption requires longitudinal data that is not available, what we show here supports the idea that students do better after more time in CPS elementary schools relative to other students statewide.

In order to take a more complete look at test scores in Chicago compared to the rest of the state, we use the more complex display of a box plot to make detailed comparisons. A box plot shows the full distribution of scores on a given variable—in this case, ISAT reading and math scores. The box marks off the middle 50 percent of the distribution, with the top line indicating the score at the 75th percentile, the line in the middle

FIGURE 2

How to Read a Box Plot



indicating the 50th percentile (median), and the lower line indicating the 25th percentile. The mean (statistical average) is marked by a cross. In Figure 2, the score at the 75th percentile is 233, the score at the median is 204, the score at the 25th percentile is 176, and the mean score is 208. The "whisker" at the top of the box marks the highest score (after removing outliers), so the top whisker spans the top 25 percent of scores; similarly, the lower whisker marks the lowest score and spans the range of the bottom 25 percent.

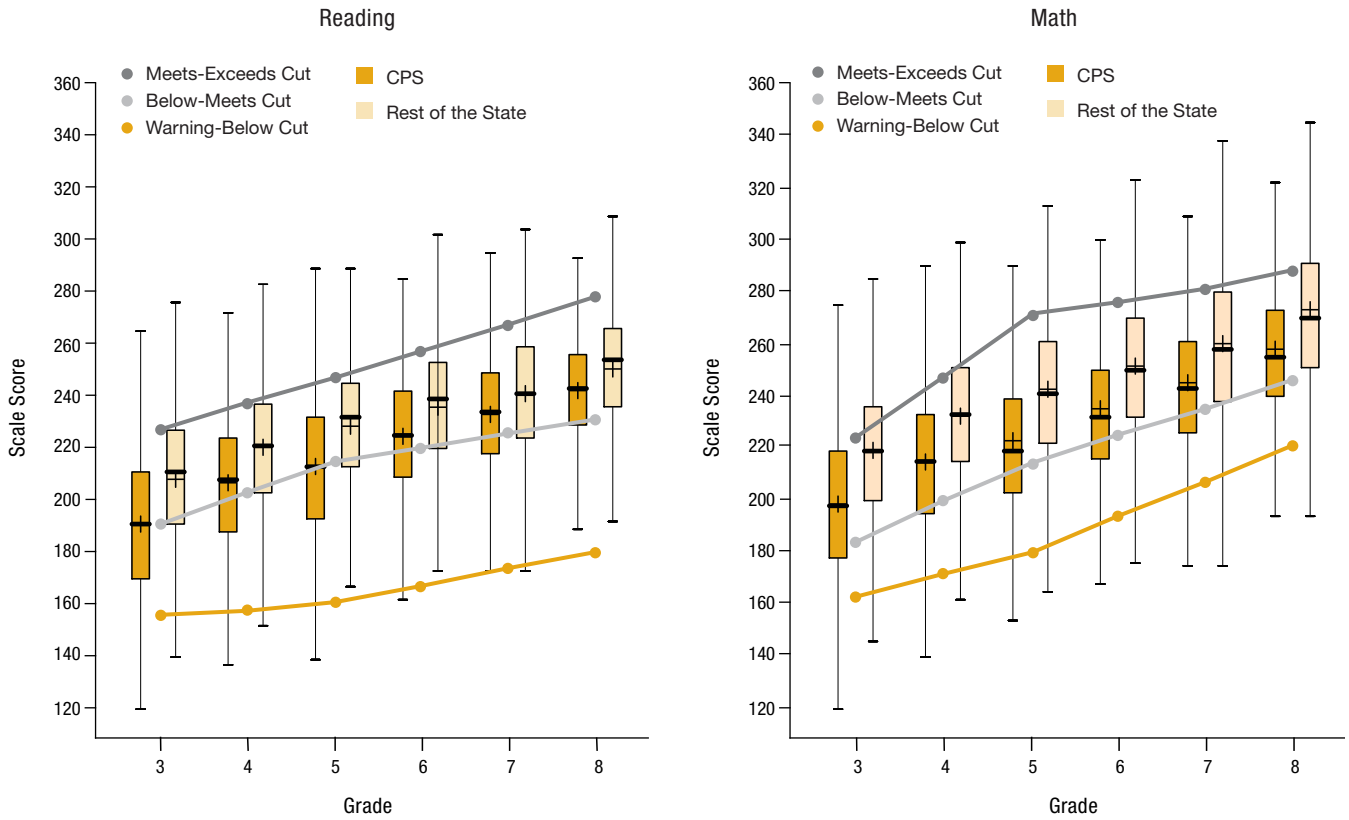
To provide additional information to the graphics, we include the cut scores that differentiate the four Illinois student performance levels (exceeds standards, meets standards, below standards, and academic warning) from each other. These are shown on the box plot graphs on the right in Figure 2. The topmost line (dark gray) differentiates the scores that exceed state standards from lower scores. Next, the light gray line marks the cut between scores that meet state standards and scores that do not meet state standards. Finally, the yellow line marks the cut scores between academic warning and below standards. Scores below the yellow line are in the warning category.[4]

Our initial graph compares the average ISAT scores in reading and math for CPS students and for students in the rest of the state. In Figure 3, we show more detail with the box plots. The two box plots show the distribution of reading scores on the left and math scores on the right. CPS students are shown by the darker box plots; these plots are to the left of the lighter box plots, which show scores of students from the rest of Illinois. Note that the three lines indicate the cut scores that define student performance levels in Illinois.

These three lines allow us to readily estimate the percentage of students in each of the four categories of Illinois student performance levels. In eighth-grade reading, for example, there are no students in the warning category either for CPS or for the rest of Illinois, and about 25 percent of CPS students are below standards. About 75 percent of CPS students meet or exceed state standards, with about 8 percent exceeding them.

FIGURE 3

Chicago 2006 ISAT Score Distributions: Chicago Compared to the Rest of the State for All Students



One can see that the gap narrows going up the grade levels. This is true for average students, for relatively low-performing students at the 25th percentile, and for relatively high-scoring students at the 75th percentile; it is especially true for students at the 25th percentile. In third-grade reading, for example, CPS students lag behind the rest of the state by 23 points (168 vs. 191). By eighth grade, that difference is down to seven points (229 vs. 236). It is encouraging to note that the weakest students are relatively stronger in the upper grades.

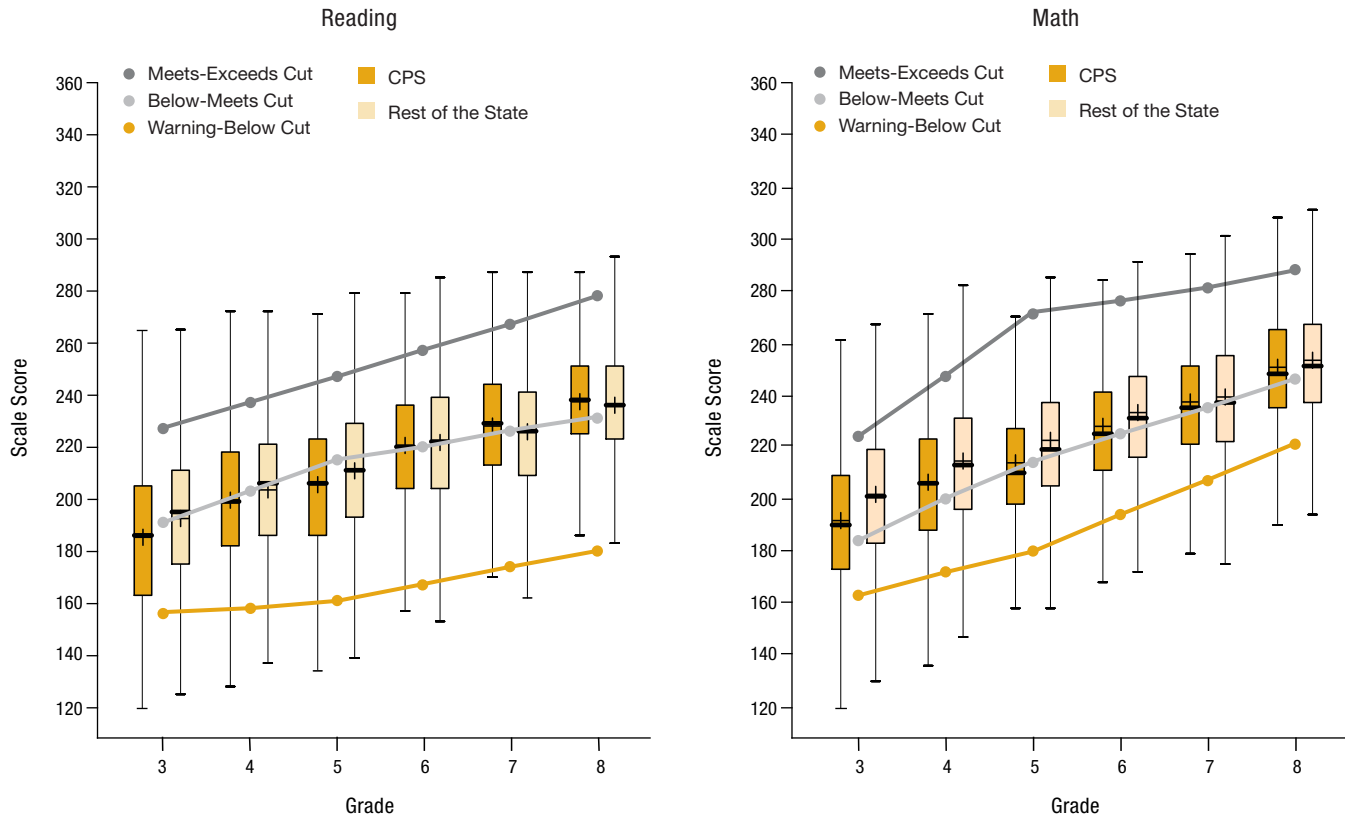
One still cannot escape noticing the very large gaps between Chicago and the rest of the state; even as they narrow in the upper grades, they are still large. It is also evident that Chicago scores are at least one grade below the rest of Illinois. For example in eighth-grade reading, where the gap between Chicago and the rest of the state is smallest, Chicago eighth-graders are scoring about the same as seventh-graders in the rest of the state.

Figure 3 shows the ISAT performance of all CPS students in comparison to all students in the rest of the state. Figure 4 looks at only African-American students. In both reading and math, CPS African-American students are directly compared to African-American students in the rest of Illinois.

Here we see some of the same patterns for African-Americans students that we saw for all students in Figure 3. There is a gap in the lower grades between African-American students in Chicago compared to those in the rest of the state in both reading and in math. In reading the third-grade gap is seven points, favoring African-American students outside of Chicago. Note that this is considerably smaller than the 17 point gap for all students shown earlier. By eighth grade, that gap has not only disappeared but reversed, with Chicago African-American students outscoring their counterparts in the rest of Illinois by one point. In standard deviation units, the difference at grade three is 0.27 standard deviation units lower for African-American students in CPS. By eighth grade, CPS African-American students score 0.06 standard deviations units higher. (See Tables 1 and 2 in the

FIGURE 4

Chicago 2006 ISAT Score Distributions: Chicago Compared to the Rest of the State for African-American Students



Appendix for detailed information. Table 3 includes score gaps in standard deviation units.) In math, there is a 10 point gap in third grade between African-American students in CPS compared to those in the rest of the state. By eighth grade, that gap is reduced to slightly over two points.

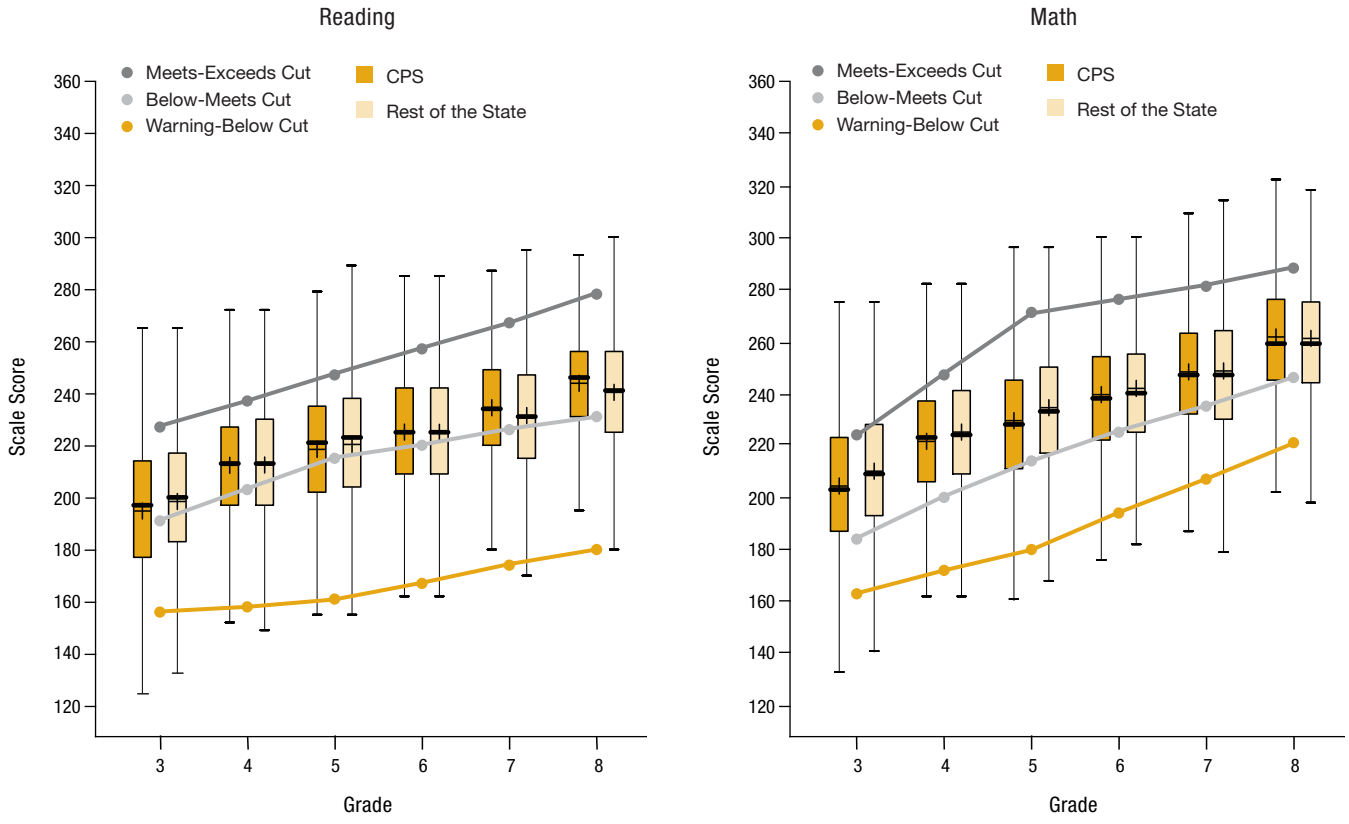
The pattern holds at the 25th and 75th percentiles for reading as well. Chicago's African-American students at the 25th percentile (the bottom line on the box plot) scored much lower than African-American students at the 25th percentile in the rest of the state in the third grade. By eighth grade, this gap is gone (in fact, it is reversed). Similarly, Chicago's African-American students at the 75th percentile are below their counterparts in the rest of the state in the third grade, but they are equal to them in the eighth grade.

Scores for African-American students in Chicago and in the rest of the state are quite low compared to scores for students of other racial/ethnic backgrounds. In eighth-grade reading, for example, African-American students in CPS score 20 points lower than White CPS students. This is the "achievement gap" that NCLB is rightly concerned about, which is evident not only in test scores but in other outcome measures as well, including graduation rates.[5] Yet if we compare CPS scores to other scores in the state or nation, we get a substantially different picture of the relative performance of CPS students by making our comparison within similar groups of students.

The same pattern prevails for Latino students (see Figure 5), and this time it is even somewhat more favorable for Chicago students. In reading, Chicago Latino students in third grade underperform Latinos in the rest of Illinois by about three score points. For eighth-graders, Chicago Latino students outperform their counterparts by four score points. In math, there was a bigger gap of six points at third grade; this gap favored Latino students outside of Chicago over Latino students in CPS. For eighth-graders, the gap is less than 1 point. Note also the performance among students at the 25th percentile. In both reading and math, CPS Latino students are below their counterparts in the third

FIGURE 5

Chicago 2006 ISAT Score Distributions: Chicago Compared to the Rest of the State for Latino Students



grade and higher than they are in the eighth grade.

It is worth observing, however, that Latino students still score considerably lower than both White and Asian students in CPS and in the rest of the state.

White CPS students are a relative minority, making up only about 9 percent of the ISAT population. White students are the majority across the rest of Illinois, where they account for nearly 70 percent of the ISAT population.

Chicago White students perform well on the ISAT in comparison to White students in the rest of the state. (See Figure 6). In reading, in fact, on average they consistently score as well as or better than their peers statewide. In third grade, the gap favors Chicago White students. In eighth grade, that gap is still in favor of CPS and is slightly higher. Chicago's White students at the 25th percentile are behind their counterparts in the third grade, but ahead of them in the eighth grade. White students at the 75th percentile ranking are consistently ahead of or equal to their peers statewide.

The pattern is somewhat different in math. Average White students in CPS score about the same as average White students in the rest of the state at all grade levels. White students at the 25th percentile in CPS are a little behind similar students in the rest of the state at all grade levels, but are less behind in eighth grade than in third. White students at the 75th percentile in CPS are consistently ahead.

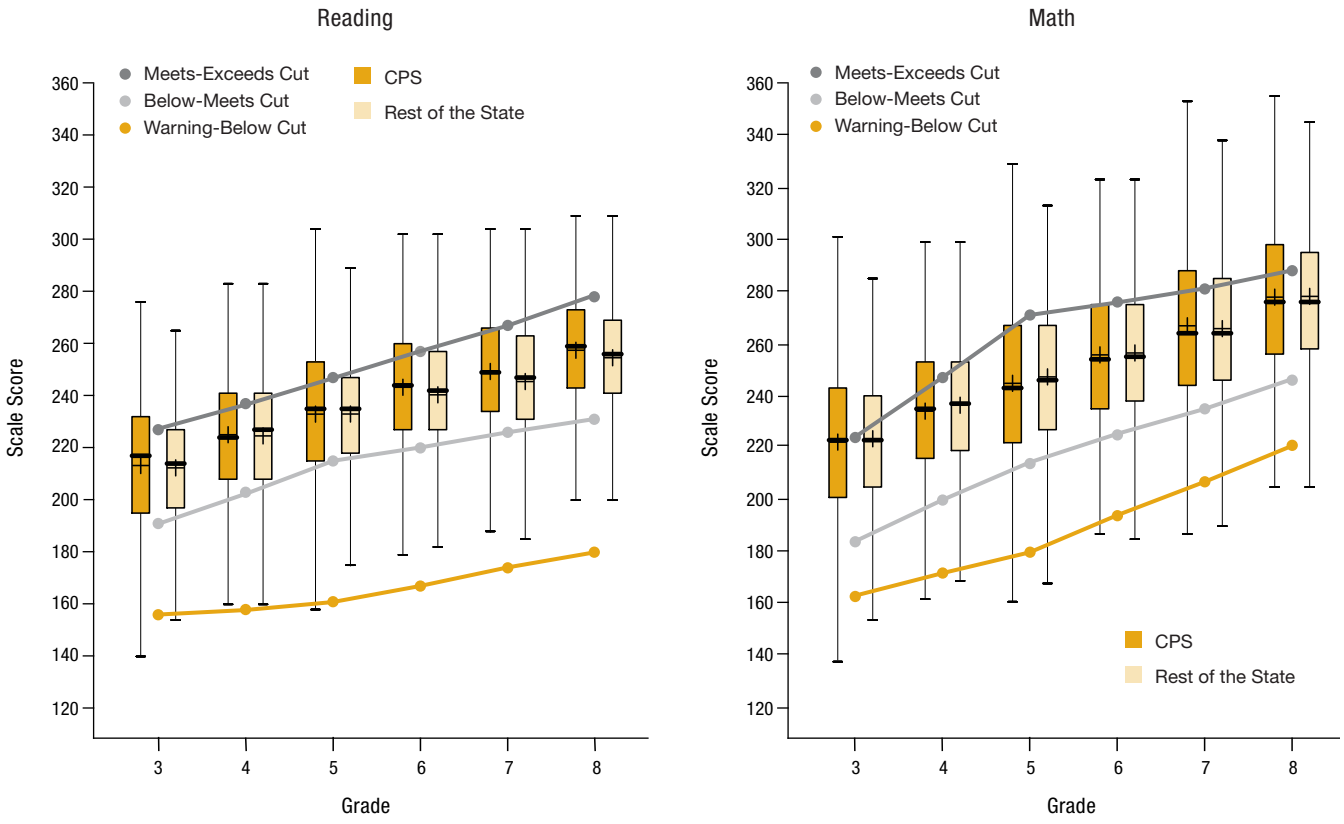
There are relatively few Asian students in CPS or in the rest of Illinois. They make up about 3 percent of the tested population in Chicago and 4 percent of the tested population in the rest of the state. On the whole, Asian students score well on the ISAT; they outperform students in all other racial/ethnic groups in both reading and math. (See Figure 7).

We see the same trend for Asian students that we see with other groups in reading, but not in math. In the third grade, Asian students in Chicago score lower in reading than Asian students in the rest of Illinois; and in eighth grade, Asian students in Chicago score about the same as other groups of students.

In math, CPS Asian students are outperformed at

FIGURE 6

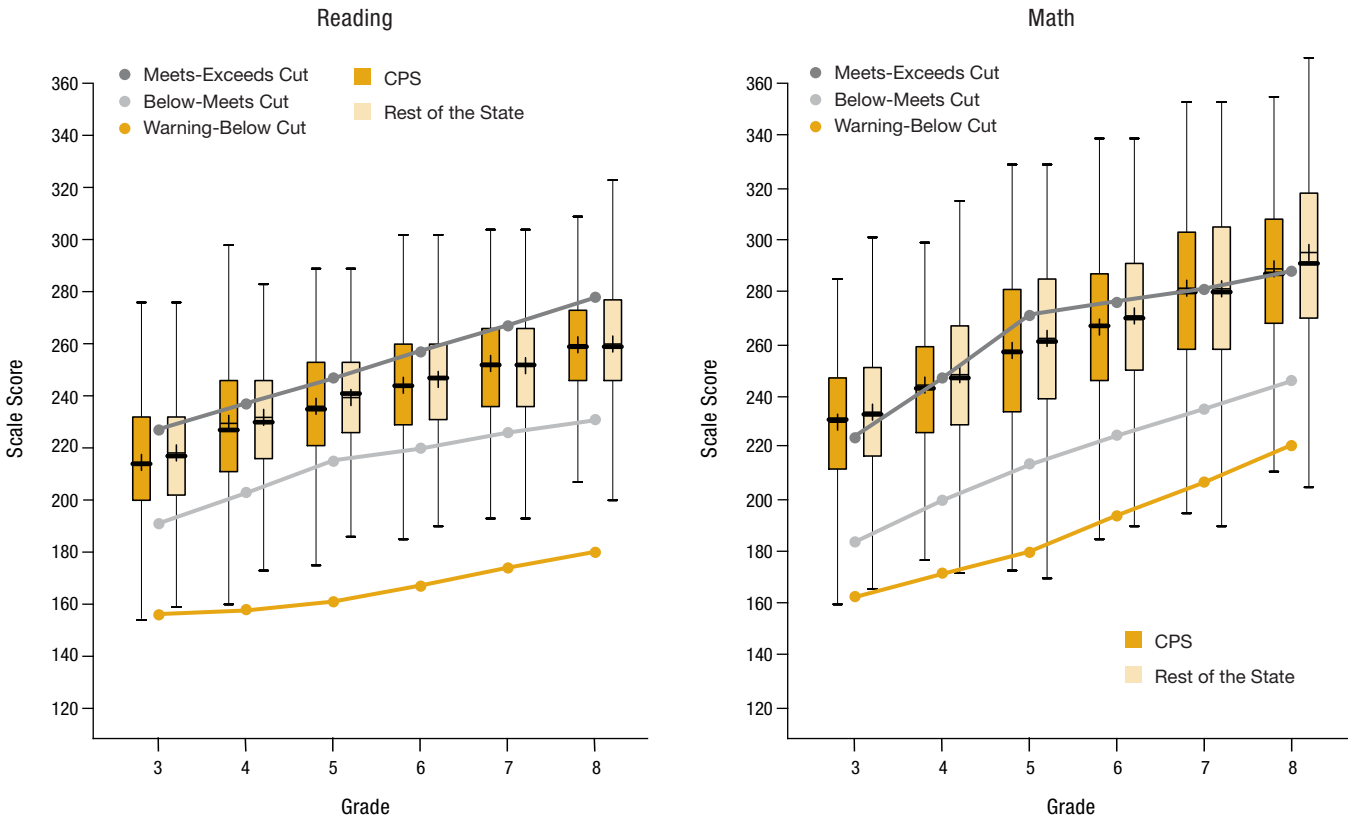
Chicago 2006 ISAT Score Distributions: Chicago Compared to the Rest of the State for White Students



every grade except seventh by Asian students in the rest of the state. This finding, like others shown here, probably runs counter to many expectations or stereotypes about test score performance. It is true that Asian students in CPS score high in math—in fact, considerably higher than African-American, Latino, and White students. But unlike those students, when we make comparisons to similar students statewide we see lower, rather than higher, scores.

FIGURE 7

Chicago 2006 ISAT Score Distributions: Chicago Compared to the Rest of the State for Asian Students



Conclusion

This simple analysis of 2006 ISAT scores brings to light several interesting findings that are not widely known about CPS test performance.

First, CPS relative performance is better in upper grades than in lower grades in comparison to students in public schools in the rest of Illinois. This is especially true in reading and especially true among African-American and Latino students, who constitute nearly 90 percent of CPS enrollment. This finding suggests that longer enrollment in CPS leads to better relative performance, not worse as was suggested previously. We don't have longitudinal data to fully test our assertion, but the data show a strong suggestive pattern that this is the case.

A second somewhat unexpected finding is that reading performance in CPS looks stronger than math performance in comparison to the rest of the state. Typically, CPS elementary students have scored higher in math than in reading on both the ISAT and the Iowa Tests of Basic Skills.[6] White students are the exception, but students of other racial/ethnic groups are behind their counterparts in the rest of the state at all grade levels in math. The gaps decrease in the upper grades, but not as significantly as they do in reading.

The most compelling finding here is that when we disaggregate ISAT reading scores by race/ethnicity and compare students in CPS to their counterparts in the rest of Illinois, CPS student performance looks more positive than what we are accustomed to seeing. In the upper grades, in fact, CPS students often look better. For example, this finding is true for African-American and Latino students in eighth-grade reading. It is also true for White students at every grade level in reading. The findings tend to hold for weak, average, and strong students in CPS as well. The math findings aren't as positive; CPS students trail their counterparts across grades. It is still the case, however, that the gap narrows in the upper grades.

African-American and Latino students are the two largest racial/ethnic groups in Chicago Public Schools. They score lower on the ISAT than White and Asian students, not only in Chicago but across the rest of the state as well. The rest of Illinois has higher ISAT scores than CPS, primarily because there is a larger enrollment of White students and a lower enrollment of racial/ethnic groups that have been long underserved by our educational systems. CPS would actually outscore the rest of the state on the ISAT if its enrollment had the same racial composition. Student performance in CPS looks remarkably better than typically portrayed when we make these group-to-group comparisons. Perhaps these findings also suggest that CPS does relatively better with traditionally underserved populations than the rest of the state does and that ways to improve can be found in Chicago rather than elsewhere.

We cannot ignore, however, the gaps between African-American and Latino students on the one hand and White and Asian students on the other. Although CPS looks good in comparison to the rest of the state, both CPS and Illinois exhibit large achievement gaps between minority and nonminority students that need to be redressed.

Endnotes

1 See, for example:

Dell'Angela, Tracey. 2007. City grade schools shine on tests. *Chicago Tribune*, March 6.

Golab, Art, and Rosalind Rossi. 2007. Highest test scores go to Chicago schools. *Chicago Sun-Times*, March 6.

Test scores better, but some question results. 2007. *NBC-5 News*, March 6.

2 For more technical information about the 2006 test and a description of how the old and new tests were linked, see the Illinois State Board of Education Assessment Division, "Report on the ISAT/SAT-10 Bridge Study and Development of the 2006 ISAT Reporting Scales." March 17, 2006. Available online at http://isbe.net/assessment/pdfs/Bridge_study.pdf.

3 The old Illinois Standards Achievement Test only tested third-, fifth-, and eighth-graders, another factor that made it difficult to measure annual achievement growth in students.

4 Cut scores document from the Illinois State Board of Education. Available online at http://isbe.net/assessment/pdfs/cut_points_07.pdf.

5 Allensworth, Elaine. 2005. *Graduation and dropout trends in Chicago: A look at cohorts of students from 1991 to 2004.* Chicago: Consortium on Chicago School Research at the University of Chicago.

6 Chicago Public Schools test score reports. Available online at http://research.cps.k12.il.us/cps/accountweb/Reports/citywide.html.

Appendix

TABLE 1

2006 ISAT Reading Scores: CPS Students Compared to the Rest of the State

		All Students		African-American		Latino		White		Asian	
		CPS	Other IL	CPS	Other IL	CPS	Other IL	CPS	Other IL	CPS	Other IL
Grade 3	Mean	190.67	208.33	185.27	192.47	194.78	198.42	213.26	212.35	214.55	218.19
	SD	28.72	27.43	27.37	26.35	26.05	24.69	30.66	26.60	26.33	24.46
	N	24,154	107,712	15,507	15,321	6,076	11,081	2,040	76,900	531	4,410
	25th Percentile	168	191	163	175	177	183	195	197	200	202
	Median	191	211	186	195	197	200	217	214	214	217
	75th Percentile	211	227	205	211	214	217	232	227	232	232
Grade 4	Mean	206.44	220.56	199.50	203.45	212.31	212.43	225.07	224.61	229.55	231.85
	SD	27.29	27.07	25.93	25.55	24.58	24.53	28.23	26.06	25.88	26.17
	N	24,894	110,705	14,454	15,717	7,627	12,159	2,139	78,358	674	4,471
	25th Percentile	188	203	182	186	197	197	208	208	211	216
	Median	208	221	199	206	213	213	224	227	227	230
	75th Percentile	224	237	218	221	227	230	241	241	246	246
Grade 5	Mean	212.71	228.65	205.46	210.78	218.42	220.33	232.97	233.01	236.10	239.47
	SD	27.70	26.86	26.42	26.00	24.98	24.63	28.10	25.59	24.42	24.49
	N	27,293	115,722	15,513	16,439	8,840	13,274	2,198	81,523	742	4,486
	25th Percentile	193	213	186	193	202	204	215	218	221	226
	Median	213	232	206	211	221	223	235	235	235	241
	75th Percentile	232	245	223	229	235	238	253	247	253	253
Grade 6	Mean	224.34	235.93	220.53	221.65	225.05	224.97	243.27	240.38	244.18	246.44
	SD	24.49	24.54	23.30	23.63	23.18	22.35	27.40	23.31	23.84	23.09
	N	31,643	120,319	17,378	17,199	11,224	15,613	2,254	82,920	787	4,587
	25th Percentile	209	220	204	204	209	209	227	227	229	231
	Median	225	239	220	222	225	225	244	242	244	247
	75th Percentile	242	253	236	239	242	242	260	257	260	260
Grade 7	Mean	232.74	241.11	227.97	225.77	234.41	231.40	249.33	245.47	252.57	251.71
	SD	24.72	25.14	23.65	23.44	22.87	22.78	27.34	24.17	25.33	23.22
	N	28,327	121,759	15,038	17,395	10,146	15,323	2,307	84,621	836	4,420
	25th Percentile	218	224	213	209	220	215	234	231	236	236
	Median	234	244	229	226	234	231	249	247	252	252
	75th Percentile	249	259	244	241	249	247	266	263	266	266
Grade 8	Mean	241.91	250.61	237.31	235.95	243.80	240.30	257.47	254.60	259.75	260.04
	SD	22.91	23.79	21.87	22.03	21.27	21.82	24.91	22.79	23.19	22.89
	N	28,761	122,803	15,488	16,398	10,030	14,625	2,475	87,306	768	4,474
	25th Percentile	229	236	225	223	231	225	243	241	246	246
	Median	243	254	238	236	246	241	259	256	259	259
	75th Percentile	256	266	251	251	256	256	273	269	273	277

TABLE 2

2006 ISAT Math Scores: CPS Students Compared to the Rest of the State

		All Students		African-American		Latino		White		Asian	
		CPS	Other IL	CPS	Other IL	CPS	Other IL	CPS	Other IL	CPS	Other IL
Grade 3	Mean	198.67	219.34	191.69	201.74	204.36	210.05	222.24	223.52	230.00	233.85
	SD	29.11	28.14	27.01	26.18	26.22	25.21	30.13	27.09	27.79	27.70
	N	25,152	110,467	15,485	15,336	6,079	11,070	2,037	76,873	531	4,407
	25th Percentile	178	200	173	183	187	193	201	205	212	217
	Median	198	219	190	201	203	209	223	223	231	233
	75th Percentile	219	236	209	219	223	228	243	240	247	251
Grade 4	Mean	214.82	232.45	206.40	214.54	221.49	225.07	234.11	236.38	244.25	248.25
	SD	27.00	27.00	24.16	24.42	23.54	23.90	27.62	25.51	26.71	28.35
	N	25,819	113,346	14,418	15,713	7,622	12,159	2,136	78,338	672	4,470
	25th Percentile	195	215	188	196	206	209	216	219	226	229
	Median	215	233	206	213	223	224	235	237	243	247
	75th Percentile	233	251	223	231	237	241	253	253	259	267
Grade 5	Mean	222.97	242.79	213.85	222.47	229.45	234.43	244.79	247.26	257.56	262.19
	SD	27.00	30.00	22.42	24.31	24.34	24.99	31.29	29.19	32.39	32.56
	N	28,197	118,230	15,487	16,414	8,842	13,276	2,192	81,512	742	4,483
	25th Percentile	203	222	198	205	211	217	222	227	234	239
	Median	219	241	210	219	228	233	243	246	257	261
	75th Percentile	239	261	227	237	245	250	267	267	281	285
Grade 6	Mean	235.23	251.70	227.85	233.14	239.43	241.83	255.70	256.43	266.55	270.83
	SD	25.00	28.00	21.94	23.35	23.28	23.16	29.46	26.90	29.04	31.17
	N	32,579	122,585	17,347	17,193	11,179	15,606	2,252	82,902	787	4,583
	25th Percentile	216	232	211	216	222	225	235	238	246	250
	Median	232	250	225	231	238	240	254	255	267	270
	75th Percentile	250	270	241	247	254	255	275	275	287	291
Grade 7	Mean	245.21	260.31	237.22	239.12	248.16	248.52	266.87	265.77	281.48	281.24
	SD	27.00	31.00	23.39	24.22	24.39	25.36	33.07	29.92	33.47	33.93
	N	29,132	123,746	15,001	17,373	10,123	15,314	2,308	84,623	835	4,420
	25th Percentile	226	238	221	222	232	230	244	246	258	258
	Median	243	258	235	237	247	247	264	264	280	280
	75th Percentile	261	280	251	255	263	264	288	285	305	305
Grade 8	Mean	258.08	273.34	250.52	253.21	261.57	261.00	277.85	278.14	288.90	295.19
	SD	26.00	30.00	22.37	23.48	23.66	24.28	30.55	29.38	31.18	36.05
	N	29,598	124,545	15,431	16,383	10,019	14,625	2,468	87,275	768	4,472
	25th Percentile	240	251	235	237	245	244	256	258	268	270
	Median	255	272	248	251	259	259	276	276	287	291
	75th Percentile	273	291	265	267	276	275	298	295	308	318

TABLE 3

2006 ISAT Reading and Math Standardized Differences Scores

Reading Standardized Differences					
	All Students	African-American	Latino	White	Asian
Grade 3	-0.62	-0.27	-0.14	0.03	-0.15
Grade 4	-0.51	-0.15	0.00	0.02	-0.09
Grade 5	-0.57	-0.20	-0.08	0.00	-0.14
Grade 6	-0.46	-0.05	0.00	0.12	-0.10
Grade 7	-0.33	0.09	0.13	0.16	0.04
Grade 8	-0.36	0.06	0.16	0.13	-0.01

Math Standardized Differences					
	All Students	African-American	Latino	White	Asian
Grade 3	-0.72	-0.37	-0.22	-0.05	-0.14
Grade 4	-0.66	-0.33	-0.15	-0.09	-0.14
Grade 5	-0.67	-0.36	-0.20	-0.08	-0.14
Grade 6	-0.60	-0.23	-0.10	-0.03	-0.14
Grade 7	-0.50	-0.08	-0.01	0.04	0.01
Grade 8	-0.52	-0.12	0.02	-0.01	-0.18

$$\text{Standardized Difference} = \frac{\text{Chicago Mean} - \text{Rest of IL Mean}}{\text{Pooled Standard Deviation}}$$

A negative difference indicates higher scores in the rest of Illinois.
A positive difference indicates higher scores in CPS.

About the Authors

John Q. Easton

John Q. Easton is Executive Director of the Consortium on Chicago School Research (CCSR). He has been affiliated with CCSR since its inception in 1990 and led its first research study. Much of Easton's research at CCSR examines trends in achievement test scores and the use of test scores in school improvement and school accountability efforts. He is coauthor of a recent study on the relationship between freshman-year academic performance and high school graduation. Easton holds a PhD in Measurement, Evaluation, and Statistical Analysis from the University of Chicago.

Stuart Luppescu

Stuart Luppescu is Chief Psychometrician at the Consortium. In his 15 years at CCSR, he has worked on projects involving measure development, survey data analysis, test equating, and studies of achievement test trends. He holds a PhD in Educational Measurement from the University of Chicago.

Todd Rosenkranz

Todd Rosenkranz is the Data Archivist and Deputy Psychometrician at the Consortium. In his eight years at CCSR, he has done extensive work on test trends for the ITBS, ISAT, TAP, and PSAE. He has an MA in Public Policy from the Irving B. Harris Graduate School of Public Policy Studies at the University of Chicago.

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Consortium on Chicago School Research

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CONSORTIUM ON
CHICAGO SCHOOL RESEARCH
AT THE UNIVERSITY OF CHICAGO

ccsr.uchicago.edu | 1313 East 60th Street | Chicago, Illinois 60637 | T 773-702-3364 | F 773-702-2010

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