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Eleven of 13 States Scored Below the National NAEP Reading Mean in 2003 Scored Below in 2015

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1. Abstract. The study compared a group of 35 states which scored at or above the national mean on the 2003 fourth grade NAEP reading assessment with a group of 13 states which scored below the national NAEP mean. There were substantial differences between the two groups on most of the eight predictor variables.

The two groups of states were also compared on the 2015 NAEP fourth grade reading assessment. The differences which existed between the two groups in 2003 also were found in 2015. For the most part the rank order of the total group of 48 states in 2015 was quite similar to the rank order in 2003. The correlation between state reading scores in 2003 and state reading scores in 2015 was 0.82.

2. Objectives. The study had five objectives. The first objective was to present in rank order the state scores on the 2003 and 2015 fourth grade NAEP reading assessment, together with the associated data on each of eight predictor variables.

The second objective was to determine if “substantial differences” existed on one or more of the eight predictor variables between the group of 35 states which scored at or above the national mean on the 2003 fourth grade NAEP reading assessment and the group of 13 states which scored below the mean on the 2003 NAEP reading assessment.

The third objective was to determine if “substantial” differences existed on one or more predictor variables between the same two groups of states on the 2015 fourth grade NAEP reading assessment.

The fourth objective was to determine the correlations between each of the eight predictor variables and the criterion variable, state NAEP reading scores, for both 2003 and 2015, for the total group of 48 states.

The fifth objective was to determine if the rank order of the 48 states on the 2015 NAEP assessment was “quite similar” to the rank order of the 48 states on the 2003 NAEP assessment, or “quite different.”

3. Background. Grissmer and associates published a comprehensive study (Grissmer et. al, 2000) of seven NAEP assessments in the early 1990s. In a section of that study, “Highlights of the Findings” the author’s state

The group of more-rural northern states had the highest average achievement scores, and southern states were usually among the lowest. The more-urban northern states generally were closer to the middle of the score distribution. This distribution is explained mainly by family rather than school characteristics...Both the level of expenditure per pupil and, more importantly, its allocation affects student achievement particularly for states with disproportionately higher numbers of minority and less advantaged students (xxxiii – xxxiv).

Each reading Report Card from 2003 to 2015 has reported NAEP reading scores for (1) students eligible for free lunch, (2) students classified as English language learners (ELL), and (3) by racial/ethnic group, for the nation and by state. An inspection of the pertinent tables reveals large, persistent differences among states on the majority of these predictor variables. However, none of the Report Cards presents correlations between these respective variables and NAEP state reading scores.

In an unpublished study, a colleague and I correlated the percentage of students’ college graduated parents with the average eighth-grade NAEP reading scores for fifty states. The correlations for 2003, 2005, 2007, 2009, and 2001 were .74, .74, .74, .72, and .77, respectively. In another unpublished study, I obtained a correlation of -.76 between the percentage of students’ eligible for free lunch and percentage of students’ proficient on the 2011 fourth-grade NAEP reading assessment.

4. Methodology. The study focused on differences between two groups of states in 2003 and 2015. The first group was comprised of 35 states which scored at or above the national average of 216 on the 2003 fourth grade NAEP reading assessment. The second group was comprised of 13 states which scored below the national average of 216 on the fourth grade NAEP reading assessment.

Table 1 (p.4) presents the 2003 NAEP state scores in rank order for both groups of states. These two groups of states are also portrayed in Figure 1 below. This map, adapted from a map included in the 2003 Reading Report Card (p.6) shows quite clearly the “geographical divide” between the two groups of states. Only two southern states – Florida and North Carolina – are in blue, that is, in the group of 35 states at or above the NAEP mean in 2003.

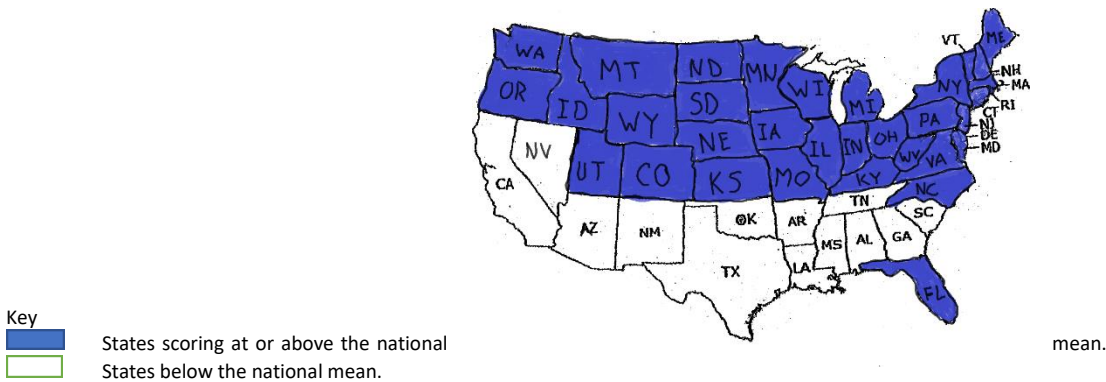


Figure 1. States scoring at or above the national mean and states scoring below the national mean on the 2003 fourth grade NAEP reading assessment.

Table 1
Rank-order fourth-grade 2003 NAEP average reading scores together with data for eight predictor variables for 35 states which had scores above the national mean and 13 states which had scores below the national mean.

	1	2	3	4	5	6	7	8	9
	Average reading scores	Percent eligible free lunch	Percent parent college graduate	Percent English language learner	Median family income	Per pupil expenditure	Percent White students	Percent Black students	Percent Hispanic students
Nation	216	44	46	8	\$50,000	\$8,041	59	17	18
State		N=35 (at or above the national mean)							
Connecticut	228	30	55	2	\$67,000	\$9,600	69	14	14
Massachusetts	228	29	55	4	\$67,000	\$8,900	74	10	11
New Hampshire	228	17	55	2	\$64,000	\$8,200	94	2	2
Vermont	226	29	52	2	\$51,000	\$10,600	95	2	1
New Jersey	225	30	56	2	\$69,000	\$10,900	58	18	16
Colorado	224	30	53	8	\$56,000	\$7,500	67	5	23
Delaware	224	38	44	2	\$60,000	\$9,500	56	33	8
Maine	224	33	48	1	\$47,000	\$9,500	95	2	1
Iowa	223	32	53	3	\$51,000	\$8,600	87	5	5
Minnesota	223	29	57	6	\$61,000	\$8,300	81	8	4
Montana	223	36	52	4	\$42,000	\$8,200	85	1	2
Virginia	223	31	50	4	\$57,000	\$8,000	62	27	5
Missouri	222	39	44	1	\$46,000	\$7,700	78	18	3
New York	222	52	52	4	\$52,000	\$10,700	52	20	21
North Dakota	222	33	58	3	\$48,000	\$8,100	88	1	2
Ohio	222	35	44	1	\$50,000	\$8,700	78	17	2
South Dakota	222	37	54	4	\$45,000	\$7,700	84	1	2
Wyoming	222	34	49	4	\$50,000	\$9,800	86	1	8
Nebraska	221	34	53	3	\$50,000	\$9,100	81	6	9
North Carolina	221	42	46	4	\$42,000	\$7,200	58	29	6
Washington	221	38	49	7	\$51,000	\$7,000	70	7	12
Wisconsin	221	29	47	4	\$54,000	\$9,400	79	9	6
Indiana	220	35	44	2	\$50,000	\$8,600	80	12	5
Kansas	220	41	50	2	\$51,000	\$8,300	78	10	8
Kentucky	219	50	39	0	\$40,000	\$7,500	85	12	1
Maryland	219	34	51	2	\$65,000	\$9,000	52	37	5
Michigan	219	36	47	4	\$53,000	\$8,600	71	21	5
Pennsylvania	219	38	47	2	\$50,000	\$8,800	74	19	4
Utah	219	33	56	9	\$52,000	\$5,100	83	2	11
West Virginia	219	54	37	1	\$36,000	\$9,300	95	4	0
Florida	218	48	43	9	\$45,000	\$6,700	51	23	21
Idaho	218	42	48	6	\$46,000	\$6,600	84	1	13
Oregon	218	35	45	10	\$47,000	\$7,800	76	3	14
Illinois	216	42	48	5	\$55,000	\$8,000	60	21	16
Rhode Island	216	39	47	7	\$57,000	\$9,400	69	9	18
Mean	221	36	49	4	\$52,200	\$8,489	75	12	8
		N=13 (below the national mean)							
South Carolina	215	52	44	1	\$41,000	\$7,800	55	40	3
Texas	215	54	41	12	\$43,000	\$7,600	41	14	42
Arkansas	214	53	39	3	\$39,000	\$7,400	69	25	4
Georgia	214	47	46	3	\$47,000	\$8,300	51	38	6
Oklahoma	214	55	45	6	\$39,000	\$6,800	61	11	7
Tennessee	212	41	41	1	\$43,000	\$6,700	71	25	2
Arizona	209	47	40	18	\$43,000	\$6,300	50	5	36
Alabama	207	54	41	1	\$40,000	\$7,100	60	37	1
Nevada	207	41	37	12	\$49,000	\$6,400	54	10	28
California	206	50	39	30	\$51,000	\$6,800	34	8	47
Louisiana	205	63	37	2	\$39,000	\$7,700	44	53	1
Mississippi	205	66	46	0	\$35,000	\$6,600	45	53	1
New Mexico	203	67	37	26	\$35,000	\$7,700	32	3	51
Mean	210	53	41	9	\$41,846	\$7,169	51	24	17

Source: Data in columns 1-4 and 7,8, and 9 from National Center of Educational Statistics: *2003 Reading Grades 4 and 8 Assessment Report Cards*. Figures for column 5 from AE. Casey Foundation, *Kids Count*, 2005. Figures for column 6 from *Education Week*, January 5, 2006.

Also presented in Table 1 are the data for eight predictor variables for 2003. The eight predictor/explanatory variables were as follows: (1) percent of students eligible for free/reduced price lunch, (2) percent of students with at least one college graduate parent, (3) percent of students identified as English language learners (ELL), (4) median family income, (5) per-pupil expenditures, adjusted for regional cost of living differences, (6) percent of White students, (7) percent of Black students, and (8) percent of Hispanic students.

5. Data Analysis. Correlations were calculated between each predictor variable and state reading score, separately for the N=35 group, for the N=13 group, and for the total group of 48 contiguous states for 2003 and 2015. Means for each of the nine variables for the three groups for 2003 and 2015 were calculated.

6. Results and Discussion. Table 1 presents in rank-order the average scale scores for the 48 states on the 2003 fourth grade 2003 NAEP reading assessment together with the associated data for eight predictor variables. In Table 1 the 35 states which scored at or above the national mean on the 2003 fourth grade NAEP reading assessment constitute the first group. The second group of 13 states in Table 1 scored below the national mean on the 2003 fourth grade NAEP reading assessment.

The reader should note that the sole criterion for membership in the N=35 group in 2003 was that the state scored at or above the national mean of 216. Two southern states, Florida and North Carolina, are members of the mostly northern group of 35 states because each state scored above the national mean of 216. Five other states, classified as “southern” by the US Census Bureau, are members of the “mostly northern group of 35 states”: Delaware, Kentucky, Maryland, Virginia, and West Virginia because they scored above the national mean of 216.

As shown in Table 1 the state reading scores in the N=35 group range from a high of 228 for Connecticut to a score of 216 for Illinois and Rhode Island, the two states with scores at the 2003 national mean of 216. *The scale criterion for membership in the N=13 group was that the state scored below the national mean of 216.* Thus, as can be seen in Table 1, the scores of the group of 13 states which scored below the mean range from a score of 215 for South Carolina to New Mexico’s score of 203. (Hereinafter, I will use “N=35” as

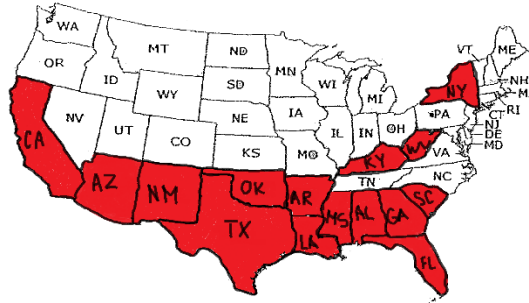
shorthand to refer to the mostly northern group of 35 states, and “N=13” as short-hand for the group of southern/southwestern states).

As mentioned above, Table 1 presents the data for each of eight predictor variables. Columns 2, 3, 4, 7, 8, and 9 report data for six NAEP predictor variables while columns 5 and 6 present data for non-NAEP variables. Each “Reading Report Card”, published by the National Center for Educational Statistics, since 2002 has included data on the six NAEP variables. As mentioned earlier, these Report Cards do not present correlations between a given variable and state score. Indeed, the tables which reports state scores are separate from the tables which present data for the respective predictor variables. One contribution that this paper makes is that the interested reader can for example, quite easily ascertain by inspection that five highest scoring states in Table 1 – Connecticut, Massachusetts, New Hampshire, Vermont, and New Jersey – are distinguished by favorable data on the first five predictor variables. Consider the free lunch percentage for these five top states: Connecticut (30%), Massachusetts (29%), New Hampshire (17%), Vermont (29%), and New Jersey (30%). Table 1 also presents mean scores for all the variables for the nation. The mean percent of students eligible for free lunch for the nation is 44%. All five states have free lunch percentages 14 or more points below the national mean. Table 1 also presents the mean for N=35 and N=13 groups. The N=35 free lunch mean is 36%, for N=13 group, the mean is 53%.

In contrast, consider the five highest scoring states in the N=13 group. The free lunch percentages are as follows: South Carolina (52%), Texas (54%), Arkansas (53%), Georgia (47%), and Oklahoma (55%). All five states have free lunch percentages above the national average of 44%.

To help understand the relationship of “percentage of students eligible for free lunch,” I have constructed Figure 2. Figure 2 (below) is a map of the 48 states with free lunch percentages shown in red. The “red states” have free lunch percentages at or above the 2003 national free lunch mean of 44%. The Figure 2 map shows the much higher incidence of free lunch percentages for the N=13 states than for the N=35 states.

As the map in Figure 2 shows, only four states – New York, Kentucky, West Virginia and Florida – of the N=35 states had free lunch percentages above the national free lunch average. For the N=13 group, 11 states had freed lunch percentages above the national average.



Key
 States with students eligible for free/reduced price lunch at or above the national average.
 States with students eligible for free/reduced price lunch at below the national average.

Figure 2. States with percentages of students eligible in 2003 for free/reduced price lunch at or above the national average and states with percentages of students eligible for free/reduced priced lunch below the national average.

In Table 3 (p. 9 below) the correlations for the eight predictor variables with state fourth grade 2003 NAEP reading scores are presented. Table 3 presents the correlations for all three groups. The emphasis here is on the correlations for the total group of 48 states. For the total group, the eight correlations for 2003, for predictors 1 through 8 respectively are $-.81$, $.73$, $-.49$, $.63$, $.56$, $.67$, $-.45$, and $-.37$. If we arbitrarily say that the best predictors are the predictors which correlate at least 0.70 with the criterion variable, then percentage free lunch and parents with a college degree are the best predictors of the 2003 reading scores.

Table 2 presents in rank order the average scores of the 48 states on the 2015 fourth-grade NAEP reading assessment, together with the associated data for the eight predictor variables. In Table 2 the 35 states which scored at or above the national mean on the fourth-grade 2003 NAEP reading assessment constitutes the top group. The reader should note that the N=35 group of states are the same 35 states as in Table 1 but in slightly different rank order, depending on their 2015 state scores. Thus, in Table 2, Massachusetts is alone as the top ranked state, New Hampshire is second, and Vermont is third. At the bottom of the (N=35) group are Oregon, South Dakota, Michigan, and West Virginia. In 2015 these four states scored below the national mean 221.

In Table 2 the scores for the N=13 group are presented in rank order according to their scores on the 2015 assessment. The two top scoring states of the N=13 group – Georgia and Oklahoma – have scores of 222, one point above the 2015 national mean of 221. Eleven of the 13 states which scored below the national means in 2003 scored below the national mean in 2015.

The 2003 free lunch percentages for the N=35 group are quite different. Only four of the states have free lunch percentages above the national average. Therefore, 31 of the 35 states have free lunch percentages below the national average of 44%. The free lunch percentages for 2015 for the N=13 states were quite similar in number to the free lunch percentages for 2003. See Table 2. In 2015 all of the N=13 states have free lunch percentages above the 2015 national average of 55%. For the N=35 group, 8 states have free lunch percentages above the national average.

The second-best predictor in both 2003 and 2015 was percent of college graduate parent. As shown in Table 3, the college graduate variable correlated 0.73 with state reading scores in 2003 and 0.65 in 2015.

Table 1 presents the college graduate data for 2003. Unlike the free lunch variable which correlates negatively with state reading score, the college graduate variable correlates positively. Thus, if one has knowledge of the college graduate correlation one would expect the highest scoring states to have higher than average percentages of college graduates, and lower scoring states to have lower than average percentages of college graduates.

In addition to the state reading scores for 2015, Table 2 presents data for each of the eight predictor variables for 2015. Table 3 presents the correlations for both 2003 and 2015 between each of the eight predictor variables and state reading scores. Inspection of these eight correlations, for the 2015 year, reveals that the highest of the eight correlations was -0.73 the correlation between percentage of free lunch and state reading score.

Table 2

Rank-order fourth-grade 2015 NAEP average reading scores together with data for eight predictor variables for 35 High-Scoring states and 13 low-scoring states.

	1	2	3	4	5	6	7	8	9
	Average reading score	Percent eligible free lunch	Percent parent college graduate	Percent English language learner	Median family income	Per pupil expenditure (2014)	Percent White students	Percent Black students	Percent Hispanic students
Nation	221	55	49	12	\$55,775	\$12,156	49	15	26
N=35 (high-scoring states)									
State									
Massachusetts	235	42	62	10	\$71,000	\$14,000	65	7	19
New Hampshire	232	28	63	3	\$70,000	\$15,400	87	2	5
Vermont	230	42	59	3	\$57,000	\$19,700	91	2	2
Connecticut	229	36	60	7	\$71,000	\$16,600	59	12	20
New Jersey	229	41	61	3	\$72,000	\$15,900	46	16	26
Virginia	229	41	56	7	\$66,000	\$10,000	51	22	13
Kentucky	228	60	46	4	\$45,000	\$10,600	79	10	5
Wyoming	228	39	51	3	\$60,000	\$17,500	77	1	15
Florida	227	61	45	10	\$49,000	\$9,600	43	21	29
Indiana	227	50	49	8	\$51,000	\$11,100	69	1	11
Nebraska	227	47	58	7	\$55,000	\$14,000	69	7	17
Pennsylvania	227	44	55	4	\$56,000	\$14,400	70	13	11
North Carolina	226	60	49	7	\$48,000	\$9,000	50	25	18
Utah	226	37	55	4	\$63,000	\$7,000	77	1	16
Washington	226	50	50	13	\$64,000	\$9,900	55	5	22
Montana	225	46	57	3	\$50,000	\$13,800	79	1	4
North Dakota	225	33	63	2	\$61,000	\$13,500	80	4	4
Ohio	225	50	52	4	\$51,000	\$12,200	72	16	4
Rhode Island	225	47	51	8	\$58,000	\$14,600	62	8	22
Colorado	224	45	53	14	\$64,000	\$9,500	52	4	36
Delaware	224	40	47	5	\$61,000	\$13,900	45	30	17
Iowa	224	44	60	8	\$55,000	\$12,700	76	6	11
Maine	224	50	57	3	\$51,000	\$15,200	90	3	2
Maryland	223	46	58	9	\$76,000	\$12,900	44	9	13
Minnesota	223	41	62	10	\$63,000	\$12,300	68	10	9
Missouri	223	53	51	3	\$50,000	\$11,200	72	3	5
New York	223	57	51	8	\$61,000	\$18,200	45	8	26
Wisconsin	223	42	60	7	\$56,000	\$12,200	71	7	11
Idaho	222	51	54	5	\$48,000	\$8,100	77	5	17
Illinois	222	56	51	10	\$60,000	\$12,800	46	10	28
Kansas	221	56	55	14	\$54,000	\$11,600	64	14	21
(Oregon)	220	62	47	13	\$54,000	\$11,000	62	13	23
(South Dakota)	220	41	59	3	\$53,000	\$11,300	75	3	5
(Michigan)	216	48	57	5	\$51,000	\$12,400	72	5	6
(West Virginia)	216	75	44	1	\$42,000	\$13,100	91	1	1
Mean	225	47	55	7	\$57,628	\$12,777	67	10	14
N=13 (low-scoring states)									
(Georgia)	222	63	51	5	\$51,000	\$9,400	43	35	14
(Oklahoma)	222	61	44	7	\$49,000	\$8,900	52	9	16
Tennessee	219	59	47	5	\$47,000	\$9,400	64	23	7
Arkansas	218	68	45	8	\$42,000	\$11,600	64	21	12
South Carolina	218	62	53	8	\$47,000	\$10,900	54	32	9
Texas	218	63	42	23	\$56,000	\$8,300	26	14	53
Alabama	217	62	49	2	\$45,000	\$10,000	58	32	5
Louisiana	216	68	47	3	\$46,000	\$11,800	49	42	5
Arizona	215	62	42	10	\$51,000	\$8,100	39	6	47
Mississippi	214	73	51	2	\$41,000	\$9,700	46	48	3
Nevada	214	58	38	25	\$52,000	\$8,400	32	11	45
California	213	63	39	28	\$65,000	\$8,700	25	6	56
New Mexico	207	75	38	17	\$45,000	\$10,700	25	2	61
Mean	216	64	45	11	\$49,000	\$9,684	44	21	25

Source: Data in columns 1-4 and 7, 8, and 9 from National Center of Educational Statistics: 2015 Reading Grades 4 and 8. Figures for column 5 from U.S. Census Bureau (2016). Household income, 2015. Figures for column 6 from Education Week.

Table 3: Correlations between each of eight predictor variables and state average fourth grade NAEP reading scores for N=35 states and N=13 states, together with correlations for the total group of 48 states, for 2003 and 2015.

	1	2	3	4	5	6	7	8
2003								
Northern (N=35)	-0.61	0.52	-0.34	0.49	0.38	0.18	-0.18	-0.19
Southern (N=13)	-0.45	0.49	-0.41	-0.17	0.29	0.55	-0.01	-0.29
Total (N=48)	-0.81	0.73	-0.49	0.63	0.56	0.67	-0.45	-0.37
2015								
Northern (N=35)	-0.51	0.30	-0.07	0.57	0.27	0.03	-0.04	0.11
Southern (N=13)	-0.58	0.54	-0.41	0.14	0.09	0.51	0.21	-0.53
Total (N=48)	-0.73	0.68	-0.40	0.57	0.52	0.52	-0.35	-0.41

Note: Alaska and Hawaii were not included in this study.

- Col. 1. Percentage of students eligible for free/reduces price lunch
- Col. 2. Percentage of students with a college graduate parent
- Col. 3. Percentage of students identified as ELL (English Language Learners)
- Col. 4. Median family income, adjusted for regional cost difference
- Col. 5. Per pupil expenditure (PPE), adjusted for regional cost difference
- Col. 6. Percentage of White students
- Col. 7. Percentage of Black students
- Col. 8. Percentage of Hispanic students

One of the objectives of the study was to determine if one or more predictor variables in 2015 explained as much differences between the N=35 group and the N=13 group as between N=35 and N=13 states in 2003. Stating that objective slightly differently, the objective was to determine if the “best” predictor variable(s) in 2003 were the “best” predictor variable(s) in 2015. Because the free lunch more is the best predictor variable in both 2003 and 2015, results pertaining to free lunch are given the most attention.

First, consider Table 1 and the number of states which have free lunch percentages for the N=13 group. Only two states, Tennessee and Nevada, have free lunch percentages below the national average of 44%. Eleven states have free lunch percentages above the national average.

Consider first the college graduate percentages in for 2003 in Table 1. For the nation, the college graduate percentage mean is 46%. The five highest scoring states in Table 1 are Connecticut, Massachusetts, New Hampshire, Vermont and New Jersey. Their college graduate percentages were 55, 55, 55, 52, and 56, respectively. The five lowest scoring states in 2003 were Nevada, California, Louisiana, Mississippi, and New

Mexico. Their college graduate percentages were 37, 39, 37, 46, and 37, respectively. A quite similar pattern exists for 2015.

Table 1 presents the percentage of English language learners (ELL) for 2003. Table 2 presents percentages of English language learners for 2015. As is shown in Table 1 and Table 2, only a few states have high percentages of ELL. In 2003, the national ELL mean was 8%; in 2015 the mean was 12%. In 2003, two states – California and New Mexico – had percentages of 20% or more. In 2015, three states – California, Nevada, and Texas – had ELL percentages above 20%.

The variables in columns 5 and 6 – median family income and per pupil expenditures in Tables 1 and 2 are non-NAEP generated variables. Figures for these two variables are not reported in the Nations Report Card series. The median family income figures in column 5 for 2003 and 2015 are average figures for a given state. Hence, the median income figures represent all families, not just the families with fourth grade students. The correlations between median family income and state reading scores were 0.63 and 0.57 for 2003 and 2015, respectively.

As shown in Table 1 and Table 2, there is a large range in median income between the higher income states and the lower income states. In 2003, the national mean for median family income was \$50,000. New Jersey had the highest median income, \$69,000; Mississippi and New Mexico were tied for lowest at \$35,000. Therefore, the range between the highest and lowest states was \$34,000. In 2015, the national average median family income was \$55,775. Maryland had the highest median income \$76,000. Mississippi's median income was \$41,000. Thus, in 2015 the range between the highest and lowest states was \$35,000.

As the correlations of 0.63 and 0.57 indicate states with high median income tend to have high state reading scores. In 2003 five top scoring states were Connecticut, Massachusetts, New Hampshire, Vermont and New Jersey (see Table 1). As shown in Table 1 the median family incomes for these five states were as follows: Connecticut, \$67,000; Massachusetts, \$67,000; New Hampshire, \$64,000; Vermont, \$51,000; and New Jersey, \$69,000. In 2003 the five lowest scoring states were Nevada, California, Louisiana, Mississippi, and New

Mexico. As shown in Table 1, the median family incomes for these five states were as follows: Nevada, \$49,000; California, \$51,000, Louisiana, \$39,000, Mississippi, \$35,000; and New Mexico, \$35,000.

Table 2 presents the income figures for 2015. The five top scoring states were Massachusetts, New Hampshire, Vermont, Connecticut, and New Jersey. As shown in Table 2, the median family income in 2015 for these five states were as follows: Massachusetts, \$71,000; New Hampshire, \$70,000; Vermont, \$57,000; Connecticut, \$71,000; New Jersey, \$72,000. Except for Vermont, these median income figures are approximately \$15,000 higher than the national average of \$55,776. In 2015 the five lowest scoring states were Arizona, Mississippi, Nevada, California and New Mexico. As shown in Table 2, the median incomes were \$57,000, \$41,000, \$52,000, \$65,000, and \$45,000 respectively.

Of the N=13 states, only two states – California and Texas – had median income averages above the national average in 2015.

Column 6 of Table 1 and Table 2 presents the per pupil expenditure (PPE) for the 48 states. In 2003 the mean PPE for the nation was approximately \$8,000. For the N=35 states, the mean PPE in 2003 was approximately \$8,500; for the N=13 states, the mean PPE was approximately \$7,200. (The PPE figures were adjusted for regional differences in cost of living.) For 2015 the national mean PPE was approximately \$12,200; for the N=35 states, the mean PPE was approximately \$12,800, and for the N=13 states the mean was approximately \$9,700 in 2003 only one southern state – Georgia – had a PPE above the national mean (see Table 1). In 2015 none of the N=13 states had a PPE above the national mean.

Although it is beyond the scope of this study to thoroughly examine state differences in PPE, a cursory inspection of the PPE distribution reveals large differences in PPE state to state, especially for the 2015 year. In 2015 Vermont had the highest PPE - \$19,700. Utah had the lowest PPE, \$7,000. It may be of interest to note that Utah had a median income of \$63,000, \$6,000 more than Vermont.

If one considers three variables – free lunch eligible, median family income, and per pupil expenditures as economic variables - then the below the national mean reading score in 2015 for the 11 southern states can be largely explained in economic terms. In 2015, all 11 states (two states, Georgia and Oklahoma, scored one point

above the national mean. – see Table 2) had free lunch percentages above the national mean, ten states had median family income below the national mean, and all 11 states had per pupil expenditures below the national mean.

In Table 1 the state by state percentages of White, Black, and Hispanic fourth grade students are presented for 2003. Table 2 presents the comparable percentages for 2015. Table 3 presents the correlations for each racial group with the average NAEP reading scores for 2003 and 2015.

For the most part the figures in Table 1, 2 and 3 are self-explanatory. I limit my comments to two points. First, the national percentages showed considerable increase in the percentage of fourth grade Hispanic students over the 12-year period, and a considerable decrease in the percentage of White students. The percentage of Black students changed very little.

Tables 1 and 2 show large differences between the N=35 group and N=13 the group of states in the percentage for Hispanic fourth graders. In 2003, the N=35 mean percentage was eight; the N=13 states mean percentage was 17. In 2015, the comparable percentages for Hispanic students were 14 and 25.

My second point pertains to the correlations in Table 3 between each of the three racial groups and NAEP reading scores. The correlations are for the total group of 48 states. The 2003 and 2015 correlations between percentages of White students and reading scores were 0.67 and 0.52, approximately the same value as the respective “economic” correlations in columns 5 and 6. For Black students the 2003 and 2015 correlations were lower, and negative: -0.45 and -0.35, respectively. The Hispanic correlations were similar, -0.37 and -0.41, respectively.

A further inspection of the Tables 1 and 2 reveals that a few states had percentages of Hispanic students much higher than national means, and much higher than other states. In 2003, five states had Hispanic percentages of 25 or higher: Nevada (28%), Arizona (36%), Texas (42%), California (47%), and New Mexico (47%). In 2015, six states had Hispanic percentages of 25 or higher: Colorado (36%), Nevada (45%), Arizona (47%), Texas (53%), California (56%), and New Mexico (61%). Thus, five of the six states which had high

Hispanic percentages in 2003 had high percentages in 2015. Three of these states – Texas, California, and New Mexico – had percentages of Hispanic students higher than 50%.

The increase in the percentage of Hispanic students enrolled in the nation’s public schools was predicted by the authors of *Schooling Disadvantages Children: Racing Against Catastrophe* (Natriel, McDill, & Pallas, 1990). Based on the 1986 projections by the Census Bureau, the authors projected that “while about 7 in 10 children in 1988 were White, only about 1 in 2 will be in 2020. While only 1 in 10 children in 1988 was Hispanic, more than 1 in 4 children will be in 2020 (p. 37).”

Table 2 shows that in 2015 the national percentage of fourth grade Hispanic students was 26%. Thus, in 2015 the national percentage of fourth grade Hispanic students was 26%, very close to the “more than 1 in 4 children” projected for 2020 in Schooling Disadvantaged Children.

The national fourth grade NAEP reading score increased from 216 in 2003 to 221 in 2015; an increase of 5 score points over the 12-year period. But most of the increase was from 2003 to 2007. In 2007, 2009, and 2011, the mean score was 220; in 2013 and 2015 the mean score was a constant 221. Thus, over the eight-year period of 2007-2015 the national mean reading score increased one score point.

The authors of Schooling Disadvantaged Children were pessimistic about the prospects for the nation’s educational achievement by 2020. The NAEP results for 2017, 2019, and 2021 will be informative as to whether the nations’ reading scores may actually decline.

An inspection of Tables 1 and 2 shows that several states moved-up substantially and several states moved down in the 2015 distribution. Florida appears to be an “overachiever” in 2015. In 2003 Florida had a reading score of 218; of the 35 states which scored at or above the mean in 2003 only two states – Oregon and Illinois – scored lower than Florida (see Table 1). However, in 2015, Florida scored 227; only seven states scored higher (see Table 2). In 2015, Florida’s free lunch percentage was 61%; only two of 35 states had higher percentages.

I submit the most plausible explanation for Florida’s impressive improvement in 2015 over 2003 is Florida’s practice of holding back third grade students who scored below a set score on Florida’s state

achievement test. This practice was initiated by Governor Jeb Bush in 2003. A paper presented at Columbia University by Haney (2006) was critical of the practice. According to Haney, "...considerable research has found that among children who are overage for grade in grade 9... 65-90% will not persist in high school and graduation" (p.7).

California merits attention on several counts. California has the largest population by far of any state in the nation. Based on data from the 2010 U.S. Census, California's population is larger than the combined population of 21 states. California had a population of over 37,000,000. Texas the second largest state, had a population approximately 25,000,000. In terms of the nation's educational performance, California is a major player.

The 2002 Reading Report Card included pupil-teacher ratios for the nation and the states for Fall 1999. For the nation, the pupil/teacher ratio was 16; for California, 21. In Fall 2013 pupil/teacher ratio for the nation was 16.1; for California, 24.3. (NCES, 2015).

It appears reasonable to assume that California's low NAEP reading scores in 2003 and in 2015 can be largely explained by its very high pupil-teacher ratio.

A third state which merits attention is New Jersey. In 2008 Gordon MacInnes, a former official in the New Jersey Department of Education, described New Jersey's long-term reform activities in a book titled *In Plain Sight: Simple, Difficult Lessons from New Jersey's Expensive Effort to Close the Achievement Gap*. It is much beyond the scope of this present study to attempt to describe the many reform efforts which were initiated by New Jersey in the period 1973 – 2003. According to MacInnes reform efforts were concentrated on improving reading achievement in the early grades. In 2003 New Jersey had a fourth-grade reading score of 225 fourth in the nation. In 2015 New Jersey had a score of 229, tied with Connecticut for fourth place.

As shown in Table 1 and 2, New Jersey's racial composition of fourth grade students was quite different from the four New England states which had higher NAEP scores in 2003 and 2015. Inspection of Table 1 and Table 2 reveals that New Jersey differs markedly from the average of the N=35 states. In 2003, New Jersey's White, Black, and Hispanic percentages, were 58, 18, and 16; respectively. The comparable average

percentages for N=35 states were 75, 12, and 8, respectively. Only Colorado, New York, and Florida had higher percentages of Hispanic fourth graders. Table 2 shows a similar pattern for 2015.

In Schoolhouses, Courthouses, and State houses (Hanushek and Lindseth, 2009) the authors assert that state per-pupil expenditures are not related to state NAEP scores. They state,

If the level of spending were related to achievement, we would expect significantly higher achievement in states that spend more. What we see, instead, when the NAEP scores in reading and mathematics in each state are correlated with per pupil spending, is no significant relationship between performance and spending... (pp. 55-56)

Hanushek and Lindseth do not cite any studies to support their position. It seems clear they are talking about the relationship between spending and performance expressed as statistical correlations.

In the present study, correlations were obtained between fourth grade NAEP reading scores and per-pupil expenditures for 48 states, for 2003 and 2015. The correlations are reported in Table 3 above. For 2003 the correlation was 0.56; for 2015, the correlation was 0.52. Both of these correlations are statistically significant at the 0.01 level. (Guilford and Fruchter p. 531) Thus for fourth grade reading scores, these results contradict assertions by Hanushek and Lindseth.

In an effort to keep my study manageable (I am an individual researcher), I limited the number of predictor/explanatory variables to eight. It appears that Grissmer's investigation of state differences on NAEP tests given in the early 1990s has been the most intensive study of state differences on the NAEP assessments to date. Among other variables, Grissmer and colleagues reported the "other things being equal, NAEP scores are higher in states that have...lower pupil-teacher ratio in the lower grades...and more children in public prekindergarten programs. (pp. XXV – XXVI)

I believe one reason for California's low scores in both 2003 and 2015 – only three states were lower in 2003, and only one state was lower in 2015 – is California's extremely high pupil-teacher ratio. In 2000, California's K-12 pupil-teacher ratio was 20.6; in 2013 the ratio was 24.3. The comparable figures for the nation are 16.0 and 16.1 (data from NCES, August 2015). California's NAEP performance has been compared

to Texas. Texas pupil-teacher ratio for the same years were 14.8 and 15.4, much lower than California's ratio particularly in 2013.

If I were to repeat this study, I would include these two variables – pupil-teacher ratio, and percentage of students enrolled in prekindergarten programs.

In his book, In Plain Sight, MacInnes reports on the causes of New Jersey's successful efforts to improve the education in the early years. He says, "What sets New Jersey apart is the level of court-mandated funding available, and the fact that preschool funding begins at age three" (p. 1). MacInnes provides some additional facts about New Jersey's preschool program: "New Jersey is the first state to mandate a preschool opportunity for three-year old's...and to pay teachers on the salary scale for K-12 teachers" (p. 43)

7. Major Findings.

1. Of the 13 states which scored below the national mean on the NAEP fourth grade reading assessment in 2003, 11 states scored below the national mean in 2015, 12 years later. Two of the 13 states – Georgia and Oklahoma – scored one point above the mean in 2015.
2. The predictor variable which best explained state NAEP fourth grade reading scores in both 2003 and 2015 was the percentage of students eligible for free lunch. In 2003 free lunch percentage correlated -0.81 with reading score; in 2015 the correlation was -0.73. These correlations were based on the total group of 48 states.
3. In 2003 11 of the 13 states which scored below the national reading mean had free lunch percentages above than the national average; in 2015 all of the 13 states had free lunch percentages higher than the national average.
4. The second-best predictor in both 2003 and 2015 was the percentage of students with at least one parent a college graduate. In 2003 the correlation between percentage of students with a college graduate parent and reading scores was 0.73; in 2015 the correlation was 0.68.
5. In 2003, 12 of the 13 southern/southwestern states which scored below the national reading mean had per-pupil expenditures below the national average of \$8,300. In 2015 all 13 of the southern/southwestern states had per-pupil expenditures below the national mean of \$12,156.

6. In 2003 the 35 states which scored above the NAEP reading mean had a mean per-pupil expenditures of \$8,489; the comparable figure for the 13 states below the national mean was \$7,169. In 2015, twelve years later, the 35 mostly above the mean states had a mean per-pupil expenditure of \$12,777. The comparable figure for the 13 mostly below the mean states was \$9,684. Hence, the 35 above the mean states increased their per-pupil expenditures by 51% whereas the 13 mostly below the mean states increased their per-pupil expenditures by 35%. Thus, the financial support for education in the mostly 13 below the mean states appears to have weakened considerably compared to the financial support for the 35 above the mean.

7. California has, by far, the largest population of any state in the nation. California NAEP reading scores have been almost the lowest scores in the nation. In 2003 of the 48 states only Louisiana, Mississippi, and New Mexico scored lower. In 2015 only New Mexico scored lower than California.

8. In general, state household income is moderately related to state reading scores. In 2003 the correlation was 0.63; in 2015, the correlation was 0.57. In 20145 California had a median household income of %65,000, approximately \$9,000 higher than the national figure. (See Table 2) But, in 2015 California's PPE was \$8,700 approximately \$1,000 below the mean PPE (\$9,684) for the 13 southern/southwestern states. California's PPE efforts in 2015 was dramatically different from New Mexico's effort, as shown in Table 2. New Mexico had a median household income of \$45,000, \$20,000 below California. New Mexico had a PPE of \$10,700.

9. Looking at the rank-order of all 48 states in 2015 compared to 2003, the picture is one of consistency rather than change. The correlation between state NAEP reading scores in 2003 and scores in 2015 was 0.82. In 2003 the five top-scoring states were Connecticut, Massachusetts, New Hampshire, Vermont and New Jersey. In 2015, twelve years later, the five top scoring states were Massachusetts, New Hampshire, Vermont, Connecticut, New Jersey and Virginia, tied with New Jersey. In 2003 the five lowest-scoring states were Nevada, California, Louisiana, Mississippi and New Mexico (lowest). In 2015 the five lowest scoring states were Arizona, Mississippi, Nevada, California, and New Mexico (lowest).

10. An unplanned finding reported in the study pertains to the increase nationwide in the percentage of fourth grade students eligible for free lunch. In 2003, as shown in Table 1 44% of fourth grade students were eligible

for free lunch. In 2015, as shown in Table 2, 55% were eligible for free lunch. Over the same 12-year period, the mean fourth grade NAEP reading score increased by five score points whereas the free lunch percentage increased by 11 percentage points. At first glance, this increase in mean reading scores appears “counter intuitive”, given the substantial negative correlation between free lunch percentage and state reading scores. But these figures do not tell the whole story. From 2007 to 2015, the national reading score mean increased by only one point. For 2013 and 2015, the national mean score remained constant at 221.

Although it is well beyond the scope of this study to examine in a meaningful way the long-term relationship between free lunch percentage and mean reading scores for the nation, it may be constructive to look at West Virginia’s experience over the 2003-2015 period.

In 2003 West Virginia had a fourth-grade reading score of 219, three points above the national mean. In 2015, 75% of West Virginia’s fourth graders were eligible for free lunch. In 2015 West Virginia’s reading score was 216, five points below the national mean of 221. Thus, West Virginia’s reading score in 2015 was three points lower than it was in 2003, twelve years earlier. I call attention to West Virginia because of its dramatic increase in free lunch percentage and actual decrease in NAEP reading score from 2003 to 2015.

To repeat – the nation’s free lunch percentage increases – 44% in 2003 to 55% in 2015. At the same time, national mean scores have increased five score points, but only one point since 2007. These trends suggest that if free lunch percentage increase at the current rate, the fourth grade NAEP reading scores may well actually decline in the next ten years or so.

As stated above, I employed eight predictor variables. If the study had included (1) pupil-teacher ratio, and (2) percentage of 3-year-olds in public prekindergarten programs, I believe more state rankings would have been more adequately explained.

8. Educational Implications. To repeat, in 2003, 13 states scored below the national fourth grade NAEP reading assessment mean. In 2015, 11 of these 13 states scored below the national mean. The other two states scored one point above the 2015 mean.

The No Child Left Behind Act (NCLB) was signed into law in 2002, with bipartisan support. Largely as a result of the NCLB, there was an unprecedented effort at the local, state, and national levels “to close the achievement gap.” But on the 2015 NAEP fourth grade NAEP reading assessment the relative position of the group of 13 low performing states in 2003 changed hardly at all over a period of 12 years, most of the period during which the NCLB was in effect.

In 2017 there appears to be little interest at the federal level “to close the achievement gap,” or any interest at all in public education. Public education was hardly mentioned by either party in the 2016 presidential election. The current Secretary of Education, Betsy DeVoss, is not an advocate of public education. The voice of the American Federation of Teachers is not often heard.

Political considerations aside, the relatively unfavorable economic conditions of 11 southern/southwestern states, during the last 12 years at least, indicate that their chances for improving their relative standings are bleak. I point out again that in 2015 all 11 states had free lunch percentages above the national average. Because the economic conditions of these 11 states with the exception of California, are relatively so unfavorable it appears that these 11 states will likely score below the national NAEP reading mean in 2025 or so.

Another way of considering the educational implication of the study’s findings is in terms of the rank-order of the 48 states on the NAEP reading assessment. I believe the rank-order of the 48 states in 2025 will be approximately the same as the rank-order in 2015. The higher-scoring states in 2015 very likely will be the higher-scoring states in 2025; the lower-scoring states in 2015 very likely will be the lower-scoring states in 2025. If California and Texas are among the lower scoring in 2024, that could be a disaster for the nation, as well as for the students in the two states.

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