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The Forgotten 20 Percent: Achievement and Growth in Rural Schools Across the Nation

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Abstract:

Nearly one in five U.S. students attends a rural school, yet we know very little about achievement gaps and academic growth in rural schools. This study leverages a unique dataset that includes longitudinal test scores for more than five million 3rd to 8th grade students in approximately 17,000 public schools across the 50 states, including 900,000 students attending 4,727 rural schools. We find rural achievement and growth to be slightly above public schools. But there is considerable heterogeneity by student race/ethnicity. For all grades and subjects, White-Black and White-Hispanic gaps are smaller in rural schools than gaps nationwide, and White-Native American gaps are larger in rural schools than gaps nationwide. Separate analyses by racial/ethnic subgroup show that rural Black, Hispanic, and Native American students are often growing slower than their respective subgroup national average. In contrast, White students are often growing faster than the national average for White students.

Key Words:

rural education, achievement gap, academic growth

The Forgotten 20 Percent: Achievement and Growth in Rural Schools Across the Nation

Approximately one in five students in the United States attend schools in a rural locale (NCES, 2018). Rural schools are diverse in terms of demographics, resources, and student needs (Greenough & Nelson, 2015; Strange, 2011) and face challenges distinct from those of urban or suburban schools, including student grouping, transportation, and staff recruitment and retention (see Arnold et al., 2005 for a review). For these reasons, achievement levels and achievement gaps in rural schools likely differ from the overall population of students in the U.S., and likely need to be supported using different strategies and resources. To that end, The Every Student Succeeds Act of 2015 (ESSA, 2015) increased focus on rural education through funding reallocations that support rural schools.

Given the sizable student population in rural schools and investments made to support their education, their achievement and growth merit attention from research and policy perspectives. Yet, our understanding of achievement in rural schools is extremely limited, in part because evaluation and intervention studies often take place in large urban districts. Virtually everything we know about achievement in rural locales comes from a handful of journal articles (e.g., Provasnik et al., 2007) and policy reports (e.g., NCES, 2014), many of which are more than 40 years old (e.g., Henderson, 1973), and we know little about growth in achievement among these students (Graham & Provost, 2012). This oversight is likely due to challenges in accessing and pooling student-level data across state lines.

Our own study substantially expands the limited current literature on academic achievement and growth in rural schools. The intent of the study is to provide a descriptive overview of academic achievement and growth among rural schools that can be used by educators and policymakers to understand the potential needs of such schools, including how

sources of educational inequality compare to those sources among all U.S. schools. Leveraging a unique dataset that includes longitudinal test scores for more than five million 3rd to 8th grade students in approximately 17,000 public schools across the U.S., including 900,000 students attending 4,727 rural schools, we report novel evidence on how achievement and growth patterns differ between rural schools and public schools nationwide. Further, we provide some of the first estimates of achievement gain effect sizes in math and reading for rural students. Specifically, our research questions are:

1. How does academic achievement in rural schools compare to achievement nationwide? How do racial/ethnic achievement gaps in rural schools compare to achievement gaps nationwide?
2. What are patterns in fall-to-spring academic gains in rural schools and how do they compare to those nationwide? How do achievement and gains vary by students' race/ethnicity in rural schools?

Importantly, our study does not compare achievement between urban and rural schools given meaningful differences in contexts, needs, and challenges between the two settings (e.g., Graham & Provost, 2012). With those differences in mind, we feel presenting analyses that could invite interpretations of the results suggesting urban schools are doing better than rural schools (or vice-versa) is at best counterproductive and at worst could reify stereotypes. Thus, we focus on how rural schools are performing relative to all U.S. schools.

Background on Achievement in Rural America

There is not much peer reviewed research on achievement in rural schools across the U.S. One exception to this pattern is a small body of early research that explored rural student achievement with cross-state National Assessment of Educational Progress (NAEP) scores (see

Howley & Gunn, 2003 for a review). Using data from the 1969-1971 NAEP administrations, Henderson (1973) found that extreme rural[1] students scored lower than the national average on reading, writing, and citizenship. Martin (1979) similarly found that extreme rural students scored lower than the national level in all subjects of the 1969-1973 NAEP. In contrast, more recent studies by Lee and McIntire (1999, 2000) used 1992 and 1996 NAEP scores and found that rural schools outperformed nonrural schools in math, but there was substantial variation by state. Based on teacher surveys, the authors attributed rural schools' higher performance to better teacher training and school climate but pointed out that rural instructional conditions and curricular rigor needed improvement. Using test scores from 2003-2004, Provasnik and colleagues (2007) also found that a larger percentage of rural public school students scored at or above the Proficient level on reading, math, and science compared to city public school students (Provasnik et al., 2007).

Though few recent peer reviewed publications have taken up the topic of rural achievement, several policy reports have made use of NAEP data for that purpose. For example, a report by the Rural School and Community Trust (Showalter et al., 2019) found that, although rural students outperformed non-rural students on NAEP, achievement was highly variable such that achievement favored non-rural students in several states. The authors of that report (Showalter et al., 2019) highlighted inconsistencies in funding formulas for rural schools across states as a possible contributor to that variability and pointed out that socioeconomic achievement gaps in rural locales were large. The National Center for Education Statistics (NCES) also produces reports on Rural Education in America that break down NAEP scores by school locale. According to those studies (NCES, 2014), in 4th grade reading, 35.6% of students in rural locales were deemed proficient on the 2015 NAEP compared to 34.8% overall. In 8th

grade, the same numbers were 32.2% in rural schools and 32.7% overall. Similarly, in mathematics, rural and overall percentages of students deemed proficient differed by less than a percentage point with 39.7% of rural 4th graders above proficient and 31.4% of rural 8th graders above proficient.

These studies using NAEP data provide insights into rural student achievement but face limitations. Perhaps most importantly, NAEP was not designed to support analyses or inference of student-level achievement or growth. Data collection was cross-sectional, and achievement was measured only for 4th, 8th, and 12th graders. This results in silence on the critical issues of (a) academic growth and (b) achievement for students of ages not assessed by NAEP. In short, one cannot say much about rural achievement beyond aggregate proficiency rates at select timepoints and for select grades using NAEP, and few analyses of the NAEP data have been performed beyond reporting those proficiency rates.

The near total absence of evidence on growth in achievement among students attending rural schools is an especially large blind spot in our understanding of rural education. Academic growth among rural students is important for several reasons, including that students' academic trajectories are less reflective of underlying socioeconomic inequalities and more under a school or district's control than students' achievement at a point in time (Hegedus, 2019; Reardon, 2018). To the best of our knowledge, only a report by Graham and Provost (2012) explored math achievement trajectories for rural schools and compared them to schools in other locales. They used data from the Early Childhood Longitudinal Study and projected trajectories from kindergarten to 8th grade by race/ethnicity, school locale, and geographical region. The report stated that achievement differences of rural, urban, and suburban students differed by race/ethnicity. Further, they showed that growth estimates for rural students were lower than for

urban and suburban students for nearly all racial/ethnic subgroups. However, this study was limited in both the grades it was able to examine (spring achievement was measured every couple of years) and in that it did not provide evidence of whether there were statistically significant differences among locales for racial/ethnic gaps in achievement levels or projected trajectories.

Data

The current study substantially expands research on achievement and growth in rural schools by leveraging a rich data set from NWEA's Growth Research Database (GRD). We use student-level assessment data for school year 2016-17, which includes about 25% of all public schools in the nation. The data are not nationally representative: school districts and schools choose to administer MAP Growth assessments for a variety of reasons, including monitoring student achievement and growth, school accountability, and teacher evaluation. Our data include 5,058,168 3rd to 8th grade students in 17,704 public schools across the 50 states. While the GRD includes private and international schools, we focus only on US public schools in this study. Additionally, we excluded schools from the GRD data that tested fewer than 10 students in any grade between 3 and 8 in 2016-17. We refer to these schools as "public schools" for the remainder of the paper. A comparison of summary statistics of public schools in our sample and all public schools serving students in Grades 3-8 that are listed in the 2016-17 NCES Common Core of Data (CCD) are presented in Appendix Tables 1 and 2.

Of the public schools included in our study, 4,727 are schools in a rural locale. The CCD includes 12 codes for locale (City-Large; City-Medium; City-Small; Suburb-Large; Suburb-Medium; Suburb-Small; Town-Fringe; Town-Distant; Town-Remote; Rural-Fringe; Rural-Distant; Rural-Remote). We flag schools as rural if they have any of the last three codes (Rural-

Fringe; Rural-Distant; and Rural-Remote) and refer to these schools as "rural schools" for the reminder of the paper. Within each school, we focus on students in 3rd to 8th grade because these grades are commonly assessed in schools across the nation. In total, we have test scores for 949,089 students in rural schools across the 50 states.

Table 1 shows the demographic composition of the rural and public schools in our sample. Panel A shows the demographic characteristics of students in rural schools. In each subject and grade, approximately 70% of rural students were White, 9% Black, 2% Asian, 7% Hispanic, 4% Native American, and 51% male. Panel B shows public schools, which were about 50% White, 18% Black, 4% Asian, 15% Hispanic, 1% Native American, and 51% male. Compared to public schools, rural schools had higher percentages of White and Native American students and lower percentages of Black, Asian, and Hispanic students. The GRD does not have a student-level measure of socioeconomic status and so we are unable to compare the socioeconomic characteristics of students in rural and public schools in our sample.

Measures of Achievement

Students were tested using the math and reading MAP Growth assessments up to three times (fall, winter, and spring) during the school year. The MAP Growth assessments are computerized, adaptive tests that are aligned to state content standards. Each test takes approximately 40 to 60 minutes to administer. Achievement scores are reported on the Rasch unIT (RIT) scale, where RIT is a linear transformation of the logit scale units of the Rasch item response theory model.

Weeks of Instruction

MAP Growth tests are administered on schedules determined by teachers and administrators at schools and school districts. As a result, test administration varies considerably

between and even within school districts. To account for differences in testing schedules within our growth analyses, we calculate how many weeks each student has been in school by the time he or she tested based on the school start date and students' testing date within the term (values ranging from 0-36 for a typical 180-day school year). For more details on the calculation of instructional weeks, see Thum and Kuhfeld (2020).

Analyses

We conduct analyses separately for rural schools and for public schools. Then, we compare the two sets of results to see to what extent rural schools differ from public schools. In addition to pooling data by grade, we also conduct the analyses separately by racial/ethnic subgroup for only rural schools, then by racial/ethnic subgroup for public schools. We then compare students within a racial/ethnic subgroup in rural school to their subgroup counterparts in public schools (e.g., rural White students to public White students). Given that students who identified as Asian, Hawaiian, or multiethnic comprised very small percentages of rural students, our racial/ethnic subgroup analyses focus only on White, Black, Hispanic, and Native American students. The common set of analyses, applied separately to rural and public schools, are as follows.

Comparison of Achievement Levels

First, we report the mean achievement level of students in each grade. These scores are plotted to show average achievement across grades levels for students in rural and public schools. Standard errors and significance tests are reported in the Appendix.

Second, to determine the extent to which comparisons between rural and public schools are a function of race and socioeconomic status, we run models with achievement at a given timepoint as the dependent variable and a dummy variable for whether the school was rural as a

baseline model. We then estimate the same model with indicator variables for student race/ethnicity, as well as school percentage free/reduced-price lunch as a control. Such models are used to determine how much the mean difference between rural and public schools changed conditional on race and socioeconomic status.

Comparison of Racial/Ethnic Achievement Gaps

To understand racial/ethnic gaps within each set of schools (rural and public), we calculate standardized mean difference in spring test scores between White students and the other subgroups (Black, Hispanic, and Native American) using Cohen's *d*. The standardized mean difference between White students' and each subgroup' scores is

$$\frac{\overline{\mathrm{RIT}}_{Wg}-\overline{\mathrm{RIT}}_{Sg}}{\sqrt{\frac{(\mathrm{N_{Wg}}-1)\mathrm{SD}^2_{Wg}+(\mathrm{N}_{Sg}-1)\mathrm{SD}^2_{Sg}}{\mathrm{N}_{Wg}+\mathrm{N}_{Sg}-2}}}, \quad (1)$$

where, for every grade g, $\overline{\mathrm{RIT}}_{Wg}$ is the mean White student test score in the spring, $\overline{\mathrm{RIT}}_{Sg}$ is the mean subgroup (Black, Hispanic, or Native American) test score in the spring, SD_{Wg} and SD_{Sg} are the standard deviations (SDs) for White students and the other subgroup, and N_{Wg} and N_{Sg} are the corresponding number of students in each group. The mean, SD, and group sample size estimates used in these calculations are reported in Appendix Table 3.

Comparison of Achievement Growth

Next, we use fall and spring achievement scores to calculate standardized gain scores for growth (pooling all students) in each grade. To do this, we estimate the standardized mean difference effect sizes between the two terms. We do this first without accounting for repeated testing within student (Equation 2). The standardized gain score between fall and spring test scores is

$$\frac{\overline{\mathrm{RIT}}_{Sg}-\overline{\mathrm{RIT}}_{Fg}}{\sqrt{\frac{(\mathrm{N_{Sg}}-1)\mathrm{SD}_{Sg}^2+(\mathrm{N}_{Fg}-1)\mathrm{SD}_{Fg}^2}{\mathrm{N}_{Sg}+\mathrm{N_{F}}g-2}}}, \quad (2)$$

where, for every grade g, $\overline{\mathrm{RIT}}_{Sg}$ is the mean spring test score, $\overline{\mathrm{RIT}}_{Fg}$ is the mean fall test score, SD_{Sg} and SD_{Fg} are the SDs in the spring and fall, and N_{Sg} and N_{Fg} are the corresponding number of students. After we do this pooling all students, we repeat the calculation for each racial/ethnic subgroup separately. Then, as a sensitivity check, we adjust the calculation to account for repeated testing.[2] The two sets of results are very similar. Sensitivity check estimates are available upon request.

Schools select the dates on which to administer fall and spring tests, so there is variation in the amount of time elapsed between the two tests that is not accounted for in the standardized gain score approach. Our third analysis accounts for differences in time passed. We calculate the average weekly growth between the fall and spring as

$$\frac{\sum_{i=1}^{N_g}\frac{\mathrm{RIT}_{Si}-\mathrm{RIT}_{Fi}}{\mathrm{Wk}_{Si}-\mathrm{Wk}_{Fi}}}{N_g}, \quad (3)$$

where RIT_{Si} is student *i*'s spring test score, RIT_{Fi} is student *i*'s fall test score, Wk_{Si} is the number of weeks of instruction the student experienced before the spring test, Wk_{Fi} is the weeks of instruction the student experienced before the fall test, and N_g is the number of unique students grade g with both fall and spring test scores. We do this first pooling all students, then separately for each racial/ethnic subgroup.

Findings

Comparison of Achievement Levels

Figure 1 compares average spring achievement for rural schools to all public schools (in all rural and non-rural locales). The corresponding mean values are reported in Appendix Table 3

(Panel A for rural schools, Panel B for public schools). For the pooled sample, rural school achievement is the same or slightly higher than public schools for both math and reading across all grade levels. However, when we examined our regression-based estimates of rural achievement, unconditional models produced a positive coefficient on the rural indicator, but the sign of the coefficient became negative when we included race and school socioeconomic status (SES) as controls in the model (all coefficients significant at the .05 level, see Appendix Table 4). This means that the rural locale is associated with higher achievement when race and school SES are not taken into consideration, but the rural locale is associated with lower achievement when we control for race and school SES. Thus, the positive differences in achievement for rural schools may be driven by demographic factors, such as serving a higher percentage of White students. We therefore examine achievement and achievement gains separately by racial/ethnic subgroup.

Comparison of Racial/Ethnic Achievement Gaps

As shown in Figure 1, rural White students scored slightly lower than public school White students (gaps of .05 to .11 SDs). Rural Native Americans scored lower than public school Native American students across 3rd to 8th grade, with differences ranging from .17 to .23 SDs. Rural Black and Hispanic students scored slightly higher than Black and Hispanic students in public schools in most grades and subjects, with the largest differences observed in Grades 3-5.

Table 2 presents the spring achievement gaps between White students and Black, Hispanic, and Native American students and compares each gap in rural schools to the corresponding gap in public schools. For example, for 3rd grade math, rural White student achievement was higher than rural Black student achievement by .61 SDs; public school White student achievement was higher than public school Black student achievement by .73 SDs. For

all grades and subjects, White-Black and White-Hispanic gaps are smaller in rural schools than public schools: rural White students have lower average achievement than public school White students, and rural Black and Hispanic students have higher average achievement than public school Black and Hispanic students. White-Native American gaps are larger in rural schools than public schools: although rural White students have lower average achievement than public school White students, rural Native American students are even further behind public school Native American students. All rural-public achievement gap differences are statistically significant.

Comparison of Achievement Gains

Figure 2 presents fall-to-spring standardized gain scores in math and reading for the pooled sample and by racial/ethnic subgroup. The corresponding gain score estimates are reported in Table 3. For the pooled sample and for subgroups, academic gains are highest in 3rd grade and slow down over time. Looking at the pooled data, students in rural schools had significantly larger achievement gains than students in public schools in math and reading across 3rd to 8th grade (except for 7th grade reading with a positive but insignificant difference). But the growth patterns differ by race/ethnicity. Rural White students had higher gain scores than public school White students, which were significant for math and 3rd to 5th grade reading. Rural Native American and Hispanic students had significantly lower gain scores compared to their racial/ethnic peers in public schools across most subject-grade combinations. Rural Black students had significantly greater gains than public school Black students in between 3rd and 5th grade but significantly smaller gains between 5th and 8th grade.

Table 3 also shows estimated weekly growth in RIT points. For instance, in 3rd grade math, rural students had a weekly gain of .466 RIT points while public school students had a

weekly gain of .460 RIT points; the difference is statistically significant but practically small (i.e., 0.216 RIT points for the school year). Looking at all subgroups pooled, rural students had significantly higher weekly growth compared to public school students across grades and subjects. Rural White and Hispanic students also had significantly higher weekly growth than public school White students. Rural Native American students had significantly lower weekly growth than public school Native American students in most subject-grade combinations. The difference between rural and public school Black students range from significantly positive to significantly negative depending on subject and grade; however, all differences are so small in magnitude (e.g., .002 RIT points weekly in 3rd grade math, equivalent to .072 RIT points for the school year) that they could be considered practically insignificant.

Discussion

This study is the first to report achievement and growth for a large number of rural schools in the nation. We find that overall achievement in rural schools is higher relative to all public schools, but that relationship reverses when controlling for race/ethnicity and school SES. That is to say, some of rural schools' observed advantage in overall achievement may be due to the fact they serve a lower percentage of students of color. We also find that growth effect sizes are larger in rural schools overall, but there is considerable heterogeneity by race/ethnicity. Racial/ethnic minority students grow slower in rural schools than their White peers and often slower than their same-race/ethnicity counterparts in all public schools. Such differences in growth are likely contributing to the development of racial achievement gaps as students move through school.

These findings underscore the importance of tracking student progress in rural schools and provide insights that can help policymakers make decisions about resource allocation. For

example, growth data provide insights into how achievement gaps evolve in rural settings. In our national sample, Native American and Hispanic students show much lower academic growth during early and middle grades than their White peers and their same-race/ethnicity peers in all public schools. Rural middle schools also evidenced slower growth among Black students than White students, and growth for rural Black students dips below the public-school Black student average around 6th grade. Though none of our results are causal nor tied to specific policy initiatives, they are nonetheless commensurate with a theory that targeted investments in achievement for racial subgroups could be warranted in rural locales.

While few studies examine rural achievement and growth in a holistic way, there have been studies of rural education that could provide guidance on the kinds of academic supports that may be useful in addressing sources of inequality we see in our data (e.g., Lee & McIntire, 1999, 2000). One potential area of focus is curriculum access. For example, compared to students in other locales, rural students take fewer math courses, in part because they have less access to advanced math courses (Anderson & Chang, 2011; Graham, 2009). Prior research (Anderson & Chang, 2011; Graham, 2009) has suggested federal and state policies could support rural schools in developing rigorous and relevant curriculum by providing training and support to both pre-serve and in-service teachers.

Prior research has also pointed out that funding for rural schools is highly variable both between and within states (Brenner, 2016; Strange, 2011). Such studies have found that historical school funding formulas often leave rural schools, especially those with lower student enrollment, at a disadvantage (Brenner, 2016; Strange, 2011). New provisions under ESSA promise more equitable distribution of resources (Brenner, 2016), but more research is needed to determine how those funds are being used and which investments produce the largest learning

gains. Regardless of specific funding levels, our results indicate that state and federal government may wish to invest more resources in monitoring and supporting Black, Hispanic, and Native American students in rural locales.

Limitations

Despite the potential usefulness of our findings to educators and policymakers, our results should be interpreted in light of a few study limitations. First, as previously noted, the analyses are descriptive and not intended to establish causal links between rural education and achievement. Second, schools in the sample self-selected into administering the MAP Growth assessments, though some concerns around selection bias might be alleviated by the fact the GRD covers a substantial portion of rural students and the sample closely resembles rural schools in the nation in terms of demographic composition. Third, we were unable to compare achievement or growth by student-level socioeconomic status, English Learner status, and other factors that might affect student outcomes because such variables were not available in our data. Finally, the mechanisms driving achievement and growth in rural schools remain unexplored. Mixed methods studies could be especially fruitful in understanding such mechanisms going forward.

Conclusion

Nearly one in five U.S. students attends a rural school, yet we know very little about achievement, achievement gaps, and academic growth in those schools. This lack of evidence occurs despite the fact that the federal government and states are making considerable financial investments in rural schools. Our findings indicate that, although achievement in rural schools is, on average, higher than across all public schools nationwide, these advantages disappear after controlling for race/ethnicity and school-level SES. Further, racial/ethnic minority groups are

often growing slower than the national average while White students are often growing faster than the national average. These patterns likely contribute to the development of achievement gaps as students progress through school. Our findings provide educators and policymakers with a rare, extensive view of achievement in rural schools and may suggest opportunities for targeted investment in those schools.

Notes

[1] NAEP 1969-1973 defined seven locales: extreme rural, low metro, high metro, main big city, urban fringe, medium city, and small places. Extreme rural schools include schools in areas with high proportions of farmer or farm worker residents, with at least some enrollment from open country or places with populations of less than 2,500. Extreme rural schools exclude schools with enrolment from suburbs of large cities or places with populations greater than 10,000.

[2] To account for repeated testing, we apply the following modified formula to students in the pooled sample with both spring and fall test scores. In this case, we calculate the average difference score divided by the standard deviation of the difference scores (Borenstein et al., 2009):

$$\frac{\overline{\text{RIT}}_{Sg} - \overline{\text{RIT}}_{Fg}}{\frac{SD_{RITs-RITf}}{\sqrt{2(1 - r_{RITs,RITf})}}},$$

where, for every grade g, $\overline{\text{RIT}}_{Sg}$ is still the mean spring test score, $\overline{\text{RIT}}_{Fg}$ is still the mean fall test score, $SD_{RITs-RITf}$ is the SD of the difference in spring and fall test scores for individual students, and $r_{RITs,RITf}$ is the correlation between spring and fall test scores.

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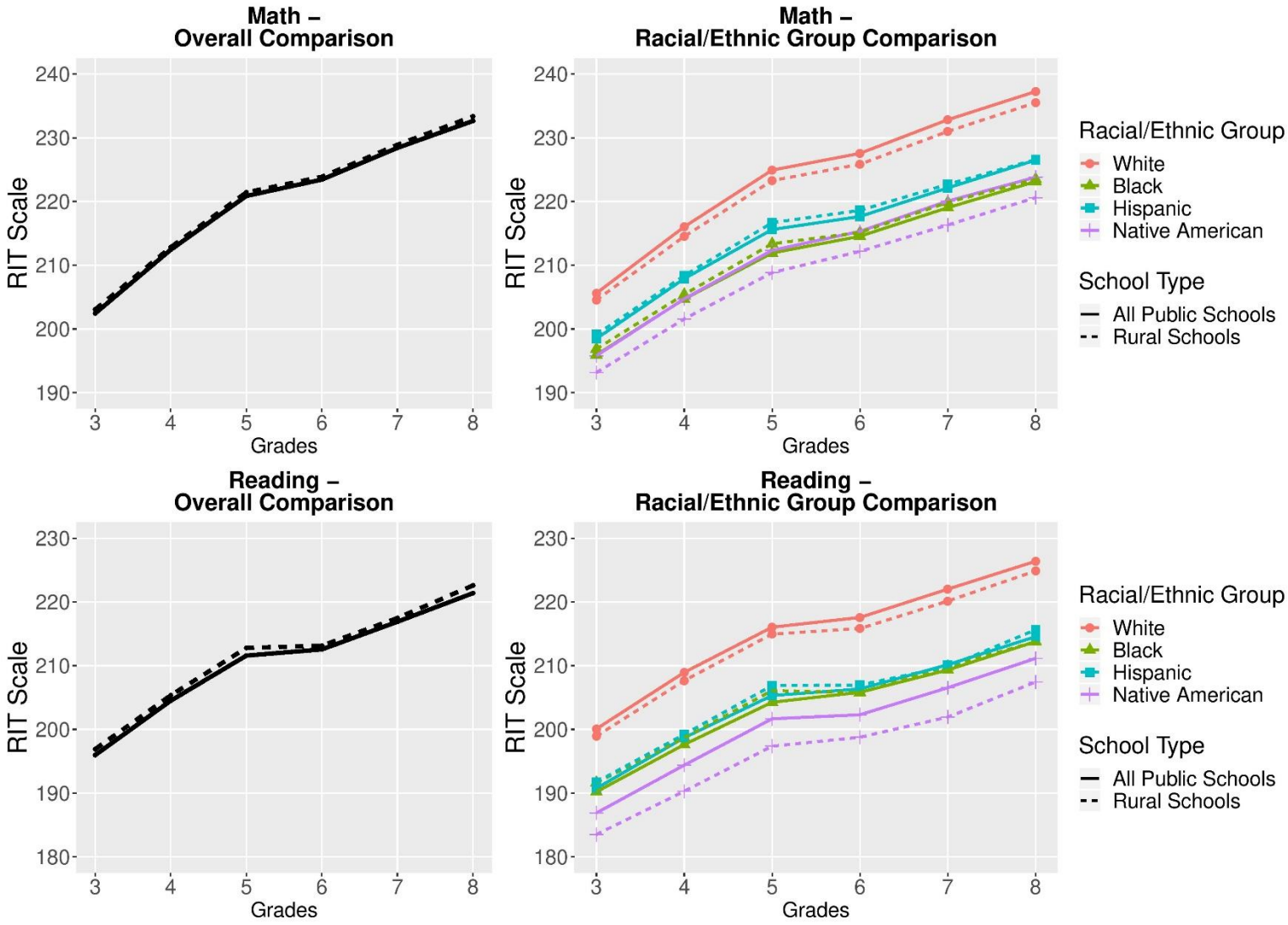
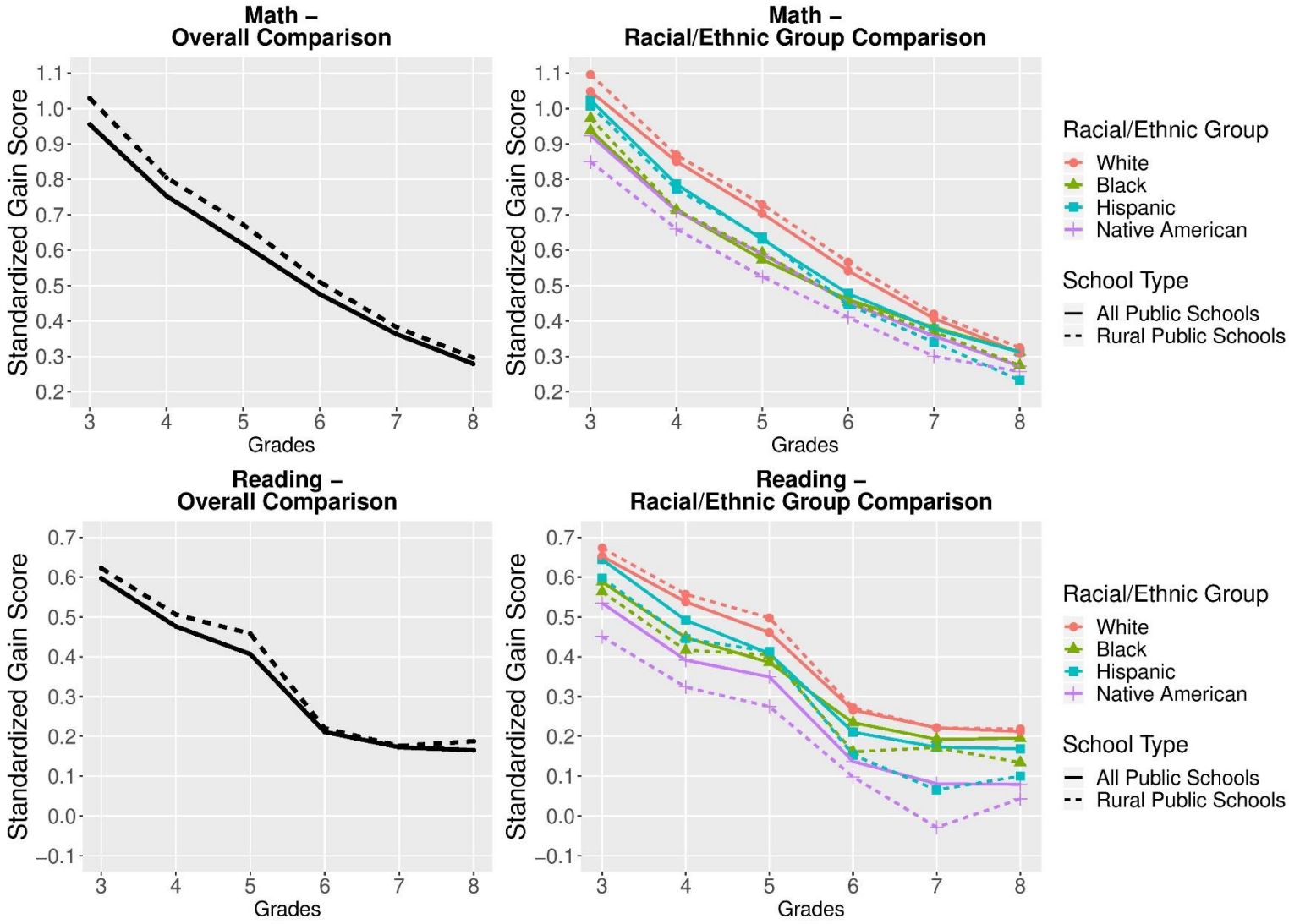
Figure 1. Academic Achievement Levels in Spring 2016-17



Note. All public vs. rural overall comparisons are small (differences in SD units ranging from .03 to .07 SDs) but statistically significant. Most racial/ethnic differences are significant (see Appendix Table 5).

Figure 2. Fall-to-Spring Growth Effect Sizes



Note. See Table 3 for statistical significance of growth effect size differences.

Table 1
Sample Summary Statistics for NWEA Schools

	Panel A: Rural Schools							Panel B: All Public Schools						
Grade	N	White	Black	Asian	Hispanic	Native American	Male	N	White	Black	Asian	Hispanic	Native American	Male
	Math							Math						
3	161312	68%	8%	2%	7%	4%	51%	861356	48%	17%	4%	17%	2%	51%
4	161964	68%	8%	2%	7%	4%	51%	845632	49%	16%	4%	18%	2%	51%
5	157594	68%	8%	2%	7%	4%	51%	838742	49%	16%	4%	17%	2%	51%
6	155756	68%	9%	2%	8%	4%	51%	818128	49%	16%	5%	18%	2%	51%
7	153143	69%	9%	2%	8%	4%	51%	802552	49%	16%	4%	18%	2%	51%
8	147736	69%	9%	2%	8%	4%	51%	757264	50%	16%	4%	18%	2%	51%
	Reading							Reading						
3	149129	67%	8%	1%	8%	4%	52%	815681	47%	18%	4%	18%	2%	51%
4	144849	67%	8%	2%	8%	4%	52%	780097	48%	17%	4%	18%	2%	51%
5	141388	68%	8%	1%	7%	4%	51%	768563	49%	17%	4%	17%	2%	51%
6	118705	67%	9%	2%	8%	4%	52%	646853	48%	17%	4%	18%	2%	52%
7	118545	68%	9%	2%	8%	4%	52%	640750	48%	17%	4%	18%	2%	52%
8	118518	68%	9%	2%	8%	4%	52%	621261	49%	17%	4%	17%	2%	51%

Table 2
Standardized Achievement Status Gaps

		Math		Reading	
Grade	Race/Ethnicity	Rural	Public	Rural	Public
3	White-Black	0.613	0.726	0.448	0.583
	White-Hispanic	0.430	0.536	0.439	0.548
	White-Native American	0.905	0.744	0.946	0.778
4	White-Black	0.655	0.771	0.540	0.663
	White-Hispanic	0.441	0.553	0.504	0.601
	White-Native American	0.929	0.775	1.040	0.858
5	White-Black	0.640	0.793	0.551	0.701
	White-Hispanic	0.425	0.568	0.501	0.637
	White-Native American	0.928	0.771	1.090	0.870
6	White-Black	0.692	0.798	0.556	0.633
	White-Hispanic	0.465	0.604	0.486	0.600
	White-Native American	0.880	0.755	0.938	0.820
7	White-Black	0.662	0.783	0.542	0.660
	White-Hispanic	0.492	0.603	0.538	0.610
	White-Native American	0.872	0.727	0.960	0.806
8	White-Black	0.678	0.761	0.596	0.661
	White-Hispanic	0.502	0.574	0.491	0.610
	White-Native American	0.840	0.723	0.932	0.803

Notes: Standardized group mean differences are reported in standard deviation units. All effect sizes are statistically significant ($p<.05$).

Table 3

Fall-to-Spring Growth Effect Sizes by Race/Ethnicity

		Math						Reading					
		Standardized Gain Score (SDs)			Weekly Growth (RIT points)			Standardized Gain Score (SDs)			Weekly Growth (RIT points)		
Grade	Race/Ethnicity	Rural	Public	Significant	Rural	Public	Significant	Rural	Public	Significant	Rural	Public	Significant
	All	1.029	0.955	*	0.466	0.460	*	0.622	0.597	*	0.380	0.373	*
	Native American	0.849	0.924	*	0.408	0.425	*	0.451	0.535	*	0.306	0.335	*
3	Black	0.973	0.938	*	0.438	0.436		0.563	0.588	*	0.342	0.355	*
	Hispanic	1.008	1.024	*	0.463	0.459	*	0.598	0.644	*	0.380	0.379	
	White	1.096	1.048	*	0.474	0.470	*	0.673	0.652	*	0.393	0.383	*
	All	0.805	0.753	*	0.396	0.393	*	0.506	0.476	*	0.286	0.278	*
	Native American	0.660	0.710	*	0.342	0.350	*	0.324	0.392	*	0.240	0.251	*
4	Black	0.714	0.712	*	0.349	0.358	*	0.416	0.448	*	0.262	0.265	*
	Hispanic	0.773	0.787	*	0.387	0.381	*	0.446	0.492	*	0.280	0.283	*
	White	0.869	0.851	*	0.405	0.408	*	0.557	0.538	*	0.296	0.284	*
	All	0.672	0.616	*	0.366	0.357	*	0.458	0.407	*	0.237	0.226	*
	Native American	0.525	0.589	*	0.299	0.319	*	0.275	0.349	*	0.197	0.210	*
5	Black	0.592	0.573	*	0.318	0.315	*	0.405	0.386	*	0.224	0.223	
	Hispanic	0.636	0.631	*	0.347	0.335	*	0.413	0.408		0.238	0.229	*
	White	0.729	0.704	*	0.376	0.376		0.498	0.461	*	0.242	0.229	*
	All	0.510	0.476	*	0.288	0.280	*	0.220	0.211	*	0.172	0.161	*
	Native American	0.410	0.452	*	0.241	0.241		0.098	0.137	*	0.148	0.148	
6	Black	0.452	0.460	*	0.248	0.252	*	0.162	0.235	*	0.141	0.151	*
	Hispanic	0.446	0.477	*	0.265	0.258	*	0.154	0.211	*	0.157	0.153	*
	White	0.566	0.542	*	0.298	0.296	*	0.272	0.266		0.184	0.168	*
	All	0.382	0.363	*	0.236	0.232	*	0.176	0.173		0.139	0.133	*
	Native American	0.300	0.357	*	0.184	0.191	*	-0.028	0.081	*	0.081	0.100	*
7	Black	0.369	0.382	*	0.215	0.215		0.172	0.193	*	0.137	0.127	*
	Hispanic	0.340	0.377	*	0.229	0.213	*	0.066	0.173	*	0.158	0.132	*
	White	0.420	0.407	*	0.241	0.243	*	0.221	0.221		0.140	0.136	*
	All	0.296	0.279	*	0.198	0.192	*	0.188	0.165	*	0.118	0.117	*
	Native American	0.257	0.272	*	0.155	0.163	*	0.043	0.079		0.095	0.102	*
8	Black	0.274	0.313	*	0.180	0.177	*	0.134	0.195	*	0.116	0.116	
	Hispanic	0.232	0.312	*	0.188	0.179	*	0.100	0.169	*	0.129	0.123	*
	White	0.324	0.310	*	0.203	0.200	*	0.218	0.212		0.119	0.116	*

* $p<0.05$. Standardized gain scores are in standard deviation units and are calculated using Formula (2). Weekly growth is in RIT points and calculated using Formula (3).

Appendix Tables

Table 1 presents the characteristics of schools in the public school data set ("NWEA") and schools in the Common Core of Data that served at least 10 students across Grades 3 to 8 ("Pop"). We present comparisons separately by subject-grade. For each subject-grade combination, NWEA public schools make up about 25% of schools in the population. Panels A and B compare NWEA rural schools and the population of rural schools in the CCD. The sample and the population of rural schools are similar in the percentages of Black, White, Asian, and FRPL-eligible students served; but rural schools in the analytic sample had slightly lower percentages of Hispanic students and slightly higher percentages of Native American students. Panels C and D compare NWEA public schools to all public schools in the CCD. The percentages of FRPL, White, Asian, and Native American students are similar. NWEA public schools served slightly higher percentages of Black students and lower percentages of Hispanic students compared to all public schools in the CCD.

Tables 2 presents NWEA public school data coverage as percentages of all public schools in each census region and division. Panel A shows the percentage of rural schools in the CCD that are in the analytic sample by grade. Panel B shows the percentage of all public schools in the CCD that are in the full data set by grade.

Table 3 provides spring achievement means, SDs, and SEs used to calculate standardized mean differences across rural and public schools. Table 4 provides results from regressing standardized spring achievement on the rural locale, student race/ethnicity, and school percentage of students eligible for free or reduced-price lunch.

Table 5 provides spring achievement means and standard deviations used to calculate standardized mean differences for the four largest racial/ethnic subgroups: Native American, Black, Hispanic, and White. Panel A shows rural schools by grade. Panel B shows public schools by grade.

Appendix Table 1

Characteristics of Schools in the Population and NWEA Sample

Grade	3		4		5		6		7		8	
Data	Pop	NWEA	Pop	NWEA	Pop	NWEA	Pop	NWEA	Pop	NWEA	Pop	NWEA
	Panel A: Math Rural Schools											
N Schools	12,118	2,796	12,097	2,761	11,774	2,706	9,400	2,105	8,558	1,819	8,528	1,801
N Students	698,772	161,223	707,363	161,930	698,530	156,908	710,625	154,611	713,525	152,327	713,977	147,030
% FRPL	0.50	0.51	0.50	0.51	0.50	0.51	0.50	0.50	0.48	0.49	0.48	0.49
% Hispanic	0.12	0.09	0.12	0.09	0.12	0.09	0.12	0.09	0.11	0.09	0.11	0.09
% Black	0.07	0.06	0.07	0.06	0.07	0.06	0.07	0.05	0.07	0.06	0.07	0.05
% White	0.73	0.74	0.73	0.74	0.73	0.74	0.73	0.74	0.73	0.73	0.73	0.74
% Asian	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
% Native American	0.04	0.07	0.04	0.07	0.04	0.07	0.05	0.08	0.05	0.09	0.05	0.09
	Panel B: Reading Rural Schools											
N Schools	12,118	2,755	12,097	2,715	11,774	2,651	9,400	1,972	8,558	1,726	8,528	1,707
N Students	698,772	148,461	707,363	144,047	698,530	139,880	710,625	116,551	713,525	116,797	713,977	116,820
% FRPL	0.50	0.51	0.50	0.51	0.50	0.51	0.50	0.50	0.48	0.49	0.48	0.49
% Hispanic	0.12	0.09	0.12	0.09	0.12	0.09	0.12	0.09	0.11	0.09	0.11	0.09
% Black	0.07	0.06	0.07	0.06	0.07	0.06	0.07	0.06	0.07	0.06	0.07	0.06
% White	0.73	0.74	0.73	0.74	0.73	0.74	0.73	0.73	0.73	0.73	0.73	0.73
% Asian	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
% Native American	0.04	0.07	0.04	0.07	0.04	0.07	0.05	0.08	0.05	0.09	0.05	0.08

Appendix Table 1 (continued)

Grade	3		4		5		6		7		8	
Data	Pop	NWEA	Pop	NWEA	Pop	NWEA	Pop	NWEA	Pop	NWEA	Pop	NWEA
	Panel C: Math Public Schools											
N Schools	48,919	11,613	48,533	11,285	46,868	10,981	31,032	7,345	25,643	6,028	25,634	5,908
N Students	3,832,704	878,165	3,816,985	861,850	3,771,581	851,613	3,708,056	828,487	3,720,182	812,812	3,708,910	766,003
% FRPL	0.51	0.49	0.51	0.49	0.51	0.49	0.51	0.50	0.50	0.50	0.50	0.50
% Hispanic	0.25	0.20	0.25	0.20	0.25	0.20	0.24	0.20	0.22	0.20	0.22	0.20
% Black	0.15	0.17	0.15	0.17	0.15	0.17	0.15	0.18	0.16	0.19	0.16	0.19
% White	0.49	0.52	0.49	0.53	0.49	0.52	0.51	0.52	0.52	0.51	0.53	0.52
% Asian	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03
% Native American	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.03
	Panel D: Reading Public Schools											
N Schools	48,919	11,616	48,533	11,247	46,868	10,919	31,032	7,157	25,643	5,865	25,634	5,758
N Students	3,832,704	828,020	3,816,985	790,228	3,771,581	775,654	3,708,056	649,243	3,720,182	643,676	3,708,910	623,276
% FRPL	0.51	0.48	0.51	0.48	0.51	0.48	0.51	0.49	0.50	0.49	0.50	0.49
%Hispanic	0.25	0.20	0.25	0.20	0.25	0.20	0.24	0.20	0.22	0.20	0.22	0.20
% Black	0.15	0.18	0.15	0.18	0.15	0.18	0.15	0.19	0.16	0.20	0.16	0.19
%White	0.49	0.52	0.49	0.52	0.49	0.51	0.51	0.51	0.52	0.51	0.53	0.51
% Asian	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03
% Native American	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.03

Appendix Table 2
NWEA Data Coverage by Region and Division

	Panel A: Rural Schools						Panel B: All Public Schools					
	3	4	5	6	7	8	3	4	5	6	7	8
	Math											
Full Sample												
N Schools	23%	23%	23%	22%	21%	21%	24%	23%	23%	24%	24%	23%
N Students	23%	23%	22%	22%	21%	21%	23%	23%	23%	22%	22%	21%
Region												
Northeast	22%	22%	22%	22%	19%	20%	16%	16%	16%	18%	16%	16%
South	15%	15%	15%	13%	12%	12%	18%	16%	17%	15%	15%	15%
Midwest	33%	33%	33%	32%	31%	31%	46%	46%	46%	45%	43%	42%
West	26%	26%	26%	26%	25%	25%	16%	16%	17%	18%	19%	19%
Division												
Mountain	19%	18%	19%	18%	18%	18%	13%	12%	14%	13%	16%	16%
Pacific	21%	20%	20%	18%	16%	16%	24%	23%	23%	20%	20%	19%
South Atlantic	6%	5%	5%	5%	4%	5%	11%	10%	10%	9%	9%	9%
West North Central	35%	35%	35%	35%	32%	32%	23%	23%	23%	25%	24%	24%
East North Central	34%	34%	35%	36%	35%	37%	23%	23%	23%	27%	25%	25%
East South Central	20%	19%	19%	19%	19%	18%	21%	19%	19%	19%	19%	18%
West South Central	31%	31%	31%	32%	30%	30%	37%	36%	37%	35%	34%	33%
New England	36%	36%	35%	33%	32%	32%	51%	51%	51%	50%	48%	47%
Middle Atlantic	12%	12%	12%	10%	9%	9%	13%	13%	13%	14%	12%	12%

Appendix Table 2 (continued)

	Panel A: Rural Schools						Panel B: All Public Schools					
	3	4	5	6	7	8	3	4	5	6	7	8
	Reading											
Full Sample												
N Schools	23%	22%	23%	21%	20%	20%	24%	23%	23%	23%	23%	22%
N Students	21%	20%	20%	16%	16%	16%	22%	21%	21%	18%	17%	17%
Region												
Northeast	21%	21%	21%	19%	18%	18%	15%	16%	15%	16%	15%	15%
South	15%	15%	15%	12%	12%	12%	18%	17%	17%	16%	16%	15%
Midwest	33%	33%	32%	31%	30%	30%	46%	45%	46%	44%	42%	41%
West	26%	25%	26%	23%	22%	22%	16%	16%	16%	16%	18%	18%
Division												
Mountain	19%	18%	19%	17%	17%	16%	12%	12%	13%	12%	15%	15%
Pacific	20%	20%	20%	16%	15%	15%	25%	24%	24%	20%	21%	21%
South Atlantic	6%	5%	5%	5%	5%	5%	11%	10%	10%	9%	9%	9%
West North Central	34%	34%	34%	31%	28%	29%	22%	22%	22%	23%	22%	22%
East North Central	33%	33%	33%	31%	32%	32%	22%	22%	22%	25%	24%	23%
East South Central	20%	19%	20%	18%	18%	17%	22%	20%	21%	20%	19%	19%
West South Central	30%	30%	30%	30%	28%	29%	36%	35%	36%	34%	32%	32%
New England	36%	35%	35%	32%	32%	31%	52%	51%	51%	49%	47%	46%
Middle Atlantic	12%	12%	11%	10%	9%	8%	13%	13%	12%	13%	11%	11%

Appendix Table 3

RIT Scores by Term, Grade, and Subject for Public and Rural Schools

		Panel A: Rural Schools								Panel B: All Public Schools								Standardized Gaps	
		Math				Reading				Math				Reading					
Grade	Term	N	M	SD	SE	N	M	SD	SE	N	M	SD	SE	N	M	SD	SE	Math	Reading
3	F16	147,797	189.9	12.5	0.03	116,450	186.5	16.6	0.05	771,078	189.1	13.6	0.02	623,405	185.5	17.4	0.02	0.05	0.06
	W17	124,484	196.6	12.2	0.03	88,010	191.6	16.2	0.05	699,658	195.8	13.4	0.02	514,683	190.4	17.3	0.02	0.06	0.07
	S17	142,999	203.0	13.1	0.03	97,395	196.9	16.9	0.05	750,998	202.4	14.3	0.02	559,610	196.0	17.7	0.02	0.04	0.05
4	F16	148,439	201.6	13.3	0.03	105,443	196.6	17.1	0.05	757,957	201.1	14.3	0.02	560,383	195.9	17.9	0.02	0.04	0.04
	W17	124,182	206.6	13.2	0.04	78,843	200.7	17.1	0.06	683,140	206.0	14.4	0.02	451,966	199.7	18.0	0.03	0.04	0.05
	S17	143,402	212.8	14.6	0.04	92,830	205.3	17.4	0.06	742,054	212.4	15.8	0.02	530,471	204.5	18.1	0.02	0.02	0.05
5	F16	144,159	211.1	14.5	0.04	101,082	205.0	17.2	0.05	749,693	210.6	15.8	0.02	544,834	204.2	18.1	0.02	0.03	0.04
	W17	118,904	215.5	14.7	0.04	74,573	208.8	17.1	0.06	671,863	215.0	16.2	0.02	432,054	207.8	18.4	0.03	0.03	0.06
	S17	139,263	221.4	16.3	0.04	93,342	212.8	17.0	0.06	730,867	220.9	17.7	0.02	532,276	211.6	18.0	0.02	0.03	0.07
6	F16	141,290	215.9	14.9	0.04	84,882	209.1	17.7	0.06	728,570	215.4	16.1	0.02	445,257	208.5	18.7	0.03	0.03	0.03
	W17	111,229	219.3	15.3	0.05	50,832	209.6	18.3	0.08	613,333	218.7	16.6	0.02	297,000	208.7	19.4	0.04	0.04	0.05
	S17	135,226	223.9	16.4	0.04	59,359	213.1	19.0	0.08	696,698	223.4	17.7	0.02	354,012	212.6	19.7	0.03	0.02	0.03
7	F16	138,529	222.4	16.5	0.04	84,477	214.2	18.1	0.06	707,695	221.7	17.8	0.02	443,131	213.5	19.2	0.03	0.04	0.04
	W17	102,603	224.8	16.8	0.05	48,119	214.1	19.3	0.09	581,775	224.1	18.2	0.02	283,487	213.2	20.4	0.04	0.04	0.05
	S17	132,342	228.9	17.7	0.05	60,982	217.5	19.8	0.08	667,290	228.4	19.0	0.02	344,182	216.9	20.5	0.03	0.03	0.03
8	F16	133,078	228.0	17.4	0.05	84,947	219.1	17.9	0.06	667,707	227.2	18.8	0.02	433,498	218.1	19.2	0.03	0.04	0.05
	W17	98,530	229.9	17.6	0.06	47,169	219.4	19.4	0.09	550,149	229.1	19.0	0.03	273,177	218.5	20.6	0.04	0.04	0.04
	S17	122,775	233.4	18.6	0.05	60,850	222.6	19.5	0.08	610,044	232.6	19.9	0.03	326,788	221.4	20.4	0.04	0.04	0.06

Note. N=number of students, M=mean, SD=standard deviation, SE=standard error. All of the rural-public comparisons reported in this table are statistically significant.

Appendix Table 4

Associations between Rural Locale and Spring Achievement

Math	(1) G3 M1	(2) G3 M2	(3) G4 M1	(4) G4 M2	(5) G5 M1	(6) G5 M2	(7) G6 M1	(8) G6 M2	(9) G7 M1	(10) G7 M2	(11) G8 M1	(12) G8 M2
Rural	0.053***	-0.032***	0.030***	-0.052***	0.040***	-0.043***	0.031***	-0.046***	0.032***	-0.058***	0.044***	-0.057***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Asian		0.859***		0.911***		0.905***		0.899***		0.881***		0.884***
		(0.010)		(0.010)		(0.010)		(0.010)		(0.011)		(0.011)
Black		-0.072***		-0.089***		-0.108***		-0.132***		-0.134***		-0.118***
		(0.009)		(0.009)		(0.009)		(0.009)		(0.010)		(0.010)
Hispanic		0.127***		0.137***		0.126***		0.075***		0.062***		0.082***
		(0.009)		(0.009)		(0.009)		(0.009)		(0.009)		(0.010)
Multiethnic		0.331***		0.354***		0.334***		0.301***		0.284***		0.311***
		(0.010)		(0.011)		(0.011)		(0.011)		(0.011)		(0.012)
Native Hawaiian		0.119***		0.136***		0.079***		0.096***		0.023		0.119***
		(0.025)		(0.025)		(0.024)		(0.025)		(0.027)		(0.029)
Eth Unspecified		0.317***		0.320***		0.339***		0.306***		0.301***		0.285***
		(0.009)		(0.009)		(0.009)		(0.010)		(0.010)		(0.011)
White		0.504***		0.517***		0.513***		0.486***		0.473***		0.490***
		(0.009)		(0.009)		(0.009)		(0.009)		(0.009)		(0.010)
School %FRPL		-0.543***		-0.590***		-0.609***		-0.630***		-0.648***		-0.576***
		(0.004)		(0.004)		(0.004)		(0.004)		(0.004)		(0.004)
Constant	-0.010***	-0.056***	-0.006***	-0.043***	-0.008***	-0.033***	-0.006***	-0.005	-0.006***	0.018*	-0.009***	-0.024**
	(0.001)	(0.009)	(0.001)	(0.009)	(0.001)	(0.009)	(0.001)	(0.009)	(0.001)	(0.009)	(0.001)	(0.010)
Observations	750,998	750,288	742,054	741,413	730,867	730,268	696,698	696,267	667,290	666,606	610,044	609,386
R-squared	0.000	0.119	0.000	0.133	0.000	0.138	0.000	0.141	0.000	0.139	0.000	0.126

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Rural is a binary indicator that takes value 1 if the school was in a rural locale. G3 refers to 3rd grade. Results are based on ordinary least squares regressions. American Indians are the reference category.

Appendix Table 4 (continued)

Reading	(1) G3 M1	(2) G3 M2	(3) G4 M1	(4) G4 M2	(5) G5 M1	(6) G5 M2	(7) G6 M1	(8) G6 M2	(9) G7 M1	(10) G7 M2	(11) G8 M1	(12) G8 M2
Rural	0.064***	-0.016***	0.057***	-0.027***	0.081***	-0.007**	0.036***	-0.040***	0.035***	-0.058***	0.073***	-0.034***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Asian		0.759***		0.787***		0.754***		0.822***		0.812***		0.794***
		(0.012)		(0.012)		(0.012)		(0.014)		(0.015)		(0.016)
Black		0.100***		0.091***		0.065***		0.100***		0.072***		0.082***
		(0.010)		(0.011)		(0.011)		(0.013)		(0.013)		(0.014)
Hispanic		0.169***		0.189***		0.166***		0.182***		0.172***		0.169***
		(0.010)		(0.011)		(0.011)		(0.012)		(0.013)		(0.014)
Multiethnic		0.445***		0.511***		0.495***		0.465***		0.464***		0.511***
		(0.012)		(0.013)		(0.013)		(0.015)		(0.016)		(0.017)
Native Hawaiian		0.185***		0.250***		0.149***		0.117***		0.093**		0.195***
		(0.030)		(0.030)		(0.029)		(0.036)		(0.038)		(0.041)
Eth Unspecified		0.382***		0.426***		0.439***		0.407***		0.420***		0.398***
		(0.011)		(0.011)		(0.011)		(0.013)		(0.014)		(0.015)
White		0.566***		0.626***		0.623***		0.614***		0.617***		0.634***
		(0.010)		(0.011)		(0.011)		(0.012)		(0.013)		(0.014)
School %FRPL		-0.526***		-0.533***		-0.551***		-0.536***		-0.521***		-0.444***
		(0.004)		(0.004)		(0.004)		(0.005)		(0.006)		(0.006)
Constant	-0.011***	-0.124***	-0.010***	-0.169***	-0.014***	-0.166***	-0.006***	-0.151***	-0.006***	-0.161***	-0.014***	-0.217***
	(0.001)	(0.010)	(0.002)	(0.011)	(0.002)	(0.011)	(0.002)	(0.012)	(0.002)	(0.013)	(0.002)	(0.014)
Observations	559,610	558,956	530,471	529,950	532,276	531,821	354,012	353,843	344,182	343,869	326,788	326,460
R-squared	0.001	0.101	0.000	0.114	0.001	0.120	0.000	0.114	0.000	0.114	0.001	0.104

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Rural is a binary indicator that takes value 1 if the school was in a rural locale. G3 refers to 3rd grade. Results are based on ordinary least squares regressions. Native Americans are the reference category.

Appendix Table 5

Spring 2016-17 Achievement by Race/Ethnicity

		Panel A: Rural Schools								Panel B: All Public Schools								Standardized Gaps	
		Math				Reading				Math				Reading					
Grade	Race/Ethnicity	N	M	SD	SE	N	M	SD	SE	N	M	SD	SE	N	M	SD	SE	Math	Reading
3	Native American	5,737	193.1	14.1	0.19	4,505	183.5	16.3	0.24	12,406	195.8	14.2	0.13	9,822	186.9	16.8	0.17	-0.19	-0.20
	Black	11,373	196.9	12.9	0.12	8,774	191.6	16.0	0.17	125,917	195.9	13.8	0.04	104,669	190.2	16.9	0.05	0.07	0.09
	Hispanic	10,254	199.1	13.2	0.13	7,809	191.7	16.9	0.19	131,148	198.5	13.7	0.04	106,808	190.8	17.1	0.05	0.05	0.06
	White	98,015	204.5	12.5	0.04	64,682	198.9	16.3	0.06	361,550	205.6	13.2	0.02	252,200	200.1	17.0	0.03	-0.08	-0.07
4	Native American	5,710	201.6	15.1	0.20	4,028	190.3	17.5	0.28	12,022	204.7	15.4	0.14	8,584	194.4	18.0	0.19	-0.21	-0.23
	Black	11,636	205.4	14.0	0.13	8,171	198.7	16.6	0.18	121,602	204.7	15.2	0.04	94,148	197.6	17.5	0.06	0.05	0.06
	Hispanic	10,378	208.4	14.6	0.14	7,325	199.2	17.5	0.20	131,516	207.9	15.2	0.04	99,747	198.7	17.4	0.06	0.03	0.03
	White	98,298	214.5	13.9	0.04	62,162	207.7	16.6	0.07	363,242	216.0	14.6	0.02	248,330	209.0	16.9	0.03	-0.10	-0.08
5	Native American	5,737	208.8	16.6	0.22	3,890	197.4	18.3	0.29	12,108	212.3	16.9	0.15	8,437	201.7	18.7	0.20	-0.21	-0.23
	Black	10,900	213.4	15.6	0.15	7,448	206.1	16.8	0.20	116,932	211.9	16.7	0.05	89,640	204.3	17.8	0.06	0.09	0.10
	Hispanic	10,212	216.7	16.1	0.16	7,004	206.9	17.3	0.21	128,945	215.6	16.8	0.05	95,995	205.3	17.8	0.06	0.06	0.09
	White	95,684	223.3	15.5	0.05	63,547	215.0	16.0	0.06	358,718	224.9	16.3	0.03	255,016	216.0	16.5	0.03	-0.10	-0.07
6	Native American	5,499	212.2	17.0	0.23	2,966	198.8	18.5	0.34	11,501	215.3	17.2	0.16	6,320	202.3	19.1	0.24	-0.18	-0.19
	Black	11,641	215.1	15.9	0.15	6,038	205.7	18.0	0.23	108,534	214.5	16.7	0.05	66,303	205.8	18.4	0.07	0.04	*0.00*
	Hispanic	10,635	218.6	16.4	0.16	5,426	207.0	18.6	0.25	125,387	217.6	17.0	0.05	72,020	206.3	19.0	0.07	0.06	0.03
	White	92,614	225.8	15.4	0.05	38,299	215.8	18.2	0.09	345,823	227.6	16.2	0.03	157,080	217.6	18.6	0.05	-0.11	-0.09
7	Native American	4,864	216.3	17.7	0.25	2,466	201.9	19.5	0.39	10,617	220.1	18.1	0.18	5,645	206.5	20.1	0.27	-0.21	-0.23
	Black	11,136	219.9	17.0	0.16	5,471	209.9	18.9	0.26	104,448	219.0	17.9	0.06	61,419	209.3	19.4	0.08	0.05	0.03
	Hispanic	10,326	222.7	17.5	0.17	5,627	209.9	20.1	0.27	120,288	222.1	18.4	0.05	68,770	210.2	20.1	0.08	0.03	-0.01
	White	91,378	231.0	16.8	0.06	40,335	220.1	18.9	0.09	334,476	232.8	17.5	0.03	157,731	222.0	19.2	0.05	-0.10	-0.10
8	Native American	4,418	220.6	18.5	0.28	2,105	207.4	20.4	0.44	9,613	223.8	18.4	0.19	5,025	211.1	20.2	0.29	-0.17	-0.18
	Black	10,465	223.5	17.6	0.17	5,422	213.8	19.2	0.26	97,688	223.1	18.5	0.06	57,269	213.8	19.4	0.08	*0.02*	*0.00*
	Hispanic	8,780	226.6	18.6	0.20	4,812	215.6	20.4	0.29	109,136	226.5	19.2	0.06	61,888	214.6	20.5	0.08	*0.00*	-0.03
	White	85,524	235.5	17.7	0.06	41,062	224.9	18.6	0.09	308,297	237.3	18.6	0.03	155,468	226.4	18.9	0.05	-0.09	-0.05

Note. N=number of students, M=mean, SD=standard deviation, SE=standard error. The standardized gaps for the rural-public comparisons that are not statistically significant are italicized.