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Graduation Rates in Arkansas

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ARKANSAS EDUCATION REPORT
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GRADUATION RATES IN ARKANSAS

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EXECUTIVE SUMMARY

In April 2014, the National Center for Education Statistics published a national report on state-level graduation rates in 2010-11 and 2011-12. The news was positive for the nation, as the national rate reached 80% for the first time, and for Arkansas, as students in the Natural State boasted higher than average rates in both years. While the statewide news was good, Arkansans may well be interested in the graduation rates of particular schools across the state.

Thus, in this report, we examine graduation rate data for the 2011-12 and 2012-13 school years for 273 high schools across the state of Arkansas. As far as we can tell, this is the first statewide analysis of high school graduation rates using the new and more meaningful measures. We first present statewide overall and subgroup school-level graduation rates for the state as a whole and by region. We further examine graduation rates by school size, poverty rate, racial composition, rural or urban classification, and levels of student achievement. In our initial analyses, we examine how each of these variables is individually related with school graduation rates. In each case, we consider both the graduation rate of the overall student body and the graduation rate for the specific group of students known as TAGG (Targeted Achievement Gap Group)¹ students. We then conduct a multivariate analysis, which examines how regional characteristics, school grade configuration, cohort group achievement, cohort group poverty and racial composition, and school size simultaneously relate to overall and TAGG school graduation rates.

Key Findings from Initial Analyses:

School Size

- In both years and for both graduation rate outcomes (overall student population and TAGG students), smaller schools have higher graduation rates than larger schools.
- **On average, the overall graduation rates of extra-small schools (enrollment less than 350) are greater than the rates in any of the groups of larger schools.**
- **These differences in favor of smaller schools are most pronounced in analyses of graduation rates for TAGG students.**

Poverty Rates

- Schools serving greater percentages of economically-disadvantaged students (as measured by eligibility for free or reduced priced lunches, or FRL) have lower overall graduation rates for 2011-12 and 2012-13.

¹The Targeted Achievement Gap Group (TAGG) includes special education, free or reduced lunch (FRL)-eligible, and limited English proficiency (LEP) students. Students that meet more than one of these criteria are only included once in the group.

- Schools classified as high-poverty (FRL-eligible student population greater than 66%), on average, have significantly lower overall graduation rates than schools with 53-65% FRL-eligible student populations.
- However, the level of student economic disadvantage is not related to graduation rates for TAGG students in particular.

Racial Composition

- Schools serving greater percentages of students from racial minority groups have lower overall and TAGG graduation rates for 2011-12 and 2012-13.
- Schools classified as highest-minority (minority student population greater than 49%), on average, have significantly lower overall and TAGG graduation rates than schools with 44% or less minority student populations.

Rural/Urban Classification

- Rural schools have higher overall and TAGG graduation rates for 2011-12 and 2012-13 than do urban schools.

Key Findings from Multivariate Analysis:

- In models simultaneously considering each of these independent factors, we find that school size, poverty, and being located in the Central region of the state are negatively correlated with overall graduation rates for 2011-12. As for 2012-13, school size, poverty, and racial composition are negatively correlated with overall graduation rates.
- In analyses examining the graduation rates for TAGG students in particular, we find that school size, poverty, and being located in the Central region of the state are negatively correlated with 2011-12 TAGG graduation rates. School size and poverty size are negatively correlated with 2012-13 TAGG graduation rates.
- Overall, then, we find that two variables in particular are negatively related to high school graduation rates in Arkansas in each year and for both overall and TAGG analyses: school size and school poverty rate.
- **In each model run, we find that larger high schools and schools serving more economically-disadvantaged students have lower graduation rates.**

Highest Graduation Rates for Groups of Arkansas Schools

While the overall analyses and the significant differences among predictor variables might be interesting, many readers in the state may well be more interested in learning which high schools were the most successful at graduating students on time in the past couple of years. Thus, in this report, we also present lists of the schools with the highest graduation rates across the state and by region. In addition, we introduce our own OEP GRAD Index, which highlights the graduation rate “performance” of each high school by comparing the schools’ actual graduation rates to the rates that would be expected at the school given the student population served. The GRAD (Graduation Regression Adjusted

Differences) Index is calculated by taking the deviation of each school’s overall and TAGG graduation rates from the school’s predicted values based on the multiple regression analyses. Therefore, a school with greater overall and TAGG graduation rates than its predicted values will have a greater GRAD Index. Since this report utilizes graduation rate data from the 2011-12 and 2012-13 school years, we present the top schools for 2011-12 and for 2012-13 based on their GRAD Index from each year. (The GRAD Index data and details are presented in an accompanying Excel Databases on the OEP web site at <http://www.officeforeducationpolicy.org/arkansas-schools-data-graduation-rate/>.)

In the two tables that follow, we first present the list of the Arkansas high schools with the highest raw graduation rates for both overall and TAGG students; second, we present the list of the high schools with the top GRAD index scores in the state. The full report includes additional tables for the top schools in each region as well as the list of top schools across the state.

Table A1: Top 20 schools in Arkansas based on actual graduation rates, 2011-12 and 2012-13

	2011-12 Overall Rate	2011-12 TAGG Rate	2012-13 Overall Rate	2012-13 TAGG Rate	Simple Average
1. Haas Hall Academy	100%	100%	100%	100%	100%
1. Lisa Academy North	100%	100%	100%	100%	100%
1. Mammoth Spring High School	100%	100%	100%	100%	100%
1. Mount Ida High School	100%	100%	100%	100%	100%
1. Oark High School	100%	100%	100%	100%	100%
1. Scranton High School	100%	100%	100%	100%	100%
1. Umpire High School	100%	100%	100%	100%	100%
1. Wickes High School	100%	100%	100%	100%	100%
9. Salem High School	98%	97%	98%	100%	98.5%
10. Lisa Academy High	100%	100%	98%	96%	98.4%
11. Horatio High School	96%	98%	100%	100%	98.3%
12. Maynard High School	95%	95%	100%	100%	97.7%
13. Izard County Cons. High School	95%	100%	97%	97%	97.1%
14. Viola High School	100%	100%	93%	95%	96.9%
15. Danville High School	94%	93%	100%	100%	96.7%
15. Rural Special High School	94%	92%	100%	100%	96.7%
17. Bruno-Pyatt High School	100%	100%	92%	95%	96.6%
18. Westside High School	95%	95%	98%	98%	96.4%
19. Tuckerman High School	96%	94%	98%	97%	96.3%
19. Elkins High School	94%	92%	99%	100%	96.3%

* Based on an average of the 2011-12 and the 2012-13 Overall and TAGG graduation rates for each school.

Table A2: Top 20 schools in Arkansas based on GRAD Index, 2011-12 and 2012-13

	2011-12 Overall Rate	2011-12 TAGG Rate	2012-13 Overall Rate	2012-13 TAGG Rate	GRAD Index*
1. Lisa Academy High	100%	100%	98%	96%	17.7%
2. Lisa Academy North	100%	100%	100%	100%	16.5%
3. ESTEM High Charter	98%	93%	97%	97%	16.0%
4. Danville High School	94%	93%	100%	100%	14.6%
5. Oark High School	100%	100%	100%	100%	13.2%
6. Scranton High School	100%	100%	100%	100%	12.8%
7. KIPP Delta Collegiate	96%	95%	93%	94%	12.1%
8. Parkview Magnet High School	94%	91%	95%	93%	11.9%
9. Wickes High School	100%	100%	100%	100%	11.8%
10. Horatio High School	96%	98%	100%	100%	10.4%
10. Mineral Springs High School	100%	100%	90%	91%	10.4%
12. Western Yell Co. High School	95%	93%	96%	94%	10.3%
12. Mammoth Spring High School	100%	100%	100%	100%	10.3%
14. Mount Ida High School	100%	100%	100%	100%	10.2%
15. Westside High School	95%	95%	98%	98%	10.0%
16. Umpire High School	100%	100%	100%	100%	9.9%
17. North Little Rock High School	73%	63%	92%	89%	9.8%
17. Haas Hall Academy	100%	100%	100%	100%	9.8%
19. Salem High School	98%	97%	98%	100%	9.7%
20. Augusta High School	90%	90%	88%	86%	9.6%
20. Academics Plus High School	95%	100%	94%	89%	9.6%

* Based on an average of the 2011-12 and the 2012-13 GRAD Index values for each school.

Conclusions and Implications

In this report, we present data from the Arkansas Department of Education on graduation rates for Arkansas high schools in 2011-12 and 2012-13. This is the first statewide analysis of high school graduation rates using the relatively new four-year adjusted cohort method to compute these rates. This report is particularly timely as the National Center for Education Statistics (NCES) recently (April 2014) published a nationwide graduation report using the new and more meaningful measures. In the NCES national analysis, Arkansas students boasted rates that were above the national average, both overall and for subgroups of students.

The data presented in this report are simply the initial step to the long-term examination of which schools and which student groups are meeting the Arkansas' graduation rate target and goals. Overall, this report serves two purposes: to investigate what school characteristics are related to grad rate and to identify schools across the state with the top grad rates. With regard to the first purpose, the answer appears straightforward: in each model run, we find that larger high schools and schools serving more economically-disadvantaged students have lower graduation rates.

It is perhaps somewhat surprising that high school size, or enrollment, is consistently negatively correlated with both overall and TAGG graduation rates. This is interesting in Arkansas because the largest high schools and districts often boast relatively high test score results. While these results are not necessarily causal, they do remind us that smaller high schools in the state may provide environments that are conducive to keeping students in school through graduation. Indeed, small-school advocates have consistently made the claim that small schools provide greater opportunities for student involvement, student engagement, meaningful interactions between students and educators. Students in larger schools, on other hand, may be at greater risk of “falling through the cracks” and disappearing from the school community and thus not making it through to graduation.

Of course, this report does not confirm the hunches of small-school advocates, but it might provide some insights for school leaders in various communities in Arkansas who must make decisions regarding school sizes and school configurations for their students.

I. INTRODUCTION

It is well known that graduating from high school is an important gateway to increased professional opportunities and greater lifetime earnings. Understandably, many policymakers believe that high schools and school districts should be held accountable for their graduation rates.

In 2001, the No Child Left Behind (NCLB) Act required states to use high school graduation rates as a measure of high school performance. Under NCLB, collection and calculation of graduation rates were under state jurisdiction, so data were not collected, calculated, or analyzed uniformly across states. Since this time, many scholars have stressed the accurate calculation of graduation rates (see Greene 2001, Miao & Haney 2004, Warren 2005). In 2005, a report by the National Governors Association recommended that all states implement a method known as the “four-year adjusted cohort graduation rate,” which had been previously used by the National Center for Education Statistics.² In December 2008, the U.S. Department of Education amended the NCLB regulations for graduation that requires states to use the “four-year adjusted cohort graduation rate” method as an accountability measure. The 2008 regulations require the four-year adjusted cohort graduation rate to be reported and disaggregated by subgroups on state and district report cards.

In April 2014, the National Center for Education Statistics (NCES) published a national report on state-level graduation rates in 2010-11 and 2011-12. The news was positive for the nation, as the national rate reached 80% for the first time, and for Arkansas, as students in the Natural State boasted higher than average rates in both years.

The full NCES report presents information about the rates for key subgroups of students, such as low-income students, students with disabilities, and students from various racial backgrounds. Table 1 below illustrates the rates for some of these student groups for Arkansas compared to the nation. Overall, in the two school years focused on in the report, the graduation rate for Arkansas students surpassed that of the nation. Here are some key findings:

- In 2010-11, the 4-year adjusted cohort graduation rate (ACGR) was 81% for Arkansas compared to 79% for the nation.
- In the most recent year (2011-12), the rate in **Arkansas improved to 84%**, while the US rate improved to the aforementioned 80%. (Only 15 states boasted higher rates in 2011-12).
- As the table below illustrates, each of the student subgroups in Arkansas “outperform” their peers across the nation in on-time graduation from high school.

²U.S. Department of Education. (2008). High School Graduation Rate. Retrieved from http://www.arkansased.org/public/userfiles/Public_School_Accountability/School_Performance/Federal_Guidance_for_High_School_Graduation_Rate_USDOE_Non-Regulatory_Guidance.pdf

Table 1: Public high school four-year adjusted cohort graduation rate (2011-12)³

	Arkansas	United States	Arkansas “Advantage”
Overall Graduation Rate	84%	80%	+4%
Subgroup Graduation Rates for:			
African American Students	78%	69%	+9%
Hispanic Students	78%	73%	+5%
White Students	87%	86%	+1%
Economically Disadvantaged Students	79%	72%	+7%
Limited English Proficient Students	77%	59%	+18%
Students with Disabilities	79%	61%	+18%

While the statewide news was good, Arkansans may well be interested in the graduation rates of particular schools across the state. Prior to 2011-12, graduation rates for high schools in Arkansas were computed based on the “completion method.” The completion method determines graduation rates by dividing dropouts by the total enrollment of each grade. Graduation rate data calculated by the completion method are not as accurate or reliable as graduation rate data calculated by the four-year adjusted cohort method.

Therefore, this report is important because it presents data on individual high school graduation rates across the state of Arkansas using the four-year adjusted cohort method which is used by other states across the nation. The 2011-12 graduation year is the first year that the four-year adjusted cohort method was tracked from the beginning of the cohort, as 2011-12 graduates began high school in 2008-09, when the U.S. Department of Education released the method requirements.

Thus, in this report, we examine graduation rate data for the 2011-12 and 2012-13 school years for 273 high schools across the state of Arkansas. As far as we can tell, this is the first statewide analysis of high school graduation rates using the new and more meaningful measures. We first present statewide overall and subgroup school-level graduation rates for the state as a whole and by region. We further examine graduation rates by school size, poverty rate, racial composition, rural or urban classification, and levels of student achievement. In our initial analyses, we examine how each of these variables is individually related with school graduation rates. In each case, we consider both the graduation rate of the overall student body and the graduation rate for the specific group of students known as TAGG (Targeted Achievement Gap Group)⁴ students. We then conduct a multivariate analysis, which examines how regional

³ Source of these figures: Table 2. Public high school 4-year adjusted cohort graduation rate (ACGR), by race/ethnicity and selected demographics for the United States, the 50 states, the District of Columbia, and other jurisdictions: School year 2011–12. <http://nces.ed.gov/pubs2014/2014391.pdf>

⁴The Targeted Achievement Gap Group (TAGG) includes special education, free or reduced lunch (FRL)-eligible, and limited English proficiency (LEP) students. Students that meet more than one of these criteria are only included once in the group.

characteristics, school grade configuration, cohort group achievement, cohort group poverty and racial composition, and school size simultaneously relate to overall and TAGG school graduation rates.

II. METHODOLOGY AND DESCRIPTION OF DATA

A. Research Questions

Over the course of this report, we conduct descriptive, correlational, and multivariate analyses to address nine distinct research questions. Below we list the research questions addressed in sections III through VII.

III. Descriptive Analyses

Research Question 1

What are statewide overall, TAGG, and subgroup graduation rates, and how have they changed over time?

Research Question 2

What are overall and TAGG graduation rates by region, and how have they changed over time?

IV. Initial Analyses

Research Question 3

How are overall and TAGG school graduation rates related to school poverty rates?

Research Question 4

How are overall and TAGG school graduation rates related to school size?

Research Question 5

How are overall and TAGG school graduation rates related to the racial composition of a school?

Research Question 6

How are overall and TAGG school graduation rates related to a school's classification as rural or urban?

Research Question 7

How are overall and TAGG school graduation rates related to school achievement?

V. Multivariate Analyses

Research Question 8

How do measures of school grade configuration, region, school rural/urban classification, school size, cohort group baseline achievement, cohort group poverty, and the racial composition of a cohort group simultaneously relate to overall and TAGG graduation rates?

B. Data Sources

Graduation rate data have been obtained by the Arkansas Department of Education (ADE), as have the demographic data used in the analyses of graduation rates by school poverty, size, and achievement. The data used to classify schools as rural or urban have been obtained from the 2010 U.S. Census. A more detailed description of each variable is provided in the discussion of each variable's relationship to overall and TAGG

graduation rates for 2011-12 and 2012-13. Before focusing on each of the questions regarding four-year adjusted cohort graduation rates in Arkansas, some definitions are provided to clarify the discussion and presentation of the data:

C. Definitions

TAGG: TAGG refers to the “Targeted Achievement Gap Group.” TAGG identifies “at-risk” students and consists of students that have been classified as special education, FRL-eligible, and/or LEP. If a student meets one or more of these criteria, they are only included once in the group.⁵

FRL: Free or Reduced Lunch eligibility is based on household size and income thresholds determined by the U.S. Department of Education. For the 2012-13 school year, an Arkansas student in a four-member household was eligible for reduced lunch if the annual household income did not exceed \$42,643 and was eligible for free lunch if the annual household income did not exceed \$29,965.⁶

LEP: LEP refers to “Limited English Proficient” students. At the time of a student’s enrollment, the Home Language Survey is administered. Students that are classified as English Learners (EL) or LEP are those who do not score at the fully proficient level.⁷

Special Education: A student that is classified as “Special Education” is a student that receives special education for a disability. The ADE defines a student with a disability as “a child evaluated in accordance with 34 CFR 300. 304 - 300. 311 and §6.00 of these regulations as having mental retardation, a hearing impairment (including deafness), a speech or language impairment, a visual impairment (including blindness), serious emotional disturbance (referred to in this part as “emotional disturbance”), an orthopedic impairment, autism, traumatic brain injury, an other health impairment, a specific learning disability, deaf-blindness, or multiple disabilities.”⁸

Minority: Although the initial portion of this report presents the statewide graduation rates for certain racial subgroups, one of our research questions involves school graduation rates and the overall minority composition of the school. The term minority includes all non-white races. For this report, the overall minority percentage of a school includes Hispanic, African American, Native American, Asian, and Hawaiian/Pacific Islander students.

⁵ U.S. Department of Education. (2012). ESEA Flexibility Request. Retrieved from http://www.arkansased.org/public/userfiles/ESEA/AR_ESEA_Flexibility_Amended_10252012.pdf

⁶ Tribiano, J. J. (2012). Child Nutrition Programs—Income Eligibility Guidelines. *Federal Register*, 77(57). Retrieved from <http://www.gpo.gov/fdsys/pkg/FR-2012-03-23/pdf/2012-7036.pdf>

⁷ U.S. Department of Education. (2013). Arkansas ESEA Flexibility Accountability Addendum. Retrieved from http://www.arkansased.org/public/userfiles/ESEA/ESEA_Flexibility_Accountability_Addendum.pdf

⁸ Arkansas Department of Education. (2008). Special Education and Related Services Definitions. Retrieved from https://arksped.k12.ar.us/rules_regs_08/1.%20SPED%20PROCEDURAL%20REQUIREMENTS%20AND%20PROGRAM%20STANDARDS/2.00%20DEFINITIONS%20w%20authority.pdf

Rural: A school is categorized as rural if it is located in a county that has been classified as non-metropolitan by the 2010 U.S. Census Bureau. Specifically, a rural county is one that does not have a core urban area with greater than 50,000 residents.

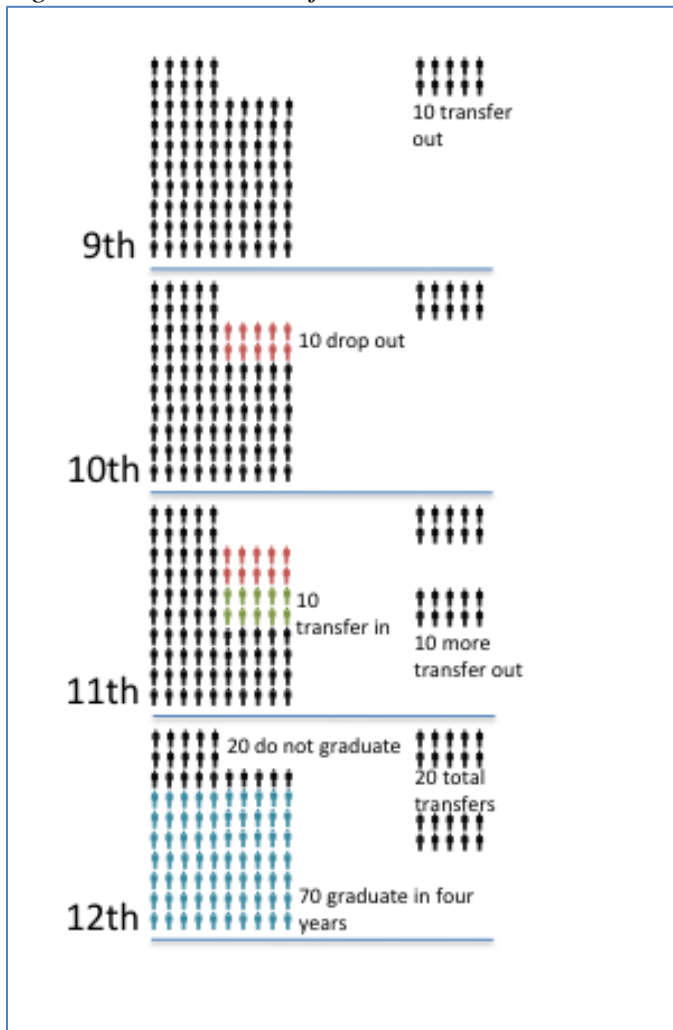
Urban: A school is categorized as urban if it is located in a county that has been classified as metropolitan by the 2010 U.S. Census Bureau. Specifically, an urban county is one that has a core urban area with greater than 50,000 residents.

Graduation Rate: Graduation rate refers to the four-year adjusted cohort graduation rate, which tracks student cohort groups from the beginning of 9th grade and follows their progress through 12th grade. The initial cohort size is calculated at the beginning of 9th grade and is adjusted for students that transfer-in, transfer out, or pass away that year and the following three years. Extended-year graduates (students who repeat a grade) are included in their original cohort group, and students who obtain a GED instead of a high school diploma are not included.

The graduation rate is the number of students that graduate in four years with a regular high school diploma divided by the total number of students that are in the adjusted cohort for that graduating class.⁹ A district may report a “lagged” four-year adjusted cohort graduation rate that includes students who graduate in the summer term after four years of high school. Figure 1 below helps to illustrate the four-year adjusted cohort method.

⁹ Smith, C.F. (2011). Every Student Counts: Arkansas Graduation Rate Calculations, Policies, and Reporting. Arkansas Department of Education. Retrieved from <http://www.slideshare.net/CharitySmith/arkansas-graduation-rate-calculations>

Figure 1: Four-Year Adjusted Cohort Method



In Figure 1, a cohort group of 100 begins 9th grade, with 10 total transferring out during the year. In 10th grade, there are no transfers in or out, but 10 students drop out (as seen in red). In the following year, there are no additional dropouts, but there are 10 transfers in and 10 transfers out. At the end of 12th grade, the cohort group has had a total of 20 total transfers out and 10 transfers in, which leaves a net of 10 transfers out. The cohort group, which originally began with 100 students, is adjusted to 90 because of the net of 10 transfers out. 10 students had dropped out, and 10 do not complete 12th grade, leaving a total of 20 students that do not graduate. This leaves the school with an adjusted cohort graduation rate of 70/90, or 78%.

Finally, we not only present graduation rate figures for the overall school population, but we also present graduation rates for the Targeted Achievement Gap Group (TAGG), a subgroup of disadvantaged students that includes special education, free or reduced lunch (FRL)-eligible, and limited English proficiency (LEP) students. Students who meet more

than one of these criteria are only included once in the group.¹⁰ We believe it is critically important to present TAGG graduation rates as we want to highlight schools that are successful at graduating disadvantaged students as well as advantaged students. Moreover, schools are being held accountable for TAGG graduation rates under the new ESEA flexibility waiver.

In order to illustrate the strength of using TAGG graduation rates as compared to the individual subgroup measures used under NCLB, consider a fictional school, Example High School, with a total of 700 students in the grade nine cohort. Most of the students in this school fit into at least one of the TAGG subgroups. Of those 700 total students, 520 are eligible for free or reduced price school lunch (FRL), 95 are categorized as special education students, 150 are in the limited English proficient (LEP) group, and a total of 600 are in the TAGG “super-subgroup”. In this fictional example, we might have the following graduation rates and computations:

- All Students: 700 in cohort, 560 graduates, graduation rate = 80%.
- FRL Students: 520 in cohort, 390 graduates, graduation rate = 75%.
- Special Ed Students: 95 in cohort, 60 graduates, graduation rate = 63%.
- LEP Students: 150 in cohort, 110 graduates, graduation rate = 69%.
- TAGG Students: 600 in cohort, 440 graduates, graduation rate = 73%.

If Example High School wanted to examine how the graduation rates of its disadvantaged students compare to the school’s overall graduation rate, it could view the graduation rates of students classified as FRL-eligible, SPED, or LEP. However, when disaggregating graduation rates by these at-risk subgroups, there is certainly overlap. Students that are classified as FRL-eligible may also be classified as LEP or SPED or even all three. One of the criticisms of NCLB was that the disaggregation by subgroup meant that students who belonged to multiple subgroups would be counted more than one time. Using TAGG accounts for the overlap that may occur by viewing graduation rates disaggregated at the subgroup-level and provides a reliable means to examine graduation rates for at-risk students.

In the section that follows, we present a descriptive overview of the graduation rates for the 273 high schools in Arkansas for 2011-12 and 2012-13.

¹⁰U.S. Department of Education. (2012). ESEA Flexibility Request. Retrieved from http://www.arkansased.org/public/userfiles/ESEA/AR_ESEA_Flexibility_Amended_10252012.pdf

III. DESCRIPTIVE ANALYSES

A. Statewide Four-Year Adjusted Cohort Graduation Rate

Research Question: What are statewide overall, TAGG, and subgroup graduation rates and how have they changed from 2011-12 to 2012-13?

Table 2: Statewide four-year adjusted cohort graduation rate (2011-12 and 2012-13)

	2011-2012	2012-2013
Arkansas Overall	85%	87%
Targeted Achievement Gap Group (TAGG)	80%	83%
Students eligible for Free or Reduced Price Lunch (FRL)	80%	83%
Limited English Proficient Students (LEP)	78%	84%
Special Education Students	79%	82%
African American Students	79%	82%
Hispanic Students	79%	84%
White Students	87%	89%

Over the past two years, statewide graduation rates have increased, going up from 85% in 2011-12 to 87% in 2012-13. Graduation rates for TAGG students have also improved over time, increasing from 80% in 2011-12 to 83% in 2012-13. In fact, students of each of the subgroups examined here have also experienced an increase in graduation rates from 2011-12 to 2012-13.

B. Regional Four-Year Adjusted Cohort Graduation Rate

Research Question: What are overall and TAGG graduation rates by region and how have they changed from 2011-12 to 2012-13?

From 2011-12 to 2012-13, overall graduation rates increased for all five regions. TAGG graduation rates increased from 2011-12 to 2012-13 for the Northwest, Central, Southwest, and Southeast regions, while the Northeast region had a slight decline in TAGG graduation rates. Despite improvement in overall and TAGG graduation rates across all regions, regional discrepancies still remain. Central Arkansas is the only region for both years in which the overall and TAGG graduation rates were below the statewide average. The overall and TAGG graduation rates of the Southwest region, which is one of the most impoverished in the state, remains above the statewide average and ahead of other regions in 2011-12 and 2012-13. Table 3 below provides the overall and TAGG graduation rates by region for the 2011-12 and 2012-13 school years. Each region differs in its number of schools, enrollment, and percentage of FRL-eligible students, which can be seen in Table 3 as well.

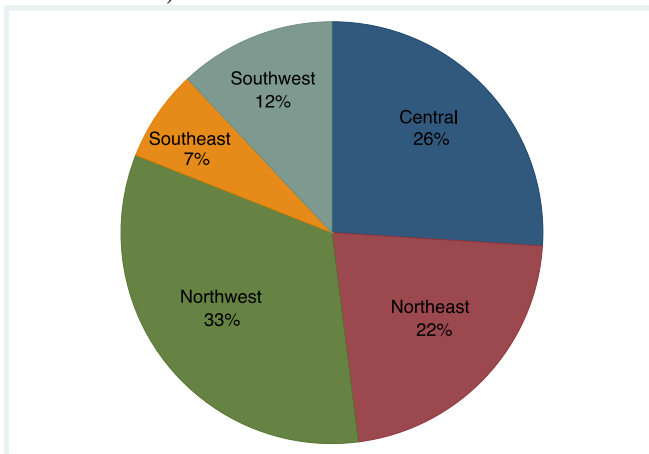
Table 3: Four-year adjusted cohort graduation rate by region (2011-12 and 2012-13)

	%FRL in HS	HS Enrollment	No. of Schools	2011-2012		2012-2013	
				Overall	TAGG	Overall	TAGG
Arkansas	53%	136,407	273	85%	80%	87%	83%
Northwest	50%	45,064	84	85%	80%	88%	83%
Northeast	57%	30,311	71	86%	82%	88%	84%
Central	47%	35,775	48	82%	75%	85%	80%
Southwest	60%	16,241	46	87%	85%	88%	86%
Southeast	68%	9,016	24	84%	82%	86%	83%

Note: %FRL and Enrollment are weighted averages for the 2011-12 and 2012-13 school years.
 * Indicates statistically significant difference across regions.

Figure 2 below illustrates the relative size of each region, based on high school enrollment for 2011-12 and 2012-13. As can be seen in the enrollment figures presented in Table 3, enrollment differs substantially across regions in the state. For example, the 2012-13 overall graduation rates of the Southwest, Northwest, and Northeast regions were greater than the statewide average. The total enrollment of these three regions makes up approximately 67% of statewide high school enrollment. Viewing graduation rates in this context illustrates that the average overall graduation rates for approximately two-thirds of students enrolled in Arkansas are above the statewide average.

Figure 2: Distribution of students enrolled in Arkansas high schools by region (2011-12 and 2012-13)¹¹

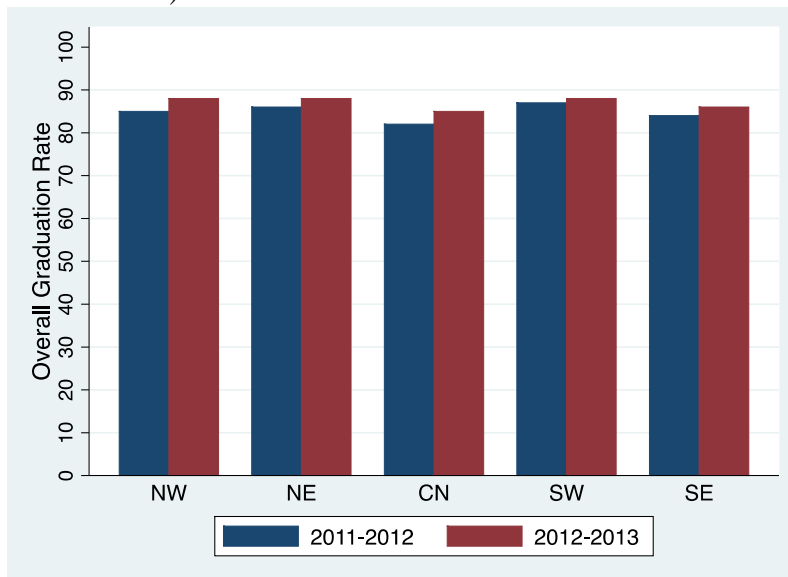


¹¹ These percentages are based on a weighted average of school enrollment in each region as a portion of the average statewide enrollment for the 2011-12 and 2012-13 school years.

1. Overall Graduation Rate

Although the overall and TAGG graduation rates of Central Arkansas are lower than the rates of all other regions for 2011-12 and 2012-13, they are only significantly different in certain instances. When examining overall graduation rates by regions, 2011-12 is the only year in which there is a statistically significant difference in overall graduation rates across regions. More specifically, there is a difference in the 2011-12 overall graduation rates of Central Arkansas and the Southwest and Northeast regions, with Central Arkansas having overall graduation rates, on average, lower than schools in the Southwest and Northeast regions.¹² As for 2012-13, there is no statistically significant difference in the overall graduation rates across regions. Figure 3 below illustrates the overall graduation rates by region from 2011-12 to 2012-13.

Figure 3: Average overall four-year adjusted cohort graduation rate by region (2011-12 and 2012-13)



2. TAGG Graduation Rate

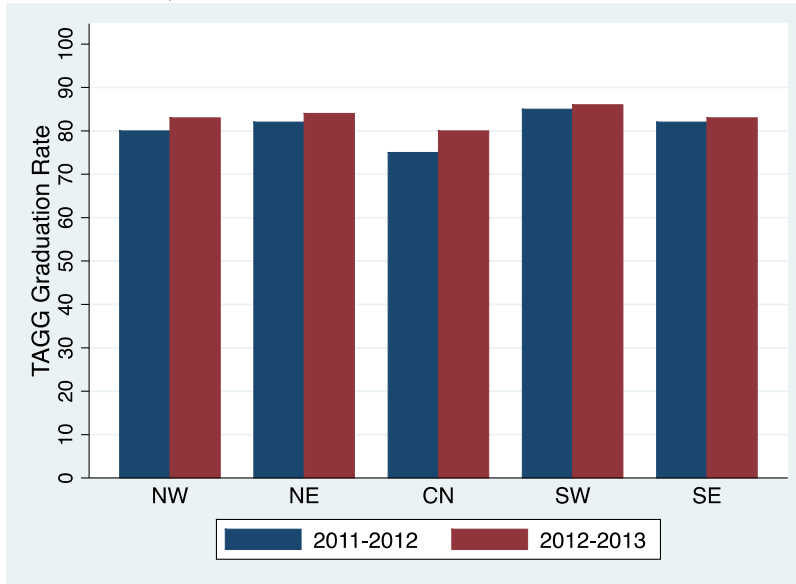
We see more variation when examining the TAGG graduation rates across regions. There is a statistically significant difference in the TAGG graduation rates of Central Arkansas and the Southwest region for both years, with Central Arkansas having lower TAGG graduation rates, on average, than the Southwest.¹³ This same pattern is seen in the TAGG graduation rates of Central Arkansas and the Northeast and Southeast regions, yet the TAGG graduation rate of Central Arkansas is only significantly lower than these two regions in 2011-12, with no significant difference in 2012-13.¹⁴ Figure 4 below presents the TAGG graduation rates for each region from 2011-12 to 2012-13.

¹² Statistical significance at the 1% (SW) and 10% (NE) levels.

¹³ Statistical significance at the 1% level in 2011-12 and 5% level in 2012-13.

¹⁴ Statistical significance at the 1% (NE) and the 5% levels (SE).

Figure 4: Average TAGG four-year adjusted cohort graduation rate by region (2011-12 and 2012-13)



3. Graduation Rate and End of Course Exams

Interestingly enough, regional graduation rates do not follow the pattern we typically observe with End of Course (EOC) exam scores. The Central region, along with the Northwest region, has the highest percentage of proficient and advanced students on the state's standardized tests. However, Central Arkansas has lower graduation rates than all other regions for the 2011-12 and 2012-13 school years. Additionally, the Southwest region has higher graduation rates than all other regions in 2011-12 and 2012-13, yet the region generally boasts EOC test scores (and other test scores for younger students) that are below the state average. Table 4 helps to demonstrate this pattern by presenting graduation rates and the percentage of students scoring proficient or advanced on the EOC examinations in 2012-13 for each region.

Table 4: Four-year adjusted cohort graduation rate and performance on EOC exams by region (2012-13)

	Graduation Rate	EOC Algebra I	EOC Geometry	EOC Literacy	EOC Biology
Arkansas	87%	77%	72%	70%	44%
Northwest	88%	82%	80%	75%	52%
Northeast	88%	76%	72%	68%	40%
Central	85%	78%	66%	70%	41%
Southwest	88%	69%	69%	64%	36%
Southeast	86%	65%	62%	59%	31%

The section that follows examines the extent to which these graduation rate outcomes are correlated with various characteristics of the high schools and the populations they serve, including school enrollment, the community’s rural or urban status, the level of economic disadvantage of the student body served, the racial composition of the student body, and even the academic ability of the student body as measured by achievement on standardized assessments.

IV. INITIAL ANALYSES

In this section, we begin by considering the relationship between graduation rates and the type of community in which the school resides. We then consider the correlation between school size and graduation rates. Next, we consider the relationship between graduation rate and student characteristics such as poverty rates and racial composition. Finally, we examine the extent to which two different important student outcome measures – test scores and graduation rates – are correlated with each other. In each case, we consider both overall graduation rate and the graduation rate for students in the TAGG student subgroup.

A. By School Rural/Urban Classification

Research Question: How are overall and TAGG school graduation rates related to a school's classification as rural or urban?

The definition of a region or county as rural or urban is relative in nature. When examining the nation, the state of Arkansas is clearly rural. According to geographic data collected by the 2010 U.S. Census, 44% of Arkansans live in a county that is considered to be rural. However, within Arkansas there exist urban, or metropolitan, counties. Central areas surrounding Pulaski County and certain counties in the Northwest region consist of core urban cities. The population size of these areas distinguishes them from more rural counties in the state, many of which have a total population that is only a fraction of that of urban areas. For this report, a high school is classified as urban or rural on the basis of how the county within which the school is located has been classified by the 2010 U.S. Census. The U.S. Census Bureau has a standardized means to measure what defines a county as rural or urban. In a general sense, a county is categorized as urban if it houses a core urban area with a population greater than 50,000. Counties with cities that have populations less than 50,000 are considered to be rural.

1. Overall and TAGG Graduation Rates by School Rural-Urban Classification: *Categorical*

There is a clear distinction between urban and rural schools in the overall and TAGG graduation rates in 2011-12 and 2012-13, with the average overall graduation rate of rural schools being greater than that of urban schools (Table 5). There is also a significant difference in the TAGG graduation rates of these two groups in 2011-12 and 2012-13.¹⁵ Schools classified as rural, on average, have greater overall and TAGG graduation rates than schools classified as urban. It is important to note demographic and enrollment differences between rural and urban schools, as any differences between the graduation rates of rural and urban schools can be attributed to differences in these characteristics. We have included the variables of percent FRL, enrollment, and number of schools in Table 5 below, along with overall and TAGG graduation rates, in order to illustrate the

¹⁵ Statistically significant at the 1% level.

differences between schools that are classified as urban and those that are classified as rural.

Table 5: Four-year adjusted cohort graduation rates by school rural-urban classification (2011-12 and 2012-13)

	% FRL	Enrollment	Number of Schools	2011-2012		2012-2013	
				Overall	TAGG	Overall	TAGG
Arkansas	53%	136,407	273	85%	80%	87%	83%
Urban	48%	67,761	86	84%	78%*	86%*	82%*
Rural	58%	68,646	187	86%	82%*	88%*	85%*

Note: %FRL and Enrollment are weighted averages for 2011-12 and 2012-13.

Rural overall and TAGG graduation rates remained above the statewide average for 2011-12 and 2012-13, while urban overall and TAGG graduation rates remained below the statewide average for both years. The magnitude of this difference can be illustrated by the total enrollment and number of schools that make up each group. Of the 273 schools that are analyzed in this report, 86 are classified as urban and 187 are classified as rural. The total enrollment of all schools classified as urban is 67,761, which is not drastically different from the total enrollment of 68,646 for all rural schools.¹⁶ Rural schools make up approximately 50% of the state's total enrollment and have overall and TAGG graduation rates higher than the state average in 2011-12 and 2012-13. Urban schools, on the other hand, enroll half of the state's student population and have average overall and TAGG graduation rates lower than the statewide average for both years. Figures 5 and 6 below illustrate the average overall graduation rates of urban and rural schools for 2011-12 and 2012-13.

¹⁶ Enrollment is based on a weighted average of enrollment for the 2011-12 and 2012-13 school years.

Figure 5: Overall four-year adjusted cohort graduation rates for urban and rural schools (2011-12 and 2012-13)

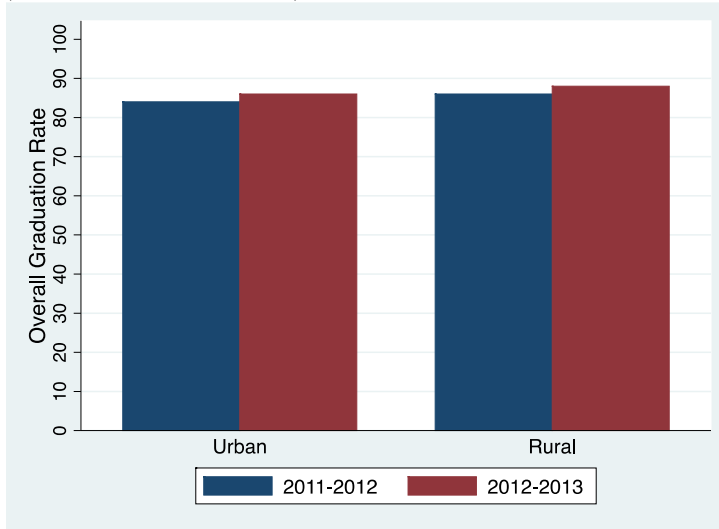
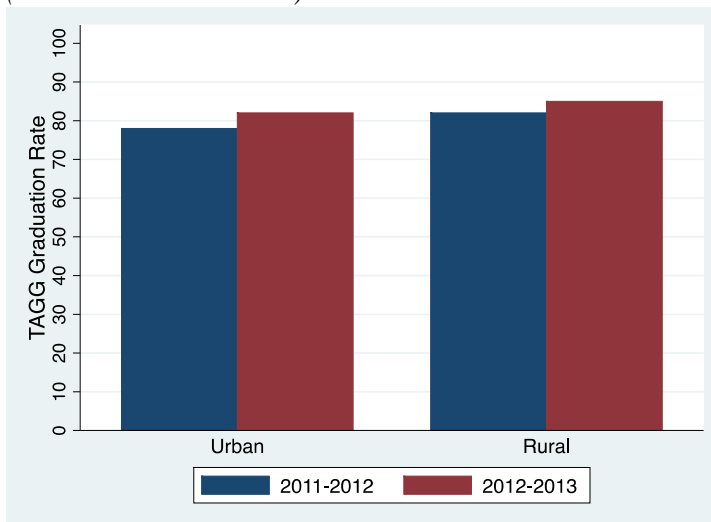


Figure 6: TAGG four-year adjusted cohort graduation rates for urban and rural schools (2011-12 and 2012-13)



2. Key Findings

- Overall and TAGG graduation rates of schools classified as rural, on average, are greater than those of schools classified as urban in 2011-12 and 2012-13.
- Rural schools outnumber urban schools, yet they make up approximately 50% of statewide high school enrollment.
- Urban schools have a greater percentage of FRL-eligible students than rural schools, which helps to explain the lower graduation rates of urban schools.

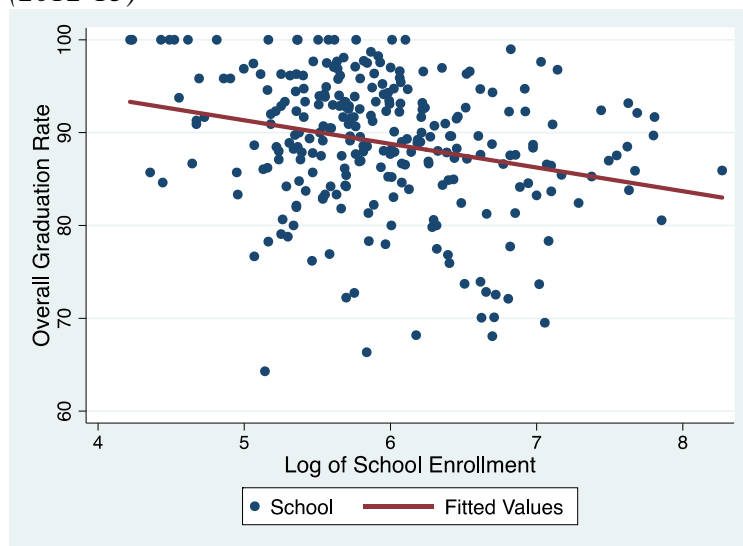
B. By School Size

Research Question: How are overall and TAGG school graduation rates related to school size?

1. Overall and TAGG Graduation Rate by School Enrollment: Continuous

The correlations between school size and overall and TAGG graduation rates for 2011-12 and 2012-13 are statistically significant and negative. The correlation between school size and overall graduation rate is $r = -0.21$ for 2011-12 and $r = -0.18$ for 2012-13, and the correlation between school size and TAGG graduation rate is $r = -0.39$ for 2011-12 and $r = -0.32$ for 2012-13. When considering the continuous relationship between enrollment and graduation rates, it is necessary to note that the majority of high schools in Arkansas have an enrollment of less than 500 students. Additionally, only seven high schools¹⁷ in Arkansas have an average enrollment greater than 2,000 students. This distribution is captured in Figures 7-8, which present the relationship between 2012-13 overall and TAGG graduation rates and school enrollment. The low overall and TAGG graduation rates illustrated in these figures may not be solely driven by school size, but also other school characteristics (e.g. FRL rate, region, rural/urban classification, and/or other unobservables). The multivariate analyses we will conduct later will allow us to better understand how much of the variation in graduation rates, if any, is driven by school size.¹⁸

Figure 7: Overall four-year adjusted cohort graduation rate by log of school enrollment (2012-13)

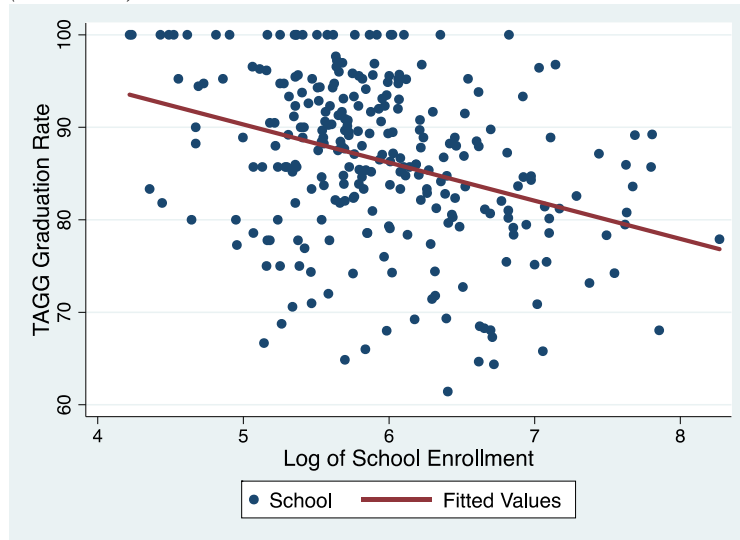


¹⁷ Cabot High, Springdale High, Rogers Heritage High, Rogers High, Central High, Bryant High, and Bentonville High School.

¹⁸ The variable Enrollment (log) denotes the natural log of enrollment for each high school. When a variable's data are skewed or have a wide distribution (as in the case of enrollment) it is best to log transform the data to better measure its relationship with other variables (such as overall and TAGG graduation rates).

$r = -0.18$ (significant at the 1% level)

Figure 8: TAGG four-year adjusted cohort graduation rate by log of school enrollment (2012-13)



$r = -0.32$ (significant at the 1% level)

2. Overall and TAGG Graduation Rates by Enrollment Groups: Categorical

School size in Arkansas varies from the smallest high school with a total enrollment less than 65 to the largest high school with a total enrollment of 3,745.¹⁹ By categorizing each school into relatively equal groups based on school enrollment, we can perhaps describe the relationship between graduation rates and school size in a more meaningful way (Table 6). The overall and TAGG graduation rates for all enrollment groups increased between 2011-12 and 2012-13 (Table 7). Groups 1 and 2, which consist of “extra small” and “small” schools due to their enrollment of less than 650 are the only enrollment groups that had overall and TAGG graduation rates at or higher than the statewide average for all three years.

¹⁹ This school enrollment is based on 2012-13 demographic data from the ADE.

Table 6: Description of enrollment groups (2011-12 and 2012-13)

School Size	Group	Number of Schools	Enrollment	% FRL	Description
Extra-Small	1	145	34,466	61%	Schools within 0-360 enrollment range.
Small	2	74	35,656	57%	Schools within 361-650 enrollment range.
Medium	3	36	32,759	51%	Schools within 651-1,210 enrollment range.
Large	4	18	33,527	43%	Schools within 1,211-3,745 enrollment range.

Note: Enrollment and % FRL are weighted averages for the 2011-12 and 2012-13 school years.

Table 7: Four-year adjusted cohort graduation rates by enrollment groups (2011-12 and 2012-13)

	2011-2012		2012-2013	
	Overall	TAGG	Overall	TAGG
Arkansas Overall	85%	80%	87%	83%
Group 1 (Extra-Small)	89%	86%	90%	88%
Group 2 (Small)	86%	83%	88%	84%
Group 3 (Medium)	82%	76%	85%	80%
Group 4 (Large)	84%	76%	87%	82%

a. Overall Graduation Rates

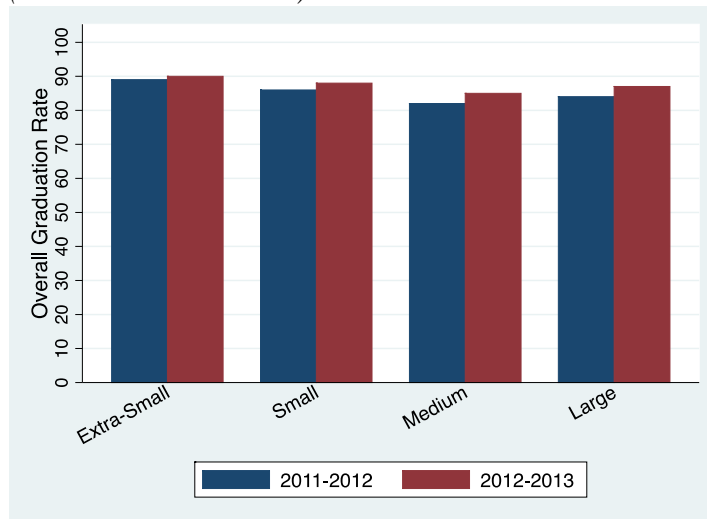
In 2011-12 and 2012-13, smaller schools, in general, had greater overall and TAGG graduation rates than medium-sized and large schools. The main distinction in overall graduation rates for both years is between schools with an enrollment of less than 360 (Group 1) and those with enrollment between 651 and 1,210 (Group 3). There is a statistically significant difference in the average overall graduation rate of Group 1 (extra-small schools) and the average overall graduation rates of Group 3 (medium-sized schools) for 2011-12 and 2012-13.²⁰ More specifically, from 2011-12 to 2012-13, the overall graduation rates of medium-sized schools (those in Group 3), on average, were significantly lower than the overall graduation rates of schools with an enrollment of less than 360 students (Group 1).²¹ Although the overall graduation rates of extra-small schools, on average, are greater than those of medium-sized schools, there is no statistically significant difference in the overall graduation rates of extra-small schools (Group 1) and large schools (Group 4). This pattern helps to explain the weak negative

²⁰ Statistically significant at the 1% level.

²¹ Statistically significant at the 5% level.

relationship our continuous analysis found between overall graduation rates and school size. Although extra-small schools have the high graduation rates, the overall graduation rates of large schools are not significantly different than those of small and medium-sized schools. The differences in overall graduation rates among enrollment groups can be seen in Figure 9 below.

Figure 9: Overall four-year adjusted cohort graduation rates by enrollment groups (2011-12 and 2012-13)

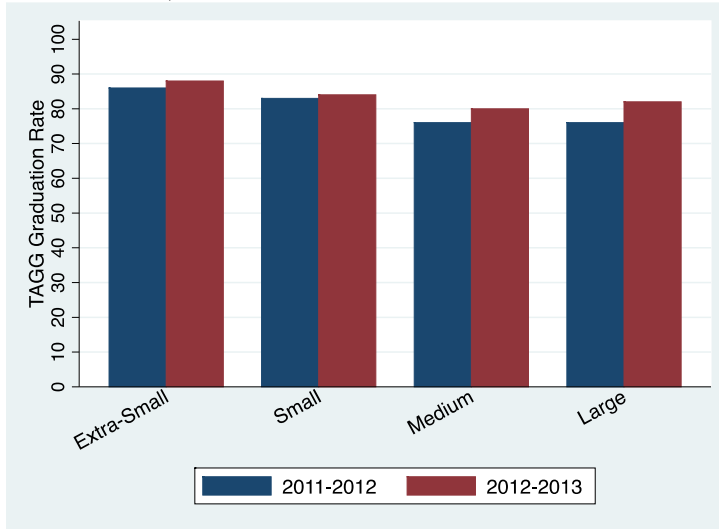


b. TAGG Graduation Rates

In 2011-12 and 2012-13, there was greater variation in TAGG graduation rates for each enrollment group than in the overall rates. There is a statistically significant difference between the TAGG graduation rate of Group 1 (extra-small schools) and those of Groups 2, 3, and 4 (small, medium, and large schools) in 2011-12 and 2012-13, with extra-small schools having greater TAGG graduation rates than all other schools.²² A similar pattern is seen when examining the 2011-12 TAGG graduation rates of Group 2 (small schools) and those of Groups 3 and 4 (medium and large schools). TAGG graduation rates of schools in Group 2 (small schools) are significantly greater than those of Groups 3 and 4. As for 2012-13, this pattern is seen as well, yet the only significant difference is between Group 2 and Group 3. Figure 10 below illustrates the patterns of TAGG graduation rates by enrollment groups.

²² Statistically significant at the 5% level.

Figure 10: TAGG four-year adjusted graduation rates by enrollment groups (2011-12 and 2012-13)



3. Key Findings

- There is a small ($r = -0.21$ and $r = -0.18$) negative correlation between log of school enrollment and overall graduation rates for 2011-12 and 2012-13, respectively.
- There is a moderate ($r = -0.39$ and $r = -0.32$) negative correlation between log of school enrollment and TAGG graduation rates for 2011-12 and 2012-13, respectively.
- On average, the overall graduation rates of extra-small schools are greater than those of medium-sized schools.
- When it comes to TAGG graduation rates, smaller schools outperform not only large schools but also medium-sized schools.

C. By School Poverty Rate

Research Question: How are overall and TAGG school graduation rate related to school poverty rate?

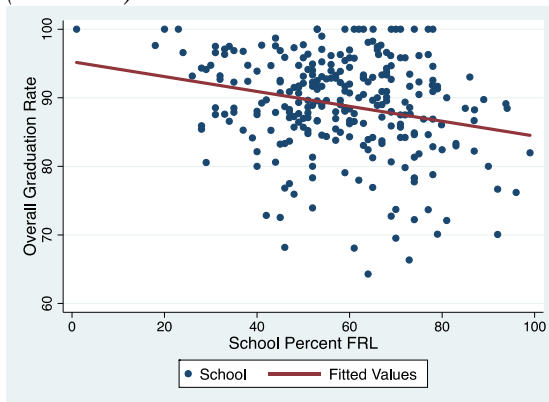
Schools or districts tend to be considered “high-poverty,” when they have a relatively large percentage of FRL-eligible students. The statewide average of FRL-eligible students in Arkansas from 2011-12 to 2012-13 is 60% overall and 53% for students enrolled in high school.²³

²³ Average % FRL is a weighted average based on ADE enrollment and demographic data for the 2011-12 and 2012-13 school years.

1. Overall and TAGG Graduation Rate by School FRL-Percentage: Continuous

There is a statistically significant negative correlation between percent FRL and the overall graduation rate in 2011-12 and 2012-13 ($r = -0.32$ and $r = -0.29$, respectively). In other words, as the percentage of a school's FRL-eligible student population increases, its overall graduation rate decreases. This trend can be seen in Figure 11 below, which illustrates the relationship between overall graduation rates and school FRL rates in 2012-13. There is essentially no relationship between a school's FRL rate in 2011-12 and 2012-13 ($r = -0.03$ and $r = -0.01$, respectively) and the TAGG graduation rate.

Figure 11: Overall four-year adjusted cohort graduation rate by school percent FRL (2012-13)



$r = -0.29$ (significant at the 1% level)

2. Overall and TAGG Graduation Rate by FRL Groups: Categorical

Our continuous analysis shows a significant negative relationship between a school's rate of poverty (as measured by its FRL rate) and its overall graduation rate, yet our findings indicate that there is no significant relationship between a school's rate of poverty and its TAGG graduation rate. However, these results tell us little about how graduation rates of schools with high levels of poverty compare to those of schools with middle levels of poverty, or those with low levels of poverty. In order to further examine how school graduation rates are related to school poverty rates, we conduct a categorical analysis. This analysis is done by dividing schools into four different categories based on their FRL rates.

FRL groups were constructed by taking a weighted average of each school's FRL rate for 2011-12 to 2012-13 and then creating an FRL-cutoff value that was determined by a weighted average of each school's overall enrollment for the 2011-12 and 2012-13 school years. This allowed for the creation of four FRL groups with relatively equal enrollment sizes (Table 8). The ascending order of each group illustrates the level of poverty of the schools that have been assigned to that group, with Group 1 consisting of low-poverty schools and Group 4 consisting of high-poverty schools.

Table 8: Description of FRL groups (2011-12 and 2012-13)

Poverty	Group	Number of Schools	Enrollment	% FRL	Description
Low-Poverty	1	43	31,937	33%	Schools within 0-42% FRL-range.
Middle-Poverty	2	58	32,484	50%	Schools within 43-52% FRL-range.
Upper-Middle Poverty	3	83	35,145	57%	Schools within 53-65% FRL-range.
High-Poverty	4	89	36,840	70%	Schools within 66-100% FRL-range.

Note: Enrollment and % FRL are weighted averages for the 2011-12 and 2012-13 school years.

By using the statewide average as a baseline for performance, we can further illustrate the negative relationship seen between a school’s FRL rate and overall graduation rate. In 2012-13, Group 4, the group with the largest percentage of FRL-eligible students, was the only FRL group to have an overall graduation rate lower than the statewide average. The overall graduation rates for this “high-poverty” group were also lower than the statewide average in 2011-12. Group 1 and Group 2, the two groups with lower percentages of FRL-eligible students than the statewide high school average of 53%, had 2012-13 overall graduation rates higher than or at the statewide average. These patterns can be seen in Table 9 below, which presents the overall and TAGG graduation rates of each FRL group for 2011-12 and 2012-13.

Table 9: Four-year adjusted cohort graduation rate by FRL groups (2011-12 and 2012-13)

	2011-2012		2012-2013	
	Overall	TAGG	Overall	TAGG
Arkansas Overall	85%	80%	87%	83%
Group 1 (Low-Poverty)	88%	80%	89%	83%
Group 2	86%	80%	88%	83%
Group 3	84%	80%	88%	85%
Group 4 (High-Poverty)	82%	80%	84%	82%

a. Overall Graduation Rate

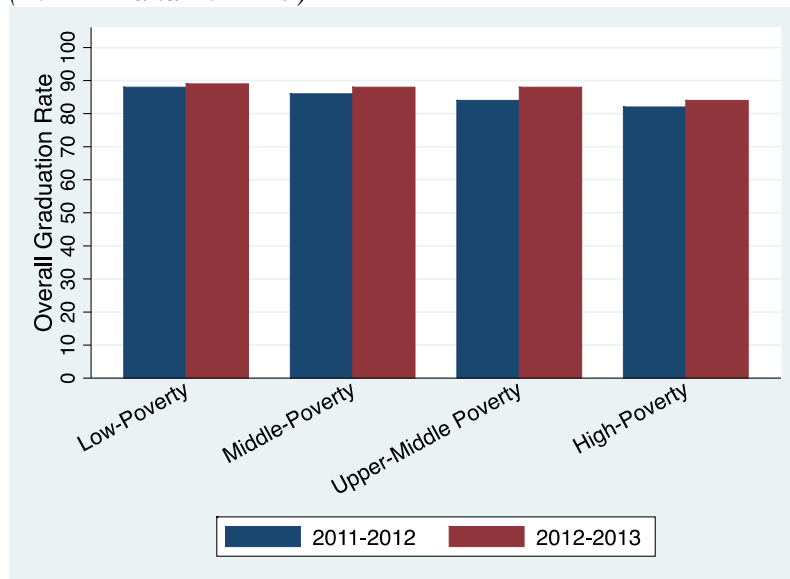
For 2011-12 and 2012-13, Table 9 illustrates what we would expect: as poverty goes up, overall graduation rates go down. However, differences in overall graduation rates among groups are more pronounced than differences in TAGG graduation rates. For example, in 2011-12, all FRL groups have the same TAGG graduation rate, yet the overall graduation rate of low-poverty schools is six percentage points greater than the graduation rate of high-poverty schools. For 2012-13, the average overall graduation rate of high-poverty

schools (Group 4) is significantly lower than the average rates of not only low-poverty schools, but also middle-poverty and upper-middle poverty schools.²⁴ An additional finding worth noting is the significant difference in the average overall graduation rate between high-poverty (Group 4) and upper-middle poverty (Group 3) schools in 2012-13. Both groups have greater percentages of FRL-eligible students than the statewide average, yet high-poverty schools (Group 4) have a significantly lower graduation rate, on average, than upper-middle poverty schools (Group 3). Figure 6 below illustrates the overall graduation rates of each FRL group for 2011-12 and 2012-13.

b. TAGG Graduation Rate

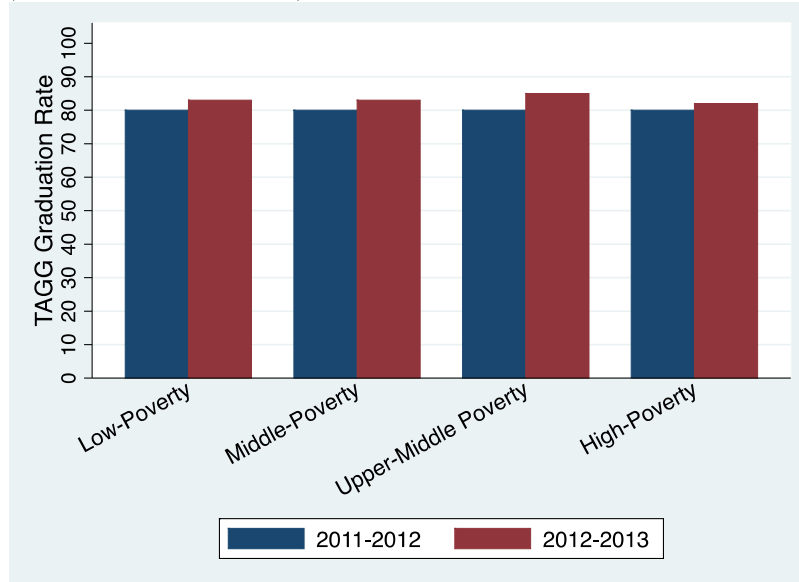
There is no statistically significant difference among the TAGG graduation rates of FRL groups in 2011-12 and 2012-13. The differences of the average overall and TAGG graduation rates among each group for 2011-12 and 2012-13 are illustrated below in Figures 12 and 13.

Figure 12: Average overall four-year adjusted cohort graduation rate by FRL groups (2011-12 and 2012-13)



²⁴ Differences are statistically significant at the 1% level.

Figure 13: Average TAGG four-year adjusted cohort graduation rate by FRL groups (2011-12 and 2012-13)



3. Key Findings

- There is a moderate ($r = -0.32$ and $r = -0.29$) negative correlation between school FRL percentage and overall graduation rates for 2011-12 and 2012-13, respectively.
- There is no statistically significant correlation between school FRL and TAGG graduation rates for 2011-12 and 2012-13.
- Low poverty and high poverty schools do equally well in TAGG graduation rates.
- Schools classified as high-poverty (Group 4), on average, have significantly lower overall graduation rates than schools in the nearest poverty group (Group 3, upper-middle poverty).

D. By School Racial Composition

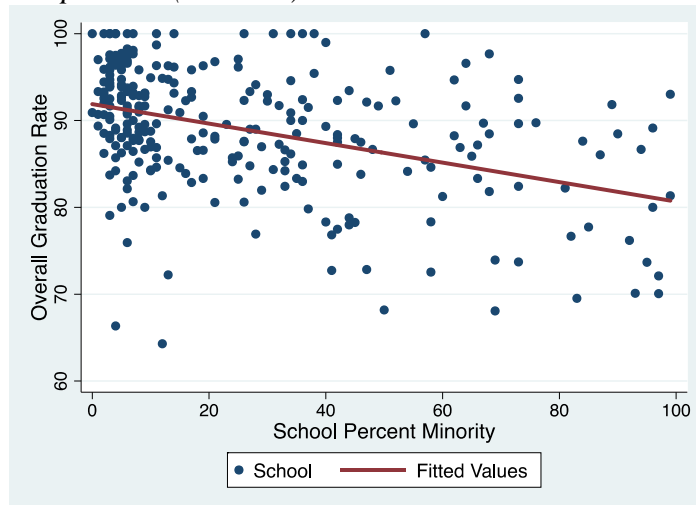
Research Question: How are overall and TAGG school graduation rates related to the racial composition of a school?

1. Overall and TAGG Graduation Rates by School Percentage Minority: Continuous

We also aim to examine how overall and TAGG graduation rates differ among schools with different racial compositions. More specifically, our focus is whether the overall percentage of minority students in a school is correlated with graduation rates. In this analysis, the percentage minority is defined as the percentage of non-white students in a

school. Figure 14 below illustrates the negative relationship between school overall graduation rates and school racial composition in 2012-13.

Figure 14: Overall four-year adjusted cohort graduation rates by school racial composition (2012-13)



$r = -0.47$ (significant at the 1% level)

a. Overall and TAGG Graduation Rates

There is a statistically significant negative correlation between a school's overall and graduation rates and overall percentage of minority students for 2011-12 ($r = -0.54$) and 2012-13 ($r = -0.47$).²⁵ As a school's overall minority student population increases, its overall graduation rate decreases, on average, for both years. A similar relationship is seen with TAGG graduation rates, yet this relationship is not as strong. On average, schools with greater percentages of minority students have lower TAGG graduation rates in 2011-12 ($r = -0.37$) and 2012-13 ($r = -0.31$).²⁶ It must be noted, however, that this negative correlation most likely reflects the correlation between graduation rates and other unobserved variables in addition to school percentage minority. Minority students tend to face economic hardships, which can place them at a disadvantage. A school with a higher percentage of minority students typically has a greater percentage of FRL-eligible students than the statewide average. The correlation between school poverty and percentage minority 0.48 for 2011-12 and 0.46 for 2012-13.

²⁵ Statistical significance at the 1% level.

²⁶ Statistical significance at the 1% level.

Table 10: Description of minority groups (2011-12 and 2012-13)

Minority	Group	Number of Schools	Enrollment	Avg. % Minority	Description
Lowest-Minority	1	102	32,970	5%	Schools within 0-8% minority range.
Low-Minority	2	63	35,091	15%	Schools within 9-25% minority range.
High-Minority	3	58	34,172	36%	Schools within 26-48% minority range.
Highest-Minority	4	50	34,736	73%	Schools within 49-99% minority range.

Note: Enrollment and % Minority are weighted averages for the 2011-12 and 2012-13 school years.

Table 11: Four-year adjusted cohort graduation rates by minority groups (2011-12 and 2012-13)

	2011-2012		2012-2013	
	Overall	TAGG	Overall	TAGG
Arkansas Overall	85%	81%	88%	84%
Group 1 (Low-Minority)	89%	85%	92%	89%
Group 2	88%	82%	88%	83%
Group 3	86%	81%	88%	84%
Group 4 (High-Minority)	79%	76%	83%	81%

As we did with school size and school poverty, we divided high schools in the state into quartiles to further explore the relationship between school or student characteristics and graduation rate outcomes. In this case, we divide the high schools into groups based on the fraction of minority students served, as described in Table 10. Using the statewide average as a baseline for performance, we can further illustrate the relationship between a school's minority rate and overall graduation rate. In 2012-13, Group 4, the group with the largest percentage of minority students, was the only category to have average graduation rates lower than the statewide averages. The overall graduation rates for this "high-minority" group were also lower than the statewide average in 2011-12. Group 1 and Group 2, the two groups with lower percentages of minority students than the statewide high school average, had 2011-12 overall graduation rates higher than or at the statewide average. These patterns are evident in both the overall and TAGG graduation rates for 2011-12 and 2012-13, as illustrated in Table 11.

2. Key Findings

- There is a moderately large significant ($r = -0.54$ and $r = -0.47$) negative correlation between school percent minority and overall graduation rates for 2011-12 and 2012-13, respectively.
- There is a moderate ($r = -0.37$ and $r = -0.31$) negative correlation between school percent minority and TAGG graduation rates for 2011-12 and 2012-13, respectively, yet this relationship is not as strong as the relationship between school percent minority and overall graduation rates.
- Schools with higher percentages of minority students, on average, have lower overall and TAGG graduation rates than those with smaller percentages of minority students.

E. By School Achievement

Research Question: How are overall and TAGG school graduation rates related to school achievement?

Standardized examinations are the most common measure used to evaluate school and district performance. For this report, school achievement is measured by the percentage of students in each school that score at the proficient or advanced level on End of Course (EOC) examinations in Algebra I, Geometry, Literacy, and Biology. We examine EOC exams rather than Benchmarks because the Benchmark exam is administered to students enrolled in grades 3 through 8 and EOC exams are administered to students at the junior high or high school level, which is closer to the grade level population of our graduation rate analysis.

There is a statistically significant positive correlation between a school's overall graduation rate and performance on EOC Algebra I, Geometry, Literacy, and Biology exams in 2011-12 and 2012-13 (Table 12) On average, for both years, the higher the percentage of students in a school that score at the proficient or advanced levels on each EOC exam, the more likely the school will have a higher overall graduation rate and a higher TAGG graduation rate. Figures 15-18 below illustrate the continuous positive relationship between a school's overall graduation rate and performance on each EOC exam for 2012-13.

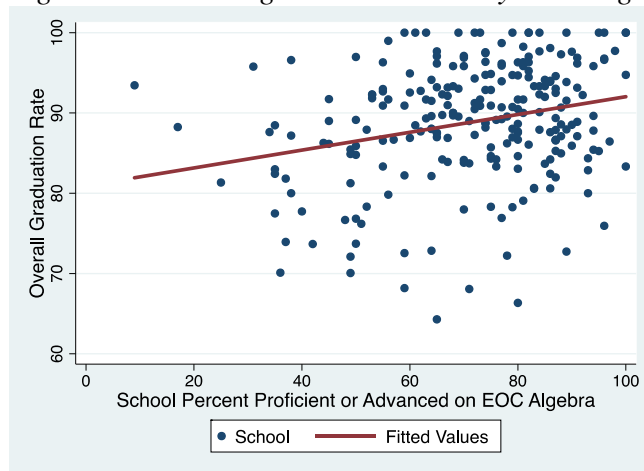
Table 12: Correlation coefficients: school EOC performance v. overall and TAGG graduation rates (2011-12 and 2012-13)

EOC Assessment	2011-12	2011-12	2012-13	2012-13
	Overall	TAGG	Overall	TAGG
Algebra	0.32	-0.25	0.27	0.16
Biology	0.39	0.21	0.38	0.18
Geometry	0.39	0.26	0.31	0.14
Literacy	0.35	0.14	0.49	0.28

** All correlations reported here statistically significant at the 1% level.

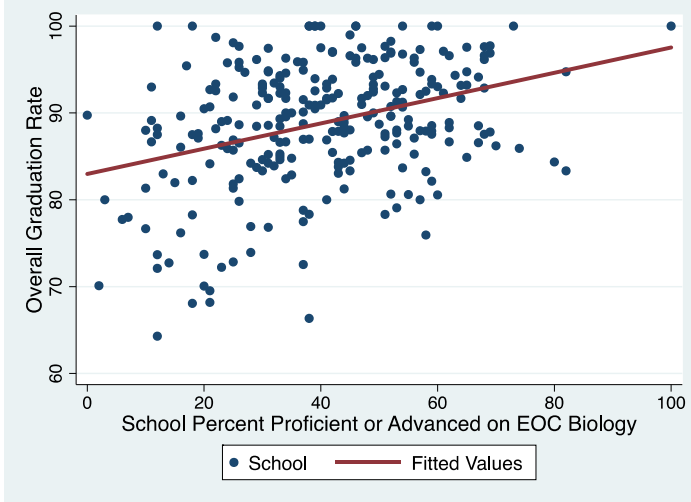
These relationships are least strong in Algebra, which may be due to the fact that many of the most capable mathematics students take algebra before they enter the high school; thus, high school algebra score may not be fully representative of the math performance of the students in the high school. It is also interesting to note that the relationships are stronger with overall graduation rates than with graduation rates for the TAGG students. This may be due to the fact that the rates for TAGG students simply do not vary as much between schools as do the overall rates.

Figure 15: Overall graduation rates by EOC algebra performance (2012-13)



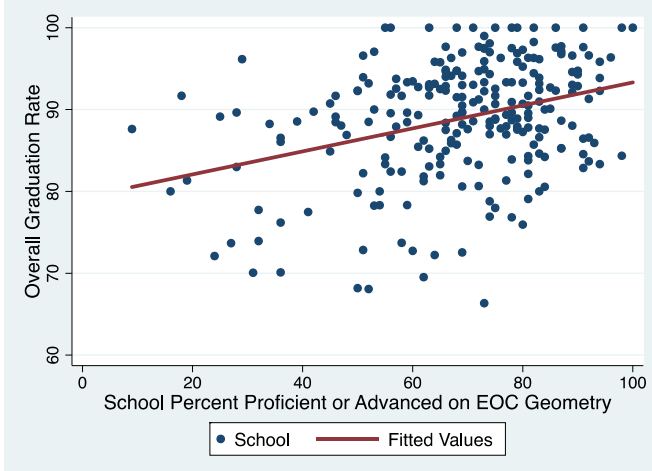
$r = 0.27$ (significant at the 1% level)

Figure 16: Overall graduation rates by EOC biology performance (2012-13)



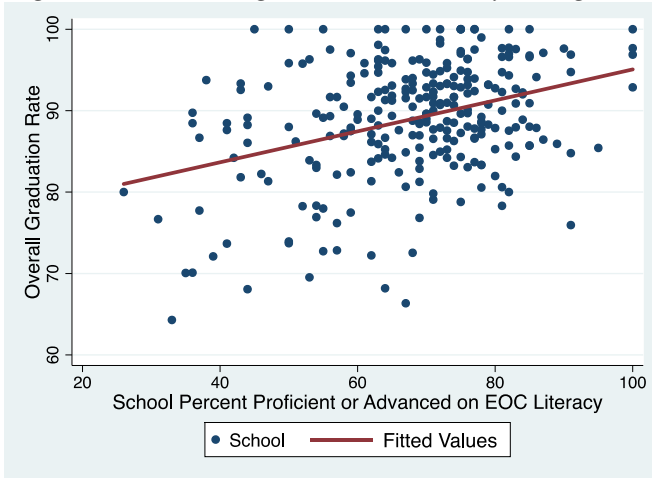
$r = 0.38$ (significant at the 1% level)

Figure 17: Overall graduation rates by EOC geometry performance (2012-13)



$r = 0.31$ (significant at the 1% level)

Figure 18: Overall graduation rates by 11th grade literacy performance (2012-13)



$r = 0.49$ (significant at the 1% level)

V. MULTIVARIATE ANALYSES

Research Question: How do measures of school grade configuration, region, school rural/urban classification, school size, cohort group baseline achievement, cohort group poverty, and the racial composition of a cohort group simultaneously relate to overall and TAGG graduation rates?

Based on our initial analysis, the variables school size, school poverty rate, size, region, and racial composition all have a statistically significant correlation with overall and/or TAGG graduation rates. As the percentage of FRL-eligible and minority students in a school increases, the overall and TAGG graduation rates, on average, tend to decrease. Additionally, as school enrollment increases, overall and TAGG graduation rates tend to decrease. As for the variable of school achievement, our initial analysis yielded a statistically significant positive correlation with overall and TAGG graduation rates. Overall and TAGG graduation rates of a school tend to increase as the percentage of students scoring proficient or advanced on EOC exams increases. The categorical analyses of these variables illustrate a similar pattern, signifying that the variables school poverty, size, achievement, and racial composition are all related to the overall and TAGG graduation rates of a school. The categorical analysis also signifies a significant difference in overall and TAGG graduation rates among different regions and rural or urban schools in the state.

Using this knowledge, we aim to construct a model for a multivariate analysis. Specifically, we ask, after controlling for region, school enrollment, school grade configuration, cohort group baseline achievement, and the socioeconomic characteristics of a cohort group, which variables are strongly correlated with overall and TAGG graduation rates? Tables 13 and 14 below present the correlation matrices of all continuous variables in our multivariate model for 2011-12 and 2012-13.

Table 13: Correlation coefficients for continuous variables (2011-12)

	Overall GR	TAGG GR	Literacy	Math	Minority	Free Lunch	Reduced Lunch	Enrollment (log)
Overall GR	1.00*							
TAGG GR	0.915*	1.00*						
Literacy	0.426*	0.242*	1.00*					
Math	0.383*	0.185*	0.872*	1.00*				
Minority	-0.409*	-0.266*	-0.596*	-0.589*	1.00*			
Free Lunch	-0.308*	-0.128*	-0.592*	-0.536*	0.519*	1.00*		
Reduced Lunch	0.256*	0.225*	0.156*	0.121*	-0.457*	-0.246*	1.00*	
Enrollment (log)	-0.286*	-0.364*	0.064	0.120	0.284*	-0.139	-0.272*	1.00*

* Indicates statistical significance at the 1% level.

Table 14: Correlation coefficients for continuous variables (2012-13)

	Overall GR	TAGG GR	Literacy	Math	Minority	Free Lunch	Reduced Lunch	Enrollment (log)
Overall GR	1.00*							
TAGG GR	0.896*	1.00*						
Literacy	0.340*	0.217*	1.00*					
Math	0.327*	0.202*	0.848*	1.00*				
Minority	-0.383*	-0.235*	-0.532*	-0.537*	1.00*			
Free Lunch	-0.313*	-0.137*	-0.574*	-0.581*	0.539*	1.00*		
Reduced Lunch	0.059*	0.035*	0.219*	0.222*	-0.414*	-0.341*	1.00*	
Enrollment (log)	-0.257*	-0.342*	0.068	0.132*	0.288*	-0.163*	-0.178*	1.00*

* Indicates statistical significance at the 1% level.

Unlike our initial analysis, which only used school-level data, our multivariate analysis incorporates more precise student-level data from each cohort group. The variables Overall Graduation Rate (or GR), TAGG Graduation Rate (or GR), and Enrollment (log) contain school-level observations, while the variables Literacy, Mathematics, Free Lunch, Reduced Lunch, and Minority are unique to the cohort group. The results of our multivariate regression models predicting overall and TAGG graduation rates are presented in Tables 15-16 for the 2011-12 cohort, and in Tables 17-18 for the 2012-13 cohort. The dependent variables are the overall graduation rate and the TAGG graduation rate of a school. In each of Tables 15-18, the labels (1) through (4) refer to our inclusion of controls for different variables. A full description of each variable can be found in the Appendix (section VIII).

The first specification (1) controls for school location and grade configuration and includes the variables Urban, HS Grades, and regional classification. Four dummy variables for region were automatically created, omitting the Southwest region. A dummy variable for school classification as rural or urban was also created, as denoted by the variable Urban. This variable serves as an indicator on whether a high school is located in an urban area. Therefore, the coefficient for the variable Urban reflects how the graduation rates of urban schools differ from schools located in rural regions. An additional dummy variable, HS Grades, was created to control for the grade configuration of each high school. This variable reflects the differences between high schools that only serve grades 10-12, as opposed to other high schools that enroll students for four years. While the overall and TAGG graduation rates for each school have been calculated based on the four-year adjusted cohort method, the graduation rates of these schools have been calculated with the same method, yet only for three years. Since these schools have one less year in which students could dropout, we felt it was necessary to control for any differences in graduation rates that may be attributed to this different calculation.

The second specification (2) includes baseline achievement measures, as denoted by the variables Literacy and Mathematics. More specifically, these variables are measures of 8th grade Benchmark performance for each cohort group. Including these variables in the

multivariate analysis helps to account for any systematic achievement differences that exist across cohort groups prior to entering high school.

The third specification (3) controls for socioeconomic characteristics, and includes the variables Free Lunch, Reduced Lunch, and Minority as measures of poverty and the racial composition of each cohort group. Free Lunch and Reduced Lunch were constructed by calculating the percentage of students eligible for free lunch and for reduced lunch in each cohort group. Minority refers to the percentage of students in each cohort group that are classified as at-risk minority students.

The fourth specification (4) includes school size, as denoted by enrollment. With school size ranging from less than 100 to over 3,500 students, there is clearly a wide variation in enrollment across high schools in Arkansas. When a variable's data are skewed or have a wide distribution (as in the case of enrollment) it is best to log transform the data to better measure its relationship with other variables (such as overall and TAGG graduation rates). The variable Enrollment (log) denotes the natural log of enrollment for each high school in our model. The coefficients seen below specification (4) reflect the relationship each variable in our analysis has with graduation rates, controlling for all variables in our model.

A. 2011-12 Overall Graduation Rates

The results of our multivariate analysis of overall graduation rates for 2011-12 can be seen below in Table 15. As we move from specification (1) to (4), we see changes in the magnitude and statistical significance for certain variables, while some variables remain statistically significant across all specifications. In specification (1), which only includes variables for grade configuration and geographical characteristics of a high school, Central Arkansas is the only region that has a statistically significant correlation with overall graduation rates. The coefficient for Central is negative in specifications (1) through (4), signifying that high schools in Central Arkansas, on average, have lower graduation rates than other regions.

When we add baseline achievement (moving from specification 1 to 2), we see that the variable Literacy has a statistically significant positive relationship with overall graduation rates. This indicates that an increase in the 8th grade literacy benchmark performance of a cohort group is associated with higher overall graduation rates, when controlling for a school's geographical characteristics, grade configuration, and baseline achievement in math. However, when we include a control for socioeconomic characteristics of a cohort group (moving from specification 2 to 3), we see that the coefficient for Literacy is no longer statistically significant and decreases in magnitude. Under this specification, Minority is statistically significant and negatively correlated with overall graduation rates. Although Free Lunch and Reduced Lunch are not statistically significant under specification (3), we see that with the inclusion of socioeconomic variables the statistical significance of Literacy goes away, indicating that the variables Minority, Free Lunch, and Reduced Lunch are all explaining some of the variation in overall graduation rates.

When controlling for all variables, as denoted by specification (4), we see relationships that one would expect to find. The variables Free Lunch and Enrollment (log) are statistically significant and negatively correlated with overall graduation rates. In addition, the variables HS Grades and Central are statistically-significant.

Table 15: Determinants of overall graduation rates (2011-12)

	(1)	(2)	(3)	(4)
HS Grades	0.007 (0.50)	0.003 (0.20)	0.014 (0.99)	0.026* (1.97)
Northwest	-0.004 (0.24)	-0.019 (1.36)	-0.032* (2.16)	-0.025 (1.75)
Northeast	0.000 (0.02)	-0.006 (0.42)	-0.013 (0.87)	-0.001 (0.07)
Central	-0.044* (2.22)	-0.039* (2.14)	-0.044* (2.47)	-0.037* (2.17)
Southeast	-0.034 (1.67)	-0.015 (0.79)	0.007 (0.35)	0.010 (0.52)
Urban	-0.005 (0.38)	-0.009 (0.73)	0.002 (0.14)	0.015 (1.18)
Literacy		0.095** (3.14)	0.054 (1.69)	0.051 (1.68)
Mathematics		0.019 (0.69)	0.018 (0.67)	0.036 (1.38)
Minority			-0.065* (2.45)	0.127 (1.30)
Free Lunch			-0.029 (0.91)	-0.064* (2.01)
Reduced Lunch			0.176 (1.73)	-0.019 (0.70)
Enrollment (log)				-0.038** (5.11)
Constant	0.885** (73.55)	0.891** (80.54)	0.903** (38.79)	1.124** (23.18)
Observations	273	272	272	272
R-squared	0.05	0.22	0.27	0.34

Note: Numbers in the tables are regression coefficients for each predictor variable. Absolute value of t-statistics are in parentheses beneath each coefficient.

* significant at 5% level; ** significant at 1% level

The variable HS Grades indicates that high schools serving only grades 10-12 have overall graduation rates that are 2.6 percentage points higher than those serving 9-12, which is reasonable given that the schools serving all four high school years have one additional year in which students might be lost from the cohort. The cohort for the 10-12 high schools begins in grade 10 rather than grade 9. Thus, it is important to note that this coefficient does not indicate that 10-12 high schools are more effective at graduating students.

The variable Central indicates that high schools located in Central Arkansas have overall graduation rates 3.7 percentage points lower than schools in the other regions. The variable Free Lunch refers to how the overall graduation rates of schools varies with the percentage of students eligible for free lunch. The negative sign suggests that as a school has more students eligible for free lunch, it would be expected to have a lower graduation rate. More specifically, if a school's percentage of free lunch students were to increase from the state average of 47% to 85%, the graduation rate would be projected to decrease by 2.4 percentage points.²⁷

The variable Enrollment (log) refers to how the overall graduation rates of schools varies with the natural log of enrollment.²⁸ The negative sign suggests that as a school has greater enrollment, it would be expected to have a lower graduation rate. More specifically, if a school's enrollment were to increase from the state average enrollment of approximately 500 students to approximately 1,400, the graduation rate would be projected to decrease by approximately 3.9 percentage points.²⁹

B. 2011-12 TAGG Graduation Rates

Although our initial analysis indicated that school poverty rate, racial composition, and size are all negatively correlated with TAGG graduation rates, only School Enrollment (log) is a statistically significant predictor of TAGG graduation rate in models simultaneously controlling for all possible predictors. As for regional differences in TAGG graduation rates, we see a similar pattern as with overall graduation rates. When controlling for all variables, Central Arkansas is the only region that has a statistically significant negative correlation with TAGG graduation rates. This means that when controlling for a school's geographical characteristics, grade configuration, enrollment, and the baseline achievement and socioeconomic characteristics of each cohort group, TAGG graduation rates of schools in Central Arkansas, on average, are lower than those of all other regions.

In specifications (1) and (2) we see a pattern similar to that found regarding 2011-12 overall graduation rates, with the Central region having a statistically significant relationship with TAGG graduation rates and baseline literacy achievement positively correlated with TAGG graduation rates. As for specification (3), however, we see that the variable Reduced Lunch has a statistically significant positive correlation with TAGG graduation rates. This positive direction is not something that we would expect, as the percentage of students that are eligible for reduced lunch in a cohort group is an indicator

²⁷ A 2 standard deviation change in a school's percentage of free lunch students from 47% to 85% is a 38 percentage point change. This change of 38% multiplied by the coefficient of -0.064 equals -0.024, which represents 2.4 percentage points.

²⁸ The variable Enrollment (log) denotes the natural log of enrollment for each high school. When a variable's data are skewed or have a wide distribution (as in the case of enrollment) it is best to log transform the data to better measure its relationship with other variables (such as overall and TAGG graduation rates).

²⁹ A 2 standard deviation change in enrollment from 500 students to 1,500 students is equivalent to a change in log enrollment of 1.03. This change of 1.03 multiplied by the coefficient of -0.038 equals -0.03924, which represents 3.9 percentage points.

of poverty. Additionally, the coefficient for Reduced Lunch, 0.27, seems quite large when compared to the coefficients for other variables. In fact, this is due to the lack of variation in the Reduced Lunch indicator. The percentage of students that are eligible for reduced lunch in each cohort group tends to be low (between 5% and 15%).

In specification (4) which controls for all variables, the variable Free Lunch is no longer statistically significant and Enrollment (log) and Central are the only variables that are statistically significant predictors of TAGG graduation rates.

The coefficient on the variable Central indicates that high schools located in Central Arkansas have TAGG graduation rates 5.1 percentage points lower than schools in the other regions. The coefficient on the variable Enrollment (log) indicates that if a school's enrollment were to increase from the state average enrollment of approximately 500 students to approximately 1,400, the graduation rate would be projected to decrease by 6.1 percentage points.³⁰

³⁰ A 2 standard deviation change in enrollment from 500 students to 1,500 students is equivalent to a change in log enrollment of 1.10. This change of 1.03 multiplied by the coefficient of -0.059 equals -0.0609, which represents 6.1 percentage points.

Table 16: Determinants of TAGG graduation rates (2011-12)

	(1)	(2)	(3)	(4)
HS Grades	-0.001 (0.07)	-0.003 (0.18)	0.006 (0.35)	0.024 (1.38)
Northwest	-0.022 (1.13)	-0.031 (1.65)	-0.045* (2.28)	-0.033 (1.78)
Northeast	-0.010 (0.50)	-0.015 (0.78)	-0.025 (1.26)	-0.006 (0.30)
Central	-0.067** (2.74)	-0.061* (2.55)	-0.065** (2.70)	-0.051* (2.26)
Southeast	-0.033 (1.28)	-0.018 (0.70)	0.002 (0.09)	0.006 (0.26)
Urban	-0.003 (0.17)	-0.006 (0.38)	0.009 (0.56)	0.029 (1.78)
Literacy		0.103* (2.56)	0.074 (1.72)	0.074 (1.82)
Mathematics		-0.023 (0.63)	-0.023 (0.62)	0.008 (0.23)
Minority			-0.069 (1.90)	0.199 (1.54)
Free Lunch			0.022 (0.52)	-0.030 (0.71)
Reduced Lunch			0.270* (1.97)	0.010 (0.28)
Enrollment (log)				-0.059** (5.87)
Constant	0.864** (57.75)	0.867** (58.96)	0.847** (26.94)	1.188** (18.24)
Observations	272	271	271	271
R-squared	0.05	0.11	0.14	0.24

Note: Numbers in the tables are regression coefficients for each predictor variable. Absolute value of t-statistics are in parentheses beneath each coefficient.

* significant at 5% level; ** significant at 1% level

C. 2012-13 Overall Graduation Rates

The results of our multivariate analysis of overall graduation rates for 2012-13 can be seen below in Table 17. As we move from specification (1) to (4), we see changes in the magnitude and statistical significance for certain variables, yet no variable remains statistically significant across all four specifications. When controlling for grade configuration and geographical characteristics of a high school, as denoted by specification (1), Urban is the only variable that has a statistically significant correlation with overall graduation rates. The coefficient for Urban is negative in specifications (1) through (3), signifying that high schools located in urban regions, on average, have lower graduation rates than those located in rural regions.

When we include a control for baseline achievement, (moving from specification 1 to 2), the variable Literacy has a statistically significant positive relationship with overall graduation rates. This signifies that, when controlling for regional differences and a

school's grade configuration, cohort groups with greater baseline achievement in literacy had higher overall graduation rates. However, when we include controls for the socioeconomic characteristics of a cohort group, as seen in specification (3), baseline achievement in literacy is no longer a statistically significant predictor of overall graduation rates. The statistically significant variables in specification (3) are what we would expect. Minority, Free Lunch, Reduced Lunch, and Urban are all negatively correlated with overall graduation rates. As the percentage of minority students and students that are eligible for free and for reduced lunch in a school's cohort group increase, the overall graduation rates of a school tends to decrease.

Table 17: Determinants of overall graduation rates (2012-13)

	(1)	(2)	(3)	(4)
HS Grades	0.013 (1.01)	0.009 (0.74)	0.012 (1.03)	0.022 (1.85)
Northwest	0.008 (0.56)	-0.001 (0.08)	-0.014 (1.09)	-0.005 (0.43)
Northeast	0.002 (0.17)	0.005 (0.43)	-0.004 (0.29)	0.008 (0.66)
Central	-0.019 (1.10)	-0.011 (0.67)	-0.026 (1.63)	-0.018 (1.19)
Southeast	-0.030 (1.66)	-0.010 (0.61)	-0.005 (0.29)	0.001 (0.05)
Urban	-0.024* (2.09)	-0.028* (2.59)	-0.023* (2.10)	-0.012 (1.14)
Literacy		0.048* (2.09)	0.027 (1.22)	0.018 (0.81)
Mathematics		0.026 (1.19)	0.002 (0.08)	0.023 (1.09)
Minority			-0.069** (3.20)	-0.254** (3.33)
Free Lunch			-0.075* (2.49)	-0.109** (3.64)
Reduced Lunch			-0.226** (2.87)	-0.028 (1.20)
Enrollment (log)				-0.030** (4.44)
Constant	0.898** (85.88)	0.902** (91.88)	0.984** (47.49)	1.158** (26.33)
Observations	273	272	272	272
R-squared	0.06	0.17	0.25	0.30

Note: Numbers in the tables are regression coefficients for each predictor variable. Absolute value of t-statistics are in parentheses beneath each coefficient.

* significant at 5% level; ** significant at 1% level

When controlling for all variables, as seen under specification (4), the coefficients for Free Lunch and Minority remain statistically significant, but the coefficient for Reduced lunch reduces drastically in size (from -0.226 to -0.028) and loses statistical significance. The changes we see for this variable can most likely be attributed to the addition of a control for school size. The variable Enrollment (log) is statistically significant, which

indicates that school size may account for any negative correlation that Reduced Lunch had with overall graduation rates under specification (3). Additionally, when including controls for school size, we note that the coefficients for Free Lunch and Minority increase in magnitude. This signifies that when controlling for all variables in our multivariate analysis, greater percentages of minority students and students eligible for free lunch in a cohort group are associated with lower overall graduation rates for the 2012-13 school year.

The coefficient on the variable Minority indicates that if a school's percentage of minority students were to increase from the state average of 25% to 79%, the graduation rate would be projected to decrease by 13.8 percentage points.³¹ The coefficient on the variable Free Lunch indicates that if a school's percentage of free lunch students were to increase from the state average of 50% to 84%, the graduation rate would be projected to decrease by 3.7 percentage points.³² The coefficient on the variable Enrollment (log) indicates that if a school's enrollment were to increase from the state average enrollment of approximately 500 students to approximately 1,500, the graduation rate would be projected to decrease by 3.2 percentage points.³³

D. 2012-13 TAGG Graduation Rates

When controlling for regional characteristics, school grade composition, cohort group baseline achievement measures, and cohort group socioeconomic characteristics (specifications 1-3), Urban is the only variable that has a statistically significant relationship with 2012-13 TAGG graduation rates. As we include additional controls (move from specification 1-3), the coefficient for Urban remains relatively stable and negative. This indicates that when controlling for all variables but school size, schools that are located in urban regions have TAGG graduation rates, on average, that are 3 percentage points lower than schools located in rural regions.

As we move from specification (3) to specification (4) and include school enrollment, we see that the variables Free Lunch, Reduced Lunch, and Enrollment (log) are the only statistically significant predictors of TAGG graduation rates. This indicates that as school size increases, and as the percentage of students that are FRL-eligible in a cohort group increase, TAGG graduation rates tend to decrease.

³¹ A 2 standard deviation change in a school's percentage of minority students from 25% to 79% is a 54 percentage point change. This change of 54% multiplied by the coefficient of -0.254 equals -0.138, which represents 13.8 percentage points.

³² A 2 standard deviation change in a school's percentage of free lunch students from 50% to 84% is a 34 percentage point change. This change of 34% multiplied by the coefficient of -0.109 equals -0.037, which represents 3.7 percentage points.

³³ A 2 standard deviation change in enrollment from 500 students to 1,500 students is equivalent to a change in log enrollment of 1.07. This change of 1.07 multiplied by the coefficient of -0.03 equals -0.03205, which represents 3.2 percentage points.

Table 18: Determinants of TAGG graduation rates (2012-13)

	(1)	(2)	(3)	(4)
HS Grades	0.004 (0.25)	0.001 (0.05)	0.002 (0.14)	0.017 (1.16)
Northwest	-0.006 (0.36)	-0.012 (0.78)	-0.021 (1.27)	-0.007 (0.45)
Northeast	-0.006 (0.35)	-0.002 (0.13)	-0.009 (0.53)	0.011 (0.66)
Central	-0.038 (1.81)	-0.031 (1.52)	-0.040 (1.94)	-0.028 (1.42)
Southeast	-0.034 (1.60)	-0.019 (0.92)	-0.018 (0.85)	-0.009 (0.46)
Urban	-0.032* (2.27)	-0.036** (2.61)	-0.032* (2.26)	-0.015 (1.09)
Literacy		0.042 (1.48)	0.032 (1.10)	0.016 (0.59)
Mathematics		0.015 (0.55)	0.002 (0.09)	0.037 (1.38)
Minority			-0.047 (1.68)	0.020 (0.69)
Free Lunch			-0.032 (0.82)	-0.087* (2.29)
Reduced Lunch			-0.192 (1.88)	-0.236* (2.44)
Enrollment (log)				-0.048** (5.64)
Constant	0.887** (70.09)	0.889** (72.47)	0.940** (34.98)	1.220** (21.86)
Observations	273	272	272	272
R-squared	0.07	0.12	0.14	0.24

Note: Numbers in the tables are regression coefficients for each predictor variable. Absolute value of t-statistics are in parentheses beneath each coefficient.

* significant at 5% level; ** significant at 1% level

The coefficient on the variable Free Lunch indicates that if a school's percentage of free lunch students were to increase from the state average of 50% to 84%, the graduation rate would be projected to decrease by 3.0 percentage points.³⁴ The coefficient on the variable Reduced Lunch indicates that if a school's percentage of reduced lunch students were to increase from the state average of 10% to 21%, the graduation rate would be projected to decrease by 2.6 percentage points.³⁵

The coefficient on the variable Enrollment (log) indicates that if a school's enrollment were to increase from the state average enrollment of approximately 500 students to

³⁴ A 2 standard deviation change in a school's percentage of free lunch students from 50% to 84% is a 34 percentage point change. This change of 34% multiplied by the coefficient of -0.087 equals -0.03, which represents 3.0 percentage points.

³⁵ A 2 standard deviation change in a school's percentage of minority students from 10% to 21% is an 11 percentage point change. This change of 11% multiplied by the coefficient of -0.236 equals -0.026, which represents 2.6 percentage points.

approximately 1,500, the graduation rate would be projected to decrease by 5.1 percentage points.³⁶

E. Summary of Results from Multivariate Analyses

In sum, we find that, in models simultaneously considering each of these independent factors, school size, poverty, and being located in the Central region of the state are negatively correlated with overall graduation rates for 2011-12. As for 2012-13, school size, poverty, and racial composition are negatively correlated with overall graduation rates. In analyses examining the graduation rates for TAGG students in particular, we find that school size, poverty, and being located in the Central region of the state are negatively correlated with 2011-12 TAGG graduation rates. School size and poverty size are negatively correlated with 2012-13 TAGG graduation rates. Overall, then, we find that two variables in particular are negatively related to high school graduation rates in Arkansas in each year and for both overall and TAGG analyses: school size and school poverty rate. In each model run, we find that larger high schools and schools serving more economically-disadvantaged students have lower graduation rates.

³⁶A 2 standard deviation change in enrollment from 500 students to 1,500 students is equivalent to a change in log enrollment of 1.07. This change of 1.07 multiplied by the coefficient of -0.048 equals -0.0513, which represents 5.1 percentage points.

VI. ARKANSAS HIGH SCHOOLS WITH THE HIGHEST GRADUATION RATES

While the overall analyses and the significant differences among predictor variables might be interesting, many readers in the state may well be more interested in learning which high schools were the most successful at graduating students on time in the past couple of years. Thus, in the concluding section of this report, we present lists of the schools with the highest graduation rates across the state and by region.

In the second half of this section, we introduce our own OEP GRAD Index, which highlights the graduation rate “performance” of each high school by comparing the each school’s actual graduation rates to the rates that would be expected at the school given the community and the student population served.

However, before we delve into the GRAD Index, we begin in the first half of this section (parts A, B, and C) by presenting the lists of the high schools with the highest actual graduation rates for the overall high school population and for TAGG students. We do this for 2011-12 and for 2012-13, first by region and then for the state as a whole.

A. 2011-12 Top Graduation Rate Rankings, By Region

Table 19: Top 5 Graduation Rates in Northwest Arkansas, 2011-12

	Overall Rate	TAGG Rate	Simple Average
1. Bruno-Pyatt High School	100%	100%	100%
1. Haas Hall Academy	100%	100%	100%
1. Nemo Vista High School	100%	100%	100%
1. Oark High School *	100%	100%	100%
1. Scranton High School	100%	100%	100%

**Oark High School has 10 or less number of TAGG students*

Table 20: Top 5 Graduation Rates in Northeast Arkansas, 2011-12

	Overall Rate	TAGG Rate	Simple Average
1. Armorel High School	100%	100%	100%
1. Calico Rock High School	100%	100%	100%
1. Mammoth Springs High School	100%	100%	100%
1. Timbo High School	100%	100%	100%
1. Viola High School	100%	100%	100%
1. White County Central High School	100%	100%	100%

Table 21: Top 5 Graduation Rates in Central Arkansas, 2011-12

	Overall Rate	TAGG Rate	Simple Average
1. Lisa Academy High	100%	100%	100%
1. Lisa Academy North*	100%	100%	100%
3. Academics Plus High School	95%	100%	97.3%
4. ESTEM High Charter	98%	93%	95.5%
5. Ouachita High School	97%	94%	95.2%

*Lisa Academy North has 10 or less TAGG students

Table 22: Top 5 Graduation Rates in Southwest Arkansas, 2011-12

	Overall Rate	TAGG Rate	Simple Average
1. Mineral Springs High School	100%	100%	100%
1. Mount Ida High School	100%	100%	100%
1. Umpire High School	100%	100%	100%
1. Wickes High School	100%	100%	100%
5. Acorn High School	97%	100%	98.7%

Table 23: Top 5 Graduation Rates in Southeast Arkansas, 2011-12

	Overall Rate	TAGG Rate	Simple Average
1. KIPP Delta Collegiate High School	96%	95%	95.4%
2. Des Arc High School	94%	94%	93.8%
3. Monticello High School	94%	93%	93.6%
4. Warren High School	92%	94%	92.9%
4. Rison High School	95%	91%	92.9%

B. 2012-13 Top Graduation Rate Rankings, by Region

Table 24: Top 5 Graduation Rates in Northwest Arkansas, 2012-13

	Overall Rate	TAGG Rate	Simple Average
1. Danville High School	100%	100%	100%
1. Haas Hall Academy	100%	100%	100%
1. Mount Judea High School	100%	100%	100%
1. Oark High School *	100%	100%	100%
1. Scranton High School	100%	100%	100%

* Oark High School, with less than 10 student enrollment, has 10 or less TAGG students.

Table 25: Top 5 Graduation Rates in Northeast Arkansas, 2012-13

	Overall Rate	TAGG Rate	Simple Average
1. Corning High School	100%	100%	100%
1. Mammoth Spring High School	100%	100%	100%
1. Maynard High School	100%	100%	100%
1. Rural Special High School	100%	100%	100%
5. Nettleton High School	99%	100%	99.5%

Table 26: Top 5 Graduation Rates in Central Arkansas, 2012-13

	Overall Rate	TAGG Rate	Simple Average
1. Lisa Academy North *	100%	100%	100%
2. Guy-Perkins High School	96%	100%	98.2%
3. Lisa Academy High	98%	96%	96.8%
3. Lakeside High School	97%	97%	96.8%
5. ESTEM High Charter	97%	97%	96.7%

* Lisa Academy North, with 11 student enrollment, has 10 or less TAGG Students.

Table 27: Top 5 Graduation Rates in Southwest Arkansas, 2012-13

	Overall Rate	TAGG Rate	Simple Average
1. Horatio High School	100%	100%	100%
1. Mount Ida High School	100%	100%	100%
1. Oden High School	100%	100%	100%
1. Sparkman High School	100%	100%	100%
1. Umpire High School	100%	100%	100%
1. Wickes High School	100%	100%	100%

Table 28: Top 5 Graduation Rates in Southeast Arkansas, 2012-13

	Overall Rate	TAGG Rate	Simple Average
1. Rison High School	93%	97%	95.1%
2. Woodlawn High School	98%	92%	94.6%
3. Barton High School	93%	95%	94.2%
4. KIPP Delta Collegiate High School	93%	94%	93.7%
5. Dumas High School	93%	90%	91.3%

C. Top Graduation Rate Rankings Statewide, 2011-12 and 2012-13

Table 29: Top 20 schools in Arkansas based on actual graduation rates, 2011-12 and 2012-13

	2011-12 Overall Rate	2011-12 TAGG Rate	2012-13 Overall Rate	2012-13 TAGG Rate	Simple Average
1. Haas Hall Academy	100%	100%	100%	100%	100%
1. Lisa Academy North*	100%	100%	100%	100%	100%
1. Mammoth Spring High School	100%	100%	100%	100%	100%
1. Mount Ida High School	100%	100%	100%	100%	100%
1. Oark High School*	100%	100%	100%	100%	100%
1. Scranton High School	100%	100%	100%	100%	100%
1. Umpire High School	100%	100%	100%	100%	100%
1. Wickes High School	100%	100%	100%	100%	100%
9. Salem High School	98%	97%	98%	100%	98.5%
10. Lisa Academy High	100%	100%	98%	96%	98.4%
11. Horatio High School	96%	98%	100%	100%	98.3%
12. Maynard High School	95%	95%	100%	100%	97.7%
13. Izard County Cons. High School	95%	100%	97%	97%	97.1%
14. Viola High School	100%	100%	93%	95%	96.9%
15. Danville High School	94%	93%	100%	100%	96.7%
15. Rural Special High School	94%	92%	100%	100%	96.7%
17. Bruno-Pyatt High School	100%	100%	92%	95%	96.6%
18. Westside High School	95%	95%	98%	98%	96.4%
19. Tuckerman High School	96%	94%	98%	97%	96.3%
19. Elkins High School	94%	92%	99%	100%	96.3%

* Have 10 or less TAGG Students

* Based on an average of the 2011-12 and the 2012-13 Overall and TAGG graduation rates for each school.

D. Description of the OEP's GRAD Index

While the tables above highlighted the high schools across the state with the best actual graduation rates, perhaps a more informative analysis might focus on the high schools that were “beating the odds”, or at least doing better than would be expected given the school and community characteristics.

Thus, in this final section of our report, we employ the multivariate analysis from the previous section to identify those schools with graduation rates (both overall and TAGG) that are much higher than predicted. Recall that in section V we employed regression models to examine what variables explained variation in the overall and TAGG graduation rates across high schools in Arkansas for 2011-12 overall and for 2012-13 (yielding a total of four analyses; see Tables 15-18).

As we included controls for additional variables (moving from specifications 1-4), we noted changes in which variables had statistically significant relationships with overall and TAGG graduation rates for 2011-12 and 2012-13. Each analysis calculated predicted values of overall and TAGG graduation rates for each school based on its characteristics and the characteristics of its cohort group. These predicted values are based on each school’s grade configuration, regional characteristics, the baseline achievement of its cohort group, and socioeconomic characteristics of its cohort group. More specifically, these predicted values were derived from the relationships seen under specification (3) in Tables 15-18. For example, the variables Free Lunch, Reduced Lunch, and Minority all have a statistically significant negative correlation with the 2012-13 overall graduation rate of a school (Table 17). Therefore, a school with a cohort group consisting of a large minority population and large percent of students eligible for free or reduced lunch would be predicted to have, on average, a lower 2012-13 overall graduation rate.

We relied on specification (3), rather than specification (4), to calculate the predicted values for each school because we only want to control for independent variables “outside” of the control of the school or district leaders. The only difference between the two is that specification (4) included a variable for school size. Although the inclusion of the variable Enrollment (log) showed a statistically significant negative relationship with graduation rates, school size is something that can be influenced by policy decisions. When calculating predicted values for each school, our aim was to examine how the graduation rates of a school compared to its predicted values. Therefore, our interest is how well each school performed based on its characteristics and the characteristics of its cohort group that were out of its “policy control”. This analytic strategy will result in an index measure which we call the GRAD Index, referring to the fact the high school scores are based on the *Graduation Regression Adjusted Differences*.

The GRAD Index is calculated by taking the deviation of each school’s overall and TAGG graduation rates from their predicted values and then taking the average of the two deviations. Therefore, a school with greater overall and TAGG graduation rates than its predicted values will have a greater GRAD Index. Since this report utilizes graduation rate data from the 2011-12 and 2012-13 school years, we will present the top schools for 2011-12 and for 2012-13 based on their GRAD Index from each year. In order to better illustrate how the GRAD Index for each school has been computed, take the following data for KIPP Delta Collegiate High School:

Table 30: 2011-12 Overall and TAGG graduation rates, predicted values, and residuals for KIPP Delta Collegiate High School

Overall Rate	Predicted Rate	Overall Difference	TAGG Rate	TAGG Predicated Rate	TAGG Difference	GRAD Index
96%	85%	11%	95%	81%	14%	12.0%

KIPP Delta Collegiate High School had an overall graduation rate of 96% and TAGG graduation rate of 95% for 2011-12. Based on its grade configuration, region, baseline achievement of its cohort group, and cohort group socioeconomic characteristics (racial

composition, percentage of students who are eligible for free or reduced lunch), KIPP Delta Collegiate High School was predicted to have an overall graduation rate of 85% and a TAGG graduation rate of 81%. We simply took the difference between the graduation rate and the predicted value for overall and TAGG graduation rates separately, and then took the average of each difference to calculate the GRAD Index.

Below we highlight the top schools in each region and the top 20 in the state that have overall and TAGG graduation rates for 2011-12 and 2012-13 that are well above their predicted values. These schools can be seen as “beating the odds,” by boasting high graduation rates, despite facing certain difficulties that would otherwise be correlated with lower graduation rates. The top schools are ranked by their calculated Graduation Regression Adjusted Differences (GRAD) Index. After calculating the GRAD Index for each school, we then used these values to rank each school. Tables 20-24 below show the top 5 schools in each region for 2011-12, and Tables 25-29 show the top 5 schools in each region for 2012-13. Table 30 illustrates the top 20 schools based on the average GRAD Index for 2011-12 and 2012-13.

E. 2011-12 Top GRAD Index Rankings, By Region

Table 31: Top 5 GRAD Index scores in Northwest Arkansas, 2011-12

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. Nemo Vista High School	100%	87%	100%	84%	14.4%
2. Oark High School*	100%	87%	100%	85%	13.9%
3. Scranton High School	100%	89%	100%	85%	13.1%
4. Bruno-Pyatt High School	100%	88%	100%	87%	12.7%
5. Danville High School	94%	83%	93%	79%	12.6%

**Oark High school has 10 or less TAGG students*

Table 32: Top 5 GRAD Index scores in Northeast Arkansas, 2011-12

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. Augusta High School	92%	75%	90%	75%	15.3%
2. Timbo High School	100%	87%	100%	86%	13.5%
3. Mammoth Spring High School	100%	89%	100%	87%	12.1%
4. Viola High School	100%	90%	100%	86%	11.9%
5. Amorel High School	100%	91%	100%	87%	11.0%

Table 33: Top 5 GRAD Index scores in Central Arkansas, 2011-12

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. Lisa Academy High	100%	85%	100%	79%	17.9%
2. Lisa Academy North*	100%	88%	100%	81%	15.5%
3. ESTEM High Charter	98%	84%	93%	79%	14.4%
4. Academics Plus	96%	87%	100%	81%	13.3%
5. Parkview Magnet High School	94%	84%	91%	80%	10.6%

*Lisa Academy North has 10 or less TAGG students

Table 34: Top 5 GRAD Index scores in Southwest Arkansas, 2011-12

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. Mineral Springs High School	100%	86%	100%	85%	14.2%
2. Wickes High School	100%	87%	100%	85%	13.9%
3. Mount Ida High School	100%	89%	100%	88%	11.7%
4. Strong High School	95%	85%	95%	84%	10.8%
5. Umpire High School	100%	91%	100%	89%	10.1%

Table 35: Top 5 GRAD Index scores in Southeast Arkansas, 2011-12

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. Lakeside High School	94%	81%	91%	79%	12.0%
2. KIPP Delta Collegiate	96%	85%	95%	81%	12.0%
3. Central High School	91%	76%	86%	77%	11.9%
4. Warren High School	92%	85%	94%	83%	8.9%
5. Clarendon High School	89%	82%	92%	82%	8.4%

F. 2012-13 Top GRAD Index Rankings, by Region

Table 36: Top 5 GRAD Index scores in Northwest Arkansas, 2012-13

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. Danville High School	100%	86%	100%	85%	14.5%
2. Mount Judea High School	100%	88%	100%	86%	13.2%
3. Oark High School*	100%	90%	100%	88%	11.4%
4. Mulberry High School	94%	85%	95%	81%	11.1%
5. Westside High School	98%	88%	98%	86%	10.6%

*Oark High School has 10 or less TAGG students

Table 37: Top 5 GRAD Index scores in Northeast Arkansas, 2012-13

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. Nettleton High School	99%	90%	100%	87%	11.4%
2. Corning High School	100%	90%	100%	88%	11.0%
3. Maynard High School	100%	91%	100%	89%	9.8%
4. Earle High School	89%	80%	89%	80%	9.3%
5. Izard Co. Cons. High School	97%	89%	97%	88%	8.4%

Table 38: Top 5 GRAD Index scores in Central Arkansas, 2012-13

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. North Little Rock High School	92%	76%	89%	73%	15.9%
2. ESTEM High Charter	97%	82%	97%	81%	15.0%
3. Lisa Academy High	98%	85%	96%	80%	14.5%
4. Lisa Academy North*	100%	87%	100%	85%	14.0%
5. Guy-Perkins High School	96%	87%	100%	84%	12.4%

*Lisa Academy North has 10 or less TAGG students

Table 39: Top 5 GRAD Index scores in Southwest Arkansas, 2012-13

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. Horatio High School	100%	90%	100%	89%	10.8%
2. Harmony Grove High School	97%	87%	93%	82%	10.4%
3. Oden High School	100%	91%	100%	89%	10.0%
4. Sparkman High School	100%	92%	100%	90%	9.1%
5. Wickes High School	100%	92%	100%	91%	8.8%

Table 40: Top 5 GRAD Index scores in Southeast Arkansas, 2012-13

	Overall Rate	Overall Predicted Rate	TAGG Rate	TAGG Predicted Rate	GRAD Index
1. Lakeside High School	97%	84%	97%	84%	13.1%
2. KIPP Delta Collegiate	93%	84%	94%	83%	10.1%
3. Rison High School	93%	89%	97%	86%	7.4%
4. Dumas High School	93%	87%	90%	84%	6.0%
5. Dermott High School	88%	82%	88%	82%	5.9%

G. Top GRAD Index Rankings Statewide, 2011-12 and 2012-13

Table 41: Top 20 GRAD Index scores in Arkansas based on GRAD Index, 2011-12 and 2012-13

	2011-12 Overall Rate	2011-12 TAGG Rate	2012-13 Overall Rate	2012-13 TAGG Rate	GRAD Index*
1. Lisa Academy High	100%	100%	98%	96%	17.7%
2. Lisa Academy North*	100%	100%	100%	100%	16.5%
3. ESTEM High Charter	98%	93%	97%	97%	16.0%
4. Danville High School	94%	93%	100%	100%	14.6%
5. Oark High School*	100%	100%	100%	100%	13.2%
6. Scranton High School	100%	100%	100%	100%	12.8%
7. KIPP Delta Collegiate	96%	95%	93%	94%	12.1%
8. Parkview Magnet High School	94%	91%	95%	93%	11.9%
9. Wickes High School	100%	100%	100%	100%	11.8%
10. Horatio High School	96%	98%	100%	100%	10.4%
10. Mineral Springs High School	100%	100%	90%	91%	10.4%
12. Western Yell Co. High School	95%	93%	96%	94%	10.3%
12. Mammoth Spring High School	100%	100%	100%	100%	10.3%
14. Mount Ida High School	100%	100%	100%	100%	10.2%
15. Westside High School	95%	95%	98%	98%	10.0%
16. Umpire High School	100%	100%	100%	100%	9.9%
17. North Little Rock High School	73%	63%	92%	89%	9.8%
17. Haas Hall Academy	100%	100%	100%	100%	9.8%
19. Salem High School	98%	97%	98%	100%	9.7%
20. Augusta High School	90%	90%	88%	86%	9.6%
20. Academics Plus High School	95%	100%	94%	89%	9.6%

*Has less than 10 TAGG students

* Based on an average of the 2011-12 and the 2012-13 GRADS Index values for each school.

VII. CONCLUSIONS AND IMPLICATIONS

Thus, in this report, we present data from the Arkansas Department of Education on graduation rates for Arkansas high schools in 2011-12 and 2012-13. As far as we can tell, this is the first statewide analysis of high school graduation rates using the relatively new four-year adjusted cohort method to compute these rates. This report is particularly timely as the National Center for Education Statistics (NCES) recently (April 2014) published a nationwide graduation report using the new and more meaningful measures. In this national analysis, Arkansas students boasted rates that were above the national average, both overall and for subgroups of students.

The data presented and analyzed in this report are primarily descriptive and correlational in nature. Nevertheless, these data present a “first look” at graduation rate data in our state. For years, we have considered the effectiveness and perhaps even efficiency of schools and districts by viewing standardized test results as indicators of student outcomes. However, all of those connected with schools in any way realize that the impact of the “schooling experience” on students cannot be fully measured by test scores alone. Students learn much more in school than academic content and problem solving skills; they learn soft skills such as persistence, time management, and the ability to juggle multiple tasks and deal with numerous individuals. Perhaps one measure, albeit imperfect, of the ability of schools to improve the soft skills of students is the extent to which schools successfully graduate their students. In any event, it is absolutely true that students themselves benefit immensely from earning high school diplomas. For this reason alone, it is critically important that we learn as much as possible about which students are graduating in Arkansas and which schools are graduating them!

The data presented in this report are simply the initial step to the long-term examination of which schools and which student groups are meeting the Arkansas’ graduation rate target and goals. Overall, this report serves two purposes: to investigate what school characteristics are related to grad rate and to identify schools across the state with the top grad rates. With regard to the first purpose, the answer appears straightforward: in each model run, we find that larger high schools and schools serving more economically-disadvantaged students have lower graduation rates.

It is perhaps somewhat surprising that high school size, or enrollment, is consistently negatively correlated with both overall and TAGG graduation rates. This is interesting in Arkansas because the largest high schools and districts often boast relatively high test score results. While these results are not necessarily causal, they do remind us that smaller high schools in the state may provide environments that are conducive to keeping students in school through graduation. Indeed, small-school advocates have consistently made the claim that small schools provide greater opportunities for student involvement, student engagement, meaningful interactions between students and educators. Students in larger schools, on other hand, may be at greater risk of “falling through the cracks” and disappearing from the school community and thus not making it through to graduation.

Of course, this report does not confirm the hunches of small-school advocates, but it might provide some insights for school leaders in various communities in Arkansas who must make decisions regarding school sizes and school configurations for their students.

VIII. APPENDIX

Table A1: Description of variables used in multivariate analysis

Variable Name	Description
HS Grades	Under this variable, a high school was labeled with the value of 1 if it only enrolled grades 10-12, and 0 otherwise. The coefficients for this variable refer to how graduation rates of schools that only enroll grades 10-12 compare to those that enroll a cohort group for four years.
Northwest	This refers to high schools that are located in the Northwest region.
Northeast	This refers to high schools that are located in the Northeast region.
Central	This refers to high schools that are located in the Central region.
Southeast	This refers to high schools that are located in the Southeast region.
Urban	Under this variable, a high school was labeled with the value of 1 if it is located in an urban region, and 0 otherwise. The coefficients for this variable refer to how graduation rates of schools that are located in urban regions compare to those of schools that are located in rural regions. (A full description of how schools were categorized as rural or urban can be found in the initial analysis section of the report.)
Literacy	This variable is a baseline measure of literacy achievement for each cohort group. For the 2011-12 cohort, this refers to the 8 th grade Benchmark literacy scores of each student from the 2007-08 school year. For the 2012-13 cohort, this refers to the 8 th grade Benchmark literacy scores of each student from the 2008-09 school year.
Mathematics	This variable is a baseline measure of math achievement for each cohort group. For the 2011-12 cohort, this refers to the 8 th grade Benchmark math scores of each student from the 2007-08 school year. For the 2012-13 cohort, this refers to the 8 th grade Benchmark math scores of each student from the 2008-09 school year.
Free Lunch	This variable is the percentage of students in each cohort group that were eligible for free lunch.
Reduced Lunch	This variable is the percentage of students in each cohort group that were eligible for reduced lunch.
Minority	This variable is the percentage of minority students in each cohort group. This included students that were classified as Hispanic, African American, Native American, Hawaiian/Pacific Islander, or Two or More Races.
Enrollment (log)	This is the natural log of the weighted average of school enrollment for the four (or three) years that each cohort attended the school. When a variable's data are skewed or have a wide

distribution (as in the case of enrollment) it is best to log transform the data to better measure its relationship with other variables.
