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ARKANSAS HIGH SCHOOL FRESHMEN COURSE FAILURES
2009-11 – 2018-19

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EXECUTIVE SUMMARY

This study assesses the course failures among Arkansas high school freshmen by different student demographic and programmatic characteristics. We analyze 10 independent cohorts of Arkansas freshmen for descriptive analyses, and then we limit our analytic sample to the two most recent years of data. Algebra I is the most commonly failed course among Arkansas freshmen. Using logit analyses, we find economically disadvantaged students are nine percentage points more likely to fail a course their freshman year than their more advantaged peers after controlling for prior academic achievement and district characteristics and fixed effects. This study is the first research study conducted on Arkansas course for failure high school freshmen. We discuss our findings in the context of course failures among different demographic and programmatic characteristics and conclude with policy suggestions for district leaders to implement and help lead more students to success.

Major Findings:

Failure rates have declined over the past ten years, from 31.7 to 21.9 percent of high school freshman failing at least one course.

Descriptively, Black students have the highest failure rates followed by students who are eligible for federal free-or-reduced lunch programs and English Language Learners. The results of multivariate analyses that control for prior student achievement and district characteristics, find that Black students are slightly less likely to fail a course than White students. We also find that students receiving services through English Learner programs or special education programs are less likely to fail a course freshman year than their peers who are not receiving these services.

FRL-eligible students, however, are 9 percentage points more likely to fail a course than their more advantaged peers. FRL-eligible students who are White are more likely to fail a course than FRL-eligible students who are Black or Hispanic. Among White students, FRL-eligible students are 11.2 percentage points more likely to fail than more advantaged peers.

I. INTRODUCTION

High school grade point averages (HSGPA) are strong predictors of students' future educational outcomes; some researchers have even discovered HSGPAs to be stronger predictors of future academic success than traditional performance exams (Allensworth & Clark, 2020; Belfield & Crosta, 2012; Bowers et al., 2013; Easton et al., 2017; Farmer & Hope, 2015; Komarraju et al., 2013). HSGPAs can reflect discipline and non-cognitive abilities not reflected in test scores, and HSGPAs can be connected to a student's ability to adapt to life changes. The University of Chicago's Consortium on School Research finds freshman GPA is highly correlated with a student's future academic successes (Easton et al., 2017). Research conducted by the Office for Education Policy finds that Arkansas' freshman's HSGPAs are also associated with future academic successes like high school graduation and college enrollment (Morris et al., 2021).

Seeskin et al. (2018) report Chicago Public Schools (CPS) students' grades decrease after the building transition from eighth grade to ninth grade and when students move school buildings, they report fewer friendships forming increased negative thoughts about their future successes. In addition, disruptions in personal lives, educational environments, and academic grades are associated behavior problems like higher absenteeism rates and being non-responsive in class (Seeskin et al., 2018). National failure rates for high school freshmen are not reported, but Easton et al. (2017) report that 20 percent of CPS' ninth-grade students had GPAs of D's and F's in 2013, a decline from the 40 percent of the 2006 cohort.

Nearly all CPS' ninth-grade students experience drops from their eighth-grade year in their GPAs in non-core courses (e.g. art, physical education, world languages or other elective courses) (Seeksin et al., 2018). Plus, students who struggled academically in eighth grade are more likely to fall behind with their grades in their ninth-grade year. When students who are more likely to struggle academically start their freshman year with academic failures, they demonstrate decreased graduation rates (Andrews & Bishop, 2012).

Aside from all students feeling the academic and relational pressure from a ninth-grade transition, researchers examine specific subgroups' struggles. Sutton et al. (2018) report that minority subgroups experience the highest chance of academic loss in the freshman year transition. The GPA decline from eighth to ninth grade is the highest for Black and Hispanic males (Seeskin et al., 2018). The highest-achieving Black males experience the most significant academic loss—a GPA 0.20 points lower than Black females. On the other hand, high-achieving White females have a minor academic loss in the transition (Sutton et al., 2018). In Chicago, freshman year results in high-achieving White females continuing to get ahead while high-achieving Black males fall behind.

Students from economically disadvantaged backgrounds are at a higher risk of having lower HSGPAs, and lower socio-economic status (SES) males are less likely to graduate high school than lower SES females (Autor et al., 2019; Malecki & Demaray, 2016). In 2016, Washington state freshmen that are low income were 22.5 percentage points more likely to fail a course their freshman year compared to non-low-income freshmen (Gillespie, 2018). When Washington state gave more attention to freshman grades, ninth-grade course failure rates decreased by 3.9 percentage points for Hispanic students and 3.3 percentage points for students with two or more races (OSPI, 2017).

Recent research reports teachers often overestimate performance abilities for students they perceive to have advantaged backgrounds (Tobisch & Dresel, 2017). Grading has been a subjective practice since the 1940's, and Puhani and Yang (2019) find scoring inequality, grading students differently with implicit or non-implicit bias based on student demographic characteristics, can differ by as much as 25% between higher- and lower-performing schools. The way the current grading system is set in the United States disproportionately favors students with privilege and harms students of less privilege (Feldman, 2019).

Education has the power to help children from all types of SES backgrounds, but Hannah and Linden (2012) find teachers grade lower SES students more harshly than higher SES students.

The Gates Foundation (2021) reports that Algebra I is the most failed course for American high school freshmen although national failure rates are not available. Most students who fail are members of racial/ethnic subgroups, English Language Learners, or economically disadvantaged students. Teachers in smaller, rural schools can help prevent failing Algebra I students in high-poverty locations with more professional development and training (Campbell, 2005). Double-doses of Algebra in CPS' low-achieving students' days showed positive effects for test scores, but the extra math class was not effective for increasing passing rates due to sorting and tracking (Nomi & Allensworth, 2013). Members of racial/ethnic subgroups and students with lower socioeconomic statuses have higher feelings of believing one is incapable of learning mathematics, which could increase chances of Algebra I failure (Spence, 2020).

This Study

There is currently no research about course failures for high school freshmen and which groups of students are failing courses and which courses in Arkansas. This study descriptively analyzes course failures of freshman students in Arkansas. We aim to fill the gap in research of course failures of freshman students in Arkansas. We examine Arkansas' freshman student course failure's association with student demographic and programmatic characteristics, prior achievement, and district characteristics.

Our research will answer the following questions:

- What percentage of Arkansas students fail a course freshman year, and how do the failure percentages vary by student demographic and programmatic characteristics and regions?
- Which courses are most common for freshman students to fail in Arkansas? Do the courses vary by geographic region?
- Does the likelihood of failing a class freshman year vary after controlling for student demographic and programmatic characteristics, prior achievement, and district characteristics?

II. METHODS

Data and Sample

Anonymized student-level data for Arkansas students is from 2009-10 through 2018-19. Data include student demographic and programmatic characteristics, and course grades. In the data provided, student course grades are either numerical or grade letter values. We create a binary indicator of student course failure, defined as an F, E, NC, I-0, or 59 and below.

Our descriptive sample of 344,624 ninth-grade students reflects ten independent cohorts (see Table 1).

Table 1: Cohort Grade by 9th Grade Academic Year

Cohort	1	2	3	4	5	6	7	8	9	10
School Year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19

All cohorts are included in the descriptive analyses, but the analytic sample for our pooled multivariate analysis regressions includes only students in Cohorts 9 and 10 with 7th- and 8th-grade state test scores. This limitation is necessary to include prior student achievement as a control variable in our analysis of the likelihood of course failures. We limit our pooled analysis sample to Cohorts 9 and 10 due to the changes in state assessments in prior years. Summary information for the combination of Cohorts 9 and 10 is presented in Table 2. Programmatic statuses are denoted as free-or-reduced lunch (FRL), our proxy for low socioeconomic status, gifted and talented (GT), English Language Learners (ELL), and special education (SPED).

Table 2: Descriptive and Analytic Sample Comparison, Cohorts 9 and 10

	Descriptive Sample	Analytic Sample	Difference
Total N	70,068	65,851	*-4,217*
% Male	51.25	51.04	*-0.21*
% Female	48.75	48.96	*0.21*
% White	62.23	62.41	*0.18*
% Black	19.30	19.53	*0.23*
% Hispanic	13.00	12.85	*-0.15*
% Other Races	5.44	5.21	*-0.23*
% FRL	59.00	59.06	*0.06*
% GT	13.00	13.72	*0.72*
% ELL	7.11	6.72	*-0.39*
% SPED	11.55	10.36	*-1.19*

The analytic limitation reduces the sample by 4,217 students or 6.1 percent. Baseline imbalance tests reveal no statistically significant differences between the descriptive and analytic for males, females, and FRL status students. Significant differences were present, however, for all races and other programmatic groups. The attrition among the indicated student groups may lead to underestimating our reported relationship between freshman course failures, leaving us with a conservative estimate for the student groups underrepresented in the analytic sample.

Empirical Approach

We analyze descriptive trends in freshman course failures to examine the differences between student demographic and programmatic characteristics. We present data to illustrate trends in failure rates of geographic region and courses. We then conduct multivariate regressions with Cohorts 9 and 10 as a pooled analysis. We control for student demographic and programmatic characteristics, prior student achievement, and district characteristics in our multivariate model to adjust for variation at the student and district levels.

III. RESULTS

Descriptive Trend Analyses

We present the percentages of freshman that failed at least one course by student demographic and programmatic characteristics in Table 3 for the 10 Cohorts. The percentage of Arkansas freshmen failing at least one course was 31.7 percent in 2010, and the rate has decreased to 21.9 percent by 2019. This decreasing failure rate is present for all the student subgroups over time except for the Gifted and Talented subgroup. GT students are less likely to fail a course their freshman year, but the failure rate remains steady across time. Males are consistently more likely to fail than females; Black students have the highest failure rates, free-or-reduced lunch status is more likely to fail than non-FRL status students; and English Language Learners have a high percentage of failing at least one course, as well. Hispanic, FRL, ELL, and SPED students have a failed at least one course rate greater than the average for all students.

Table 3: Percentages of at Least One Course Failure by Student Demographic and Programmatic Characteristics, 2010-2019

Cohort	1	2	3	4	5	6	7	8	9	10
% of Freshman	31.7	30.4	25.8	26.4	27.0	27.9	25.3	24.3	23.0	21.9
% of Male	37.6	36.0	31.7	31.4	32.8	34.5	31.4	29.6	28.2	26.4
% of Female	25.6	24.7	19.8	21.4	21.1	21.0	18.9	18.9	17.3	17.2
% of White	26.0	24.7	21.5	21.4	21.9	22.7	20.5	19.4	18.7	18.2
% of Black	46.7	45.9	40.5	40.0	42.2	42.6	39.1	38.8	35.6	34.6
% of Hispanic	40.8	39.1	29.8	33.0	31.2	32.2	29.8	27.0	25.0	22.7
% of Other Races	28.6	26.3	24.4	21.7	21.8	23.7	20.1	21.7	21.4	17.3
% of FRL	41.6	40.2	34.9	36.0	35.9	36.8	33.6	32.5	30.1	29.0
% of GT	7.6	7.0	6.0	8.0	8.3	8.2	8.1	8.0	7.9	7.1
% of ELL	47.8	44.2	35.1	40.8	38.1	36.6	33.5	30.5	30.0	28.5
% of SPED	36.7	36.0	32.1	28.7	28.4	29.5	26.9	24.9	25.1	23.7
N	*33,297*	*33,509*	*32,374*	*34,228*	*34,984*	*35,234*	*35,307*	*35,623*	*34,888*	*35,180*

To present a general sense of how Arkansas freshmen totals vary across the state, we provide 2019's geographic region demographic and program characteristics in Table 4. The Arkansas counties in each region are provided in Table A1 in the index.

Table 4: Freshman Demographic and Programmatic Characteristics by Arkansas Region, Cohort 10

Region	Northwest	Northeast	Central	Southwest	Southeast	*Arkansas*
% White	66.4	71.0	54.8	54.4	50.2	62.0
% Black	3.3	20.6	31.8	29.0	41.0	19.2
% Hispanic	21.3	5.7	8.6	13.0	6.9	13.1
% Other Races	9.1	2.7	4.8	3.7	2.0	5.7
% FRL	54.5	67.9	53.6	66.9	77.8	59.1
% GT	10.7	12.6	15.5	15.1	14.4	13.1
% ELL	11.5	2.1	4.7	6.4	3.1	6.8
% SPED	11.6	13.2	11.1	9.6	11.7	11.6
N	*13,017*	*6,964*	*10,335*	*3,163*	*1,701*	*35,180*

We report in Table 4 that most ninth-grade students attend schools in the Northwest region of Arkansas, while only five percent of ninth-grade students are attending schools in the Southeast region. Students in the Central, Southwest, and Southeast regions are more likely to be Black and to be eligible for the FRL program. The Northwest region has higher percentages of Hispanic and ELL students compared to the other regions. When we examine failure rates by region, it is important to remember that student concentrations and student characteristics vary between the regions.

The rates of freshmen failing at least one course are presented by region and gender in Table 5. Overall, rates of freshmen failing at least one course vary from 18.7 percent in Northwest Arkansas to 28.5 percent in Southwest Arkansas. Across all regions, females are less likely than males to fail a course their freshman year than their male counterparts, but the different between female and male failure rates is greatest in the Southeast, where males are 15 percentage points more likely to fail a course than their female peers.

Table 5: Course Failure Percentage by Region and Gender, Cohort 10

	% of Males	% of Females	Region Overall
Northwest	22.7	14.7	18.7
Northeast	26.7	17.8	22.4
Central	29.3	19.4	24.4
Southwest	26.8	16.6	21.9
Southeast	35.9	20.8	28.5

We illustrate the racial differences in course failure rates by region in Table 6. The regional failure pattern generally mimics race and ethnicity groups' failure percentages similar to gender's failure percentages.

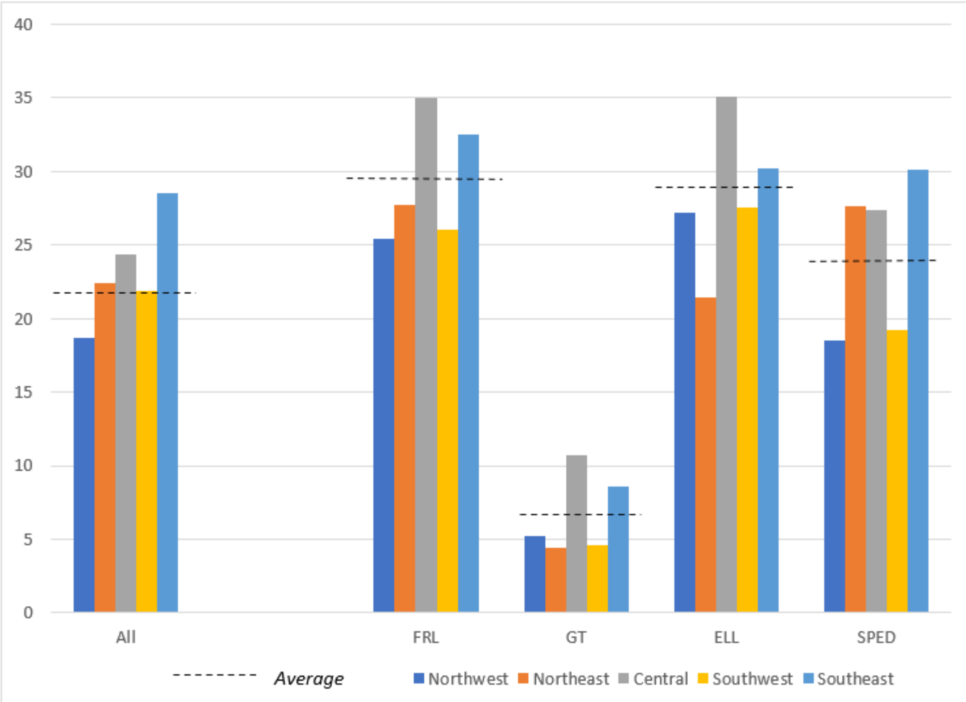
Table 6: Course Failure Percentage by Region and Race/Ethnicity, Cohort 10

	White	Black	Hispanic	Other Races	Region Overall
Northwest	17.6	28.8	20.8	18.2	18.7
Northeast	19.7	32.0	23.1	19.4	22.4
Central	16.5	38.4	28.9	14.0	24.4
Southwest	19.0	28.3	21.0	17.1	21.9
Southeast	24.3	34.2	26.5	26.5	28.5

In Table 3, we reported that Black students had the highest course failure percentage among race/ethnicity groups, and this is consistent across all geographic regions, as reflected in Table 6. The greatest gap between White and Black course failure rates was evidenced in Central Arkansas, where Black students were 12 percentage points more likely to fail a course freshman year than White students. The largest percentage of Hispanic students are in the Northwest region, yet the Northwest region has the lowest Hispanic failing percentage for course failures.

Lastly, we present Figure 1 to illustrate the differences in failure rates by region and programs. To compare the regional average failure rate with Arkansas programs, we placed the regional average on the left side of the figure with the programs by regions on the right side of the figure.

Figure 1: Course Failure Percentage by Region and Program, Cohort 10



Variation in failure rates is apparent by the overall percentage of course failures on the left side of the figure to the comparing right side. The FRL status, GT status, and ELL status course failure percentages are the highest in the Central region. The likelihood of failing at least one course in the Central region is more prevalent than we would expect given the overall failure rate for the region and the state.

To explore our second research question, we report which courses freshmen are failing and if the courses vary by region. We considered that there might be differences in course failure rates between core content courses (English, mathematics, social students, and science) and non-course courses (arts, foreign languages, physical education, technology, etc.). We report on the differing failure rates between core and non-core courses in Table 7.

Table 7: Rate of Freshmen Failing at Least One Course, by Core and Non-Core Classes, Cohort 10

Cohort 10	% of Sample	% Failed at Least One Class	% Failed Core Class	% Failed Non-Core Class
Male	50.8	26.4	21.4	6.4
Female	49.2	17.2	13.7	4.0
White	62.0	18.2	14.6	4.2
Black	19.2	34.6	27.7	9.5
Hispanic	13.1	22.7	18.3	5.4
Other Races	5.8	17.3	14.6	3.2
FRL	59.1	29.0	23.7	7.0
GT	13.1	7.1	5.4	1.9
ELL	6.8	28.5	23.4	6.8
SPED	11.6	23.7	15.8	9.3
Total	*100.0*	*21.9*	*17.6*	*5.2*

In Table 7, we find similar patterns of course failure rates by student demographic characteristics. Arkansas freshmen are more likely to fail core courses than non-core courses. Overall, Black students, FRL status students, ELL students, and male students are most likely to fail at least one course their freshman year, and this pattern is consistent for core course failure percentages. For non-core course, however, students receiving Special Education services have a failure rate almost as high as Black students.

To determine which courses resulted in the highest failure rates among Arkansas freshmen, we restricted our sample to only the courses in which at least 10 percent of the freshman sample were enrolled. This restriction is necessary due to the number of courses in Arkansas that have less than 10 percent of the freshman sample enrolled in them. If a course with less than approximately 3,500 freshman students enrolled in it, even with a higher failure percentage than reported below, the course was restricted from our report. We analyze the five most recent years, 2015-2019, Cohorts 6-10. While the most failed courses for recent Cohort is provided in Table 8, the top ten courses failed for Cohorts 6-9 are in the appendix as Table A2.

Table 8: Most Failed Courses by Arkansas Freshmen, Cohort 10

	Failure Percentage	Core Course
Algebra I	12.3	✓
Spanish I	9.2	
Physical Science	9.1	✓
Computer Business Applications	8.9	
English 9	8.8	✓
US History since 1890	8.4	✓
Family and Consumer Sciences	6.4	
Art	5.7	
World History since 1450	5.7	✓
Oral Communications	5.1	

As reflected in Tables 8 and A2, Algebra I consistently results in the highest percentage of failures, with 12.3 to 16.9 percent of students failing. Spanish I is the most failed non-core course for Cohort 10, with 9.2 percent of students receiving a failing grade.

We present the course failure rates for the top five most failed courses in each region geographic in Arkansas in Table A3. "United States History since 1890" is the most failed course in the Central region (13.3%), with Algebra I a close second (12.6%). In the Southeast region, Spanish I's failure rate is 20.9%, while Algebra I has a lower failure rate of 15.6%. As Algebra I is the most failed course for high school freshmen statewide and nationwide, we conclude that the failing rates for the Algebra I course should be a concern for education stakeholders and policymakers.

Multivariate Regression Analyses

We employ a multivariate logistic regression to explore our third and final research question: Does the likelihood of failing a class freshman year vary after controlling for student demographic characteristics, prior achievement, and district characteristics? Our variables of interest, student demographic and programmatic characteristics, are often correlated with each other so we account for the intercorrelation by running multivariate models. We utilize a logistic regression because our outcome of interest, freshman course failure, is binary. Our sample for these analyses includes only students in Cohorts 9 and 10 as prior cohorts were assessed in the 7th and 8th grade on different assessments and testing regulations.

We conduct a series of analyses, controlling only for student demographic and programmatic characteristics (Model 1), controlling for prior academic achievement (Model 2), and for district enrollment characteristics (Model 3). All three equations are presented below.

Model 1

$$Logit(haveFailed_i) = \beta_0 + \beta_1\chi_i + \beta_2(race * FRL)_i + \varepsilon_i \quad \textbf{(1)}$$

Where:

- $\boldsymbol{haveFailed_i}$ is the dependent variable of interest, probability of failing at least one course freshman year, for student *i* in the analytic pooled analysis
- $\boldsymbol{\chi_i}$ is a vector of student-level characteristics (including gender, race/ethnicity, participation in Free/Reduced Lunch Program, participation in Gifted and Talented Program, participation in English Language Learning Program, and participation in Special Education)
- $(\boldsymbol{race} * \boldsymbol{FRL})_{\boldsymbol{i}}$ is an interaction term of race/ethnicity and status in participation in the Free/Reduced Lunch Program, our interaction of interest
- $\boldsymbol{\varepsilon_i}$ is the random error for student *i* in the analytic pooled analysis

Model 2

$$Logit(haveFailed_i) = \beta_0 + \beta_1\chi_i + \beta_2(race * FRL)_i + \beta_3 priorachievement_i + \varepsilon_i \quad \textbf{(2)}$$

Where:

- All variables in Model 1, and
- $\boldsymbol{priorachievement_i}$ is a 7th and 8th grade standardized math and ELA scores control added for each student *i* in the analytic pooled analysis

Model 3

$$Logit(haveFailed_i) = \beta_0 + \beta_1\chi_i + \beta_2(race * FRL)_i + \beta_3 priorachievement_i + \beta_4 Z_i + \beta_5 districtlea_i + \varepsilon_i \quad \textbf{(3)}$$

Where:

- $\boldsymbol{haveFailed_i}$ all variables in Model 2, and
- $\boldsymbol{Z_i}$ is a vector of district characteristics including district enrollment and district FRL percentages
- $\boldsymbol{districtlea_i}$ is district controls added for each student *i*

Table 9 includes the estimated effects of student demographic and programmatic characteristics on the likelihood of failing a course freshman year. Characteristics of primary interest are presented, and complete regression results are included in the index as Tables A4-A6.

Model 1

As presented in Table 9, male students, which are the reference group, are 10.1 percentage points more likely to fail a course their freshman year than female students. In addition, Black students are 12.5 percentage points more likely to fail a course their freshman year than White students. FRL status students are 14.1 percentage points more likely to fail a course their freshman year than non-FRL status students. Non-GT status students are 15.2 percentage points more likely to fail a course their freshman year than GT status students. ELL students are 7.4 percentage points more likely to fail a course their freshman year than non-ELL students, and students receiving Special Education services are 2.7 percentage points more likely to fail a course their freshman year than students not receiving Special Education services.

Table 9: Estimated Predictors of Having Failed at Least One Course Freshman Year, Cohorts 9 and 10

VARIABLES	Model 1	Model 2	Model 3
Female	-10.1*** (0.003)	-6.8*** (0.003)	-6.8*** (0.003)
Black compared to White	12.5*** (0.006)	1.9*** (0.004)	-1.5*** (0.005)
FRL	14.1*** (0.003)	8.2*** (0.003)	8.7*** (0.003)
GT	-15.2*** (0.003)	-2.2*** (0.006)	-3.4*** (0.005)
ELL	7.4*** (0.009)	-4.7*** (0.006)	-4.6*** (0.005)
SPED	-2.7*** (0.005)	-13.8*** (0.002)	-13.1*** (0.002)
White*FRL compared to White*Non-FRL	16.1*** (0.004)	10.4*** (0.004)	11.2*** (0.004)
Black*FRL compared to Black*Non-FRL	13.6*** (0.010)	5.4*** (0.008)	5.5*** (0.007)
Black*FRL compared to White*FRL	10.4*** (0.006)	0.7 (0.005)	-4.5*** (0.006)
Hispanic*FRL compared to White*FRL	-7.0*** (0.007)	-3.5*** (0.007)	-4.7*** (0.007)
Observations	65,851	65,851	65,851
R-squared	0.0873	0.1777	0.2211

Robust standard errors in parentheses
***p<0.01, **p<0.05, *p<0.1

We also present interaction terms between race/ethnicity and FRL status in Table 9. White FRL status students are 16.1 percentage points more likely to fail a course their freshman year than White non-FRL status students. Black FRL status students are 13.6 percentage points more likely to fail a course their freshman year than Black non-FRL status students. Among FRL status students, Black students are 10.4 percentage points more likely to fail a course their freshman year than White students, and White students are seven percentage points more likely to fail a course their freshman year than Hispanic students.

All these interpretations are statistically significant at the 99% confidence level, but our initial model explains only 8.7% of the variance in the likelihood of failing a course freshman year. We expect including prior student achievement as measured by 7^{th} and 8^{th} grade state assessments in mathematics and English Language Arts (ELA) will add more explanatory power to our model.

Model 2

To examine how prior achievement on state assessments relate to 9^{th}-grade students' likelihood of failing at least one course, we add 7^{th} and 8^{th} grade math and ELA scores to our previous logit regression. The results are provided as Model 2 of Table 9. As presented in Table 9, adding prior achievement increases the variance explained and reduces the association between student demographic and programmatic characteristics and course failure. Male students are still more likely to fail a course their freshman year than females, but the percentage likelihood has decreased from 10.1 to 6.8. Similarly, the difference between Black and White students has also decreased, while Black students are now only 1.9 percentage points more likely to fail a course their freshman year than White students.

FRL status students are 8.2 percentage points more likely to fail a course than non-FRL status students, a decline from 14.1 percentage points in the initial model. The non-GT status comparison to GT status students has decreased to only 2.2 percentage points more likely to fail. After accounting for prior achievement, ELL status students are no longer more likely to fail a course their freshman year than non-ELL status students. Non-ELL status students are now 4.7 percentage points more likely to fail a course their freshman year compared to ELL status students. The SPED comparison has increased to a wider gap of students not receiving Special Education services 13.8 percentage points more likely to fail a course their freshman year than students receiving Special Education services.

Our comparisons between interaction terms are also reduced after including prior student achievement in the model, Black FRL status students are no longer statistically significantly more likely to fail than White FRL status students. Additionally, White FRL status students are now only 10.4 percentage points more likely to fail a course than White non-FRL status students compared to 16.1 percentage points in the initial model. Black FRL status students are now only 5.4 percentage points more likely than Black non-FRL status students to fail a course their freshman year, down from 13.6 in Model 1. Lastly, White FRL status students are now 3.5 percentage points more likely to fail a course than Hispanic FRL status students, down from 7 percentage points in Model 1.

Model 3

Our final model includes district characteristics and district fixed effects. The results are provided under Model 3 of Table 9. Some interpretations of the comparisons continue to decrease, and some interpretations have switched between which group is more likely to fail. This preferred model accounts for 22% of the variance of course failures for freshmen across Arkansas. After adding district characteristics and fixed effects as controls, male students remain 6.8 percentage points more likely to fail a course their freshman year than female students. Black students are now 1.5 percentage points *less* likely to fail a course than White students.

FRL status continues to have a strong relationship to course failure; having an FRL status is associated with an 8.7 percentage point increase likelihood of failing a course freshman year compared to non-FRL status students. On the other hand, non-GT status students are 3.4 percentage points more likely to fail a course their freshman year than GT status students, an increase of 2.2 percentage points from Model 1. The ELL and SPED status associations with course failures are consistent with the prior model. Non-ELL status students are 4.6 percentage points more likely to fail a course, and students not receiving Special Educations services are 13.1 percentage points more likely to fail a course than their peers that participate in the in the respective programs.

Lastly, White FRL status students are 11.2 percentage points more likely to fail a course their freshman year than White, non-FRL status students, a slight increase from Model 2. Black FRL status comparison to Black non-FRL status is consistent with the prior model at 5.5 percentage points more likely to fail. Black FRL status students' comparison to White FRL status students regains statistically significant again, but now Black FRL status students are 4.5 percentage points *less* likely to fail a course their freshman year than White FRL status students. White FRL status students are now more likely to fail a course than Hispanic FRL status students, at 4.7 percentage points.

Although the findings of interest are all statistically significant, we cannot determine causality. Our model is descriptively observing relationships between student demographic and programmatic characteristics and course failures. We discover many student demographic and programmatic characteristics are statistically significantly associated with the likelihood of course failure even after accounting for students' prior academic achievement and district characteristics.

As Algebra I is the most commonly failed course among Arkansas freshmen, we employ the same regression model but replace the outcome variable with if a student failed Algebra I. The model is provided below, and key variables of interest are presented in Table 10, with full regression results in Table A7.

$$Logit(haveFailedAlg1_i) = \beta_0 + \beta_1\chi_i + \beta_2(race * FRL)_i + \beta_3 priorachievement_i + \beta_4 districtFRL_i + \beta_5 logdistrictenrollment_i + \beta_6 districtlea_i + \varepsilon_i \quad \textbf{(4)}$$

Where:

- $\boldsymbol{haveFailedAlg1_i}$ is the dependent variable of interest, probability of failing the Algebra I course credit freshman year, for student *i* in the analytic pooled analysis
- $\boldsymbol{\chi_i}$ is a vector of student-level characteristics (including gender, race/ethnicity, and participation in Free/Reduced Lunch Program, participation in Gifted and Talented Program, participation in English Language Learning Program, and participation in Special Education)
- $\boldsymbol{(race * FRL)_i}$ is an interaction term of race/ethnicity and status in participation in the Free/Reduced Lunch Program, our interaction of interest
- $\boldsymbol{priorachievement_i}$ is a control added for each student *i* in the analytic pooled analysis
- $\boldsymbol{districtFRL_i}$, $\boldsymbol{logdistrictenrollment_i}$, and $\boldsymbol{districtlea_i}$ are district controls added for each student *i* in the analytic pooled analysis
- $\boldsymbol{\varepsilon_i}$ is the random error for student *i* in the analytic pooled analysis

Table 10: Estimated Predictors of Having Failed Algebra I Course Freshman Year, Cohorts 9 and 10

VARIABLES	havefailedAlg1
Female	-1.4*** (0.001)
Black compared to White	-0.4** (0.002)
FRL	2.1*** (0.001)
GT	-1.5*** (0.002)
ELL	-0.9*** (0.002)
SPED	-4.1*** (0.001)
White*FRL compared to White*Non-FRL	2.9*** (0.002)
Black*FRL compared to Black*Non-FRL	1.0*** (0.003)
Black*FRL compared to White*FRL	-1.4*** (0.002)
Hispanic*FRL compared to White*FRL	-1.6*** (0.003)
Observations	65,851
R-squared	0.2153

***p<0.01, **p<0.05, *p<0.1 Robust standard errors in parentheses

Our descriptive analysis demonstrated that Algebra I was the course most failed by Arkansas freshman with 12.7 percent failure rate for the most recent cohort. However, the multivariate regression shows smaller associates between student characteristics and the likelihood of failing Algebra I than the likelihood of failing any course during 9th grade. This model accounts for 21.5 % of the variance in Algebra I failure, but our statistically significant interpretations are not as practically significant as they are for failing at least one course binary outcome.

All group differences have been reduced from failing at least one course to failing the Algebra I course. Male students are 1.4 percentage points more likely to fail Algebra I than to their female peers, compared to 6.8 percentage points in Model 3. White students are 0.4 percentage points more likely to fail Algebra I than Black students, compared to 1.5 percentage points in Model 3.

FRL status students are 2.1 percentage points more likely to fail Algebra I than non-FRL status students, compared to 8.7 percentage points in Model 3. Non-GT status students are 1.5 percentage points more likely to fail Algebra I than GT status students, compared to 3.4 percentage points in Model 3. Non-ELL status students are 0.9 percentage points more likely to fail Algebra I than ELL status students, compared to 4.6 percentage points in Model 3, and lastly, students not receiving Special Education services are 4.9 percentage points more likely to fail Algebra I than students receiving Special Education services, compared to 13.1 percentage points in Model 3.

White FRL status students are 2.9 percentage points more likely to fail Algebra I than White non-FRL status students, compared to 11.2 percentage points in Model 3. Black FRL status students are 1 percentage points more likely to fail Algebra I than Black non-FRL status students, compared to 5.5 percentage points in Model 3. White FRL status students are 1.4 percentage points more likely to fail Algebra I than to Black FRL status students, compared to 4.5 percentage points in Model 3, and lastly, White FRL status students are 1.6 percentage points more likely to fail Algebra I than Hispanic FRL status students, compared to 4.7 percentage points in Model 3. All these interpretations are at the least statistically significant at the 95% confidence level.

IV. Discussion

This study examined the associations between student demographic and programmatic characteristics and the likelihood of failing at least one course freshman year for ten cohorts of Arkansas students (N=344,624). Our analytic sample for the multivariate analysis is limited to the 65,851 students from Cohorts 9 and 10 who completed state assessments during their 7th- and 8th-grade years. As this limitation results in attrition between the original descriptive and analytic samples, the interpreted results are conservative estimates of the relationships between the likelihood of course failure for students with demographic and programmatic characteristics.

Freshman Failures in Arkansas

Though reports and findings about freshmen course failures are limited to CPS and Washington state, we find similar outcomes occur for ninth-grade students across Arkansas. Our study examined which student demographic and programmatic characteristics were associated with increased likelihood of failing a course during the freshman year. After controlling for students' prior academic achievements and district enrollment characteristics, we find FRL status students are 8.7 percentage points more likely than non-FRL status students to fail a course during their freshman year. The discrepancy is greatest between White FRL status students and White non-FRL status students. White FRL status students are 11.2 percentage points more likely to fail a course their freshman year than White non-FRL status students. The four programs we reported in the analysis are FRL status, GT status, ELL status, and Special Education services. Except for FRL status, participation in these programs and services result in a reduced likelihood of failing a course freshman year. More specifically, students not receiving Special Education services are associated with a 13.1 percentage point greater likelihood of course failure their freshman year than students receiving Special Education services. Being in SPED programs in Arkansas schools result in a lower likelihood of failing, as does ELL programs and GT programs. Non-ELL status students are 4.6 percentage points more likely to fail a course their freshman year than ELL status students, and non-GT status students are 3.4 percentage points more likely to fail a course their freshman year than GT status students. The designation of these programs is associated with a lower likelihood of course failure, yet the designation of an FRL status is associated with a higher probability of failing for freshmen in Arkansas.

Algebra I failures are not as related to student demographic and programmatic characteristics as failing any course freshman year. All our findings may be statistically significant at the 99% confidence level, which is expected with large sample size, but not all interpretations are practically significant. The discrepancies that we find of all course failures for Arkansas freshmen between student demographic and programmatic characteristics cannot be attributed to the most failed course, Algebra I, as the statistically significant differences are not practically significant between one another.

Limitations

Our study is limited to descriptive interpretations and cannot identify a causal relationship between student demographic and programmatic characteristics and course failure. Secondly, we limit our multivariate analysis to two cohorts with prior achievement. Adding in prior achievement as a control required us to have math and ELA scores for the freshmen's 7th and 8th corresponding years, and some students did not reside in Arkansas for those years, did not take the state tests, or took alternate state assessments that were not comparable on the same scale as the general state test. This limitation has the most significant attrition from the initial sample for students receiving Special Education services, resulting in a conservative estimate of the association between students receiving Special Education services and course failure compared to students not receiving Special Education services. Additionally, we are only able to control for prior academic achievement in ELA and math, which may not capture the academic and cognitive skills required for other types of freshman year courses like science, social studies, art, etc. Finally, our data does not allow us to see the components on which course grades are based—what percentage is participation, what percentage is standards-based, etc.

Future Research

States should consider conducting future research on high school freshman GPAs and freshman course failure work to investigate if similar trends and associations appear in their data. More information about the components of course grades could provide further insight into why students are failing courses and identify corrective courses of action. Without gathering the potential effects of course failures for freshmen and their future educational outcomes, school districts across the country could be leaving certain groups of students behind when helping these students could be quickly addressed.

Policy Recommendations

The increased likelihood of FRL status students failing a course freshman year, even after controlling for prior academic achievement, suggests that educators and district leaders across the state should examine the possibility of grading bias occurring for this group of students. Our results indicate that there is a possibility of grades for freshmen in Arkansas reflecting soft skills, such as time management, completing paperwork, class participation, timeliness of submissions, etc.

The designation of a SPED, ELL, and GT status are all associated with a decreased likelihood of failing. FRL status students are more likely to fail. Even after controlling for prior achievement and district characteristics, however, ELL and SPED status students could be receiving the supports they need to successfully pass their classes in Arkansas, whereas Arkansas could be lacking the additional supports for FRL status students to receive the help they need.

Chicago school district leaders implemented interventions to prevent freshman students falling behind in school due to failing grades. Programs that have been found to be effective for freshmen include professional learning communities (PLCs), reviewing student data that focuses on the most at-risk students (lower grades and higher absences), arranging Freshman Success meetings, and forming intentional relationships with lower GPA students (Allensworth et al., 2018; Clark et al., 2016; Park & Denson, 2013; Shoulders et al., 2019; Seeskin et al., 2018). For example, Chicago Public Schools' Freshman OnTrack program has been associated with positive results for alerting teachers and administrators of students close to falling behind academically for high school graduation (Allensworth et al., 2018). Arkansas should consider a similar state-wide early warning indicator.

To address failing grades for all students directly, Arkansas district leaders should consider enacting a "no-zero" policy to prevent zeros from pulling down weighted averages in students' course grades (Allensworth et al., 2018). Joe Feldman (2019) expands the no-zero idea further by suggesting that educators implement a minimum grading policy. Under a minimum grading policy, all letter grades should have the same weight on the scale from 50 to 100. Feldman suggests that teachers and leaders to consider this policy as our current grading scale disproportionately harms students of color, low-income students, and English Language Learners.
Feldman (2019) reports schools that implement the minimum grading policy decreased student failures, reduced grade inflation, and reduced achievement gaps. While this policy recommendation may be uncomfortable for teachers as it challenges the norm and the standard zero grade, it is necessary to help eliminate the possibility of grading bias.
Basing grades on soft skills –time management, completing paperwork, class participation, timeliness of submissions, etc.—should not be incorporated in grades as it can harm students who face challenges outside of the school environment, when the main purpose should be to assess if students really understand the content (Feldman, 2019). The primary purpose of grading should be to assess what a student knows instead of evaluating soft skills.

Malecki and Demaray (2016) encourage schools to provide social mentorship programs for FRL students as their implementations are associated with higher academic performance. Shoulders et al. (2019) urge teachers and counselors to give FRL students with lower GPAs more attention and more academic assistance. Moreover, Park and Denson (2013) suggest teachers and principals analyze their relationships with FRL status students further because providing financial aid for college will not help alleviate education success disparities unless the problem is met head-on—teachers and principals need to form intentional mentorship opportunities for FRL status students.

The OEP team plans to take this report further in the coming term by contacting districts directly with course failure evaluations and their comparisons to the ten biggest districts in Arkansas. We also plan to include diagnostics of which student demographic subgroups are failing disproportionately in each district to address the possible grading bias in local districts across the state. As our previous OEP paper, *Examining Arkansas' Ninth-Grade GPAs and Long-Term Outcomes*, provided evidence that freshman GPAs matter for educational outcomes, we must address possible grading biases sooner rather than later. Additionally, we hope to help Arkansas develop a Freshman OnTrack program.

School leaders should evaluate grading practices in their districts to ensure fairness and consistency for all student demographic and programmatic groups. Identifying and removing barriers to student success is a step towards helping Arkansas students experience better academic and social outcomes.

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APPENDIX

Table A1: Arkansas Counties by Geographic Region

Northwest	Northeast	Central	Southwest	Southeast
Baxter	Clay	Faulkner	Calhoun	Arkansas
Benton	Cleburne	Garland	Clark	Ashley
Boone	Craighead	Grant	Columbia	Bradley
Carroll	Crittenden	Hot Spring	Dallas	Chicot
Conway	Cross	Jefferson	Hempstead	Cleveland
Crawford	Fulton	Lonoke	Howard	Desha
Franklin	Greene	Pulaski	Lafayette	Drew
Johnson	Independence	Saline	Little River	Lee
Logan	Izard		Miller	Lincoln
Madison	Jackson		Montgomery	Monroe
Marion	Lawrence		Nevada	Phillips
Newton	Mississippi		Ouachita	Prairie
Perry	Poinsett		Pike	
Pope	Randolph		Polk	
Scott	Sharp		Sevier	
Searcy	St Francis		Union	
Sebastian	Stone			
Van Buren	White			
Washington	Woodruff			
Yell				

Table A2: Top Ten Most Failed Freshman Courses, Cohorts 6-10

Course Name	Cohort 6	Cohort 7	Cohort 8	Cohort 9	Cohort 10
Algebra I	16.9	15.3	14.8	13.5	12.3
Spanish I	9.5	9.6	9.0	7.9	9.2
Physical Science	11.0	10.3	9.6	8.8	9.1
Computer Business Applications	8.4	8.8	9.5	8.3	8.9
English 9	11.8	10.2	9.7	9.3	8.8
US History since 1890	-	-	-	-	8.4
Family and Consumer Sciences	5.9	6.1	6.6	6.3	6.4
Art	7.4	6.4	7	6.1	5.7
World History since 1450	-	-	-	-	5.7
Oral Communications	6.6	5.3	5.6	4.7	5.1
Survey of Agriculture Systems	-	-	-	5.8	-
Biology	-	5.4	7.5	5.4	-
Economics	5.4	4.9	5.3	4.7	-
Civics	5.4	-	-	-	-

**Note: Only courses with less than or equal to 10 percent of freshmen enrolled are included.*

Table A3: Course Failure Rank and Percent Failing, Cohort 10

Region	1	2	3	4	5
Northwest	Algebra I (10.0%)	Spanish I (7.5%)	Physical Science (7.3%)	English 9 (7.3%)	World History since 1450 (6.3%)
Northeast	Algebra I (14.5%)	Physical Science (9.8%)	Spanish I (8.8%)	Computer Bus. App. (8.7%)	English 9 (8.3%)
Central	US History since 1890 (13.3%)	Algebra I (12.6%)	Spanish I (10.9%)	Computer Bus. App. (10.8%)	Physical Science (10.3%)
Southwest	Algebra I (13.9%)	English 9 (10.3%)	US History since 1890 (9.9%)	Physical Science (9.7%)	Computer Bus. App. (7.7%)
Southeast	Spanish I (20.9%)	Algebra I (15.6%)	Biology (14.0%)	US History since 1890 (13.8%)	Computer Bus. App. (12.6%)

Table A4: Estimated Predictors of Having Failed at Least One Course Freshman Year, Model 1 full results

Model 1: Student Characteristics r^2 = 0.0873	Contrast	Delta-method Std. Err.	Unadjusted z	P>z
Sex M vs F	0.101	0.003	32.5	0.000
race				
Hispanic vs Black	-0.125	0.007	-16.72	0.000
Other vs Black	-0.146	0.008	-17.84	0.000
White vs Black	-0.125	0.006	-22.66	0.000
Other vs Hispanic	-0.021	0.008	-2.72	0.007
White vs Hispanic	0.001	0.006	0.09	0.927
White vs Other	0.022	0.007	3.26	0.001
isFRL 1 vs 0	0.141	0.003	44.21	0.000
race#isFRL				
(Black#1) vs (Black#0)	0.136	0.010	13.25	0.000
(Hispanic#0) vs (Black#0)	-0.064	0.013	-5.12	0.000
(Hispanic#1) vs (Black#0)	-0.039	0.011	-3.55	0.000
(Other#0) vs (Black#0)	-0.138	0.012	-11.8	0.000
(Other#1) vs (Black#0)	-0.004	0.013	-0.34	0.736
(White#0) vs (Black#0)	-0.129	0.009	-13.85	0.000
(White#1) vs (Black#0)	0.032	0.010	3.28	0.001
(Hispanic#0) vs (Black#1)	-0.200	0.010	-20.29	0.000
(Hispanic#1) vs (Black#1)	-0.175	0.008	-22.82	0.000
(Other#0) vs (Black#1)	-0.274	0.009	-31.52	0.000
(Other#1) vs (Black#1)	-0.140	0.010	-13.47	0.000
(White#0) vs (Black#1)	-0.266	0.005	-51.21	0.000
(White#1) vs (Black#1)	-0.104	0.006	-18.55	0.000
(Hispanic#1) vs (Hispanic#0)	0.026	0.010	2.65	0.008
(Other#0) vs (Hispanic#0)	-0.073	0.011	-6.57	0.000
(Other#1) vs (Hispanic#0)	0.060	0.012	4.88	0.000
(White#0) vs (Hispanic#0)	-0.065	0.009	-7.41	0.000
(White#1) vs (Hispanic#0)	0.096	0.009	10.43	0.000
(Other#0) vs (Hispanic#1)	-0.099	0.009	-10.91	0.000
(Other#1) vs (Hispanic#1)	0.034	0.010	3.41	0.001
(White#0) vs (Hispanic#1)	-0.091	0.006	-14.95	0.000
(White#1) vs (Hispanic#1)	0.070	0.007	10.47	0.000
(Other#1) vs (Other#0)	0.133	0.012	11.47	0.000
(White#0) vs (Other#0)	0.008	0.008	1.07	0.284
(White#1) vs (Other#0)	0.169	0.008	21.4	0.000
(White#0) vs (Other#1)	-0.125	0.010	-13.3	0.000
(White#1) vs (Other#1)	0.036	0.010	3.68	0.000
(White#1) vs (White#0)	0.161	0.004	42.9	0.000
isGT 1 vs 0	-0.152	0.003	-43.85	0.000
isLEP 1 vs 0	0.074	0.009	8.41	0.000
isSPED 1 vs 0	-0.027	0.005	-6.07	0.000

Table A5: Estimated Predictors of Having Failed at Least One Course Freshman Year, Model 2 full results

Model 2: Model 1 + prior achievement r² = 0.1777	Contrast	Delta-method Std. Err.	Unadjusted z	P>z
Sex M vs F	0.068	0.003	22.36	0.000
race				
Hispanic vs Black	-0.007	0.007	-1.04	0.301
Other vs Black	-0.027	0.008	-3.37	0.001
White vs Black	-0.019	0.004	-4.23	0.000
Other vs Hispanic	-0.020	0.009	-2.34	0.019
White vs Hispanic	-0.011	0.006	-1.91	0.056
White vs Other	0.008	0.007	1.15	0.25
Is FRL 1 vs 0	0.082	0.003	25.82	0.000
race#isFRL				
(Black#1) vs (Black#0)	0.054	0.008	6.81	0.000
(Hispanic#0) vs (Black#0)	0.019	0.012	1.6	0.11
(Hispanic#1) vs (Black#0)	0.026	0.010	2.81	0.005
(Other#0) vs (Black#0)	-0.035	0.012	-2.86	0.004
(Other#1) vs (Black#0)	0.035	0.011	3.12	0.002
(White#0) vs (Black#0)	-0.043	0.007	-5.79	0.000
(White#1) vs (Black#0)	0.061	0.008	8.04	0.000
(Hispanic#0) vs (Black#1)	-0.035	0.010	-3.32	0.001
(Hispanic#1) vs (Black#1)	-0.028	0.007	-3.96	0.000
(Other#0) vs (Black#1)	-0.088	0.011	-8.35	0.000
(Other#1) vs (Black#1)	-0.019	0.010	-1.92	0.055
(White#0) vs (Black#1)	-0.097	0.005	-21.18	0.000
(White#1) vs (Black#1)	0.007	0.005	1.57	0.115
(Hispanic#1) vs (Hispanic#0)	0.007	0.011	0.63	0.528
(Other#0) vs (Hispanic#0)	-0.054	0.014	-3.93	0.000
(Other#1) vs (Hispanic#0)	0.016	0.013	1.27	0.206
(White#0) vs (Hispanic#0)	-0.062	0.010	-6.27	0.000
(White#1) vs (Hispanic#0)	0.042	0.010	4.15	0.000
(Other#0) vs (Hispanic#1)	-0.060	0.011	-5.39	0.000
(Other#1) vs (Hispanic#1)	0.010	0.010	0.96	0.337
(White#0) vs (Hispanic#1)	-0.069	0.006	-11.01	0.000
(White#1) vs (Hispanic#1)	0.035	0.007	5.32	0.000
(Other#1) vs (Other#0)	0.070	0.013	5.32	0.000
(White#0) vs (Other#0)	-0.008	0.010	-0.85	0.395
(White#1) vs (Other#0)	0.100	0.010	9.34	0.000
(White#0) vs (Other#1)	-0.078	0.009	-8.54	0.000
(White#1) vs (Other#1)	0.026	0.009	2.76	0.006
(White#1) vs (White#0)	0.104	0.004	27.35	0.000
Is GT 1 vs 0	-0.022	0.006	-3.67	0.000
Is LEP 1 vs 0	-0.047	0.006	-8.29	0.000
Is SPED 1 vs 0	-0.138	0.002	-56.08	0.000

Table A6: Estimated Predictors of Having Failed at Least One Course Freshman Year, Model 3 full results

Model 3: Model 2 + district characteristics $r^2 = 0.2211$	Contrast	Delta-method Std. Err.	Unadjusted z	P>z
Sex M vs F	0.068	0.003	23.32	0.000
race				
Hispanic vs Black	0.015	0.007	2.26	0.024
Other vs Black	-0.000	0.008	-0.04	0.97
White vs Black	0.015	0.005	3.23	0.001
Other vs Hispanic	-0.016	0.008	-1.96	0.05
White vs Hispanic	-0.000	0.006	-0.05	0.962
White vs Other	0.015	0.007	2.24	0.025
Is FRL 1 vs 0	0.087	0.003	26.71	0.000
race#isFRL				
(Black#1) vs (Black#0)	0.055	0.007	8.03	0.000
(Hispanic#0) vs (Black#0)	0.036	0.012	3.36	0.001
(Hispanic#1) vs (Black#0)	0.052	0.008	6.25	0.000
(Other#0) vs (Black#0)	-0.012	0.010	-1.19	0.233
(Other#1) vs (Black#0)	0.067	0.011	6.29	0.000
(White#0) vs (Black#0)	-0.012	0.006	-1.93	0.053
(White#1) vs (Black#0)	0.099	0.007	14.15	0.000
(Hispanic#0) vs (Black#1)	-0.018	0.010	-1.83	0.067
(Hispanic#1) vs (Black#1)	-0.003	0.007	-0.35	0.727
(Other#0) vs (Black#1)	-0.067	0.010	-6.89	0.000
(Other#1) vs (Black#1)	0.013	0.010	1.27	0.204
(White#0) vs (Black#1)	-0.070	0.005	-13.2	0.000
(White#1) vs (Black#1)	0.045	0.006	7.94	0.000
(Hispanic#1) vs (Hispanic#0)	0.016	0.010	1.59	0.111
(Other#0) vs (Hispanic#0)	-0.049	0.012	-3.94	0.000
(Other#1) vs (Hispanic#0)	0.031	0.012	2.52	0.012
(White#0) vs (Hispanic#0)	-0.049	0.009	-5.25	0.000
(White#1) vs (Hispanic#0)	0.063	0.010	6.45	0.000
(Other#0) vs (Hispanic#1)	-0.065	0.010	-6.32	0.000
(Other#1) vs (Hispanic#1)	0.015	0.010	1.55	0.12
(White#0) vs (Hispanic#1)	-0.064	0.006	-10.36	0.000
(White#1) vs (Hispanic#1)	0.047	0.007	6.87	0.000
(Other#1) vs (Other#0)	0.080	0.012	6.49	0.000
(White#0) vs (Other#0)	0.000	0.090	0.01	0.989
(White#1) vs (Other#0)	0.118	0.009	11.88	0.000
(White#0) vs (Other#1)	-0.080	0.009	-8.7	0.000
(White#1) vs (Other#1)	0.032	0.010	3.37	0.001
(White#1) vs (White#0)	0.112	0.004	27.07	0.000
is GT 1 vs 0	-0.033	0.005	-6.19	0.000
is LEP 1 vs 0	-0.046	0.005	-8.41	0.000
isSPED 1 vs 0	-0.131	0.002	-55.38	0.000

Table A7: Estimated Predictors of Having Failed Algebra I Freshman Year, full results

Algebra I Model r² = 0.2153	Contrast	Delta-method Std. Err.	Unadjusted z	P>z
Sex M vs F	0.014	0.001	12.37	0.000
race				
Hispanic vs Black	0.000	0.003	0.14	0.886
Other vs Black	0.002	0.003	0.64	0.523
White vs Black	0.004	0.002	2.23	0.025
Other vs Hispanic	0.002	0.003	0.51	0.608
White vs Hispanic	0.004	0.002	1.64	0.102
White vs Other	0.002	0.003	0.7	0.486
Is FRL 1 vs 0	0.021	0.001	15.79	0.000
race#isFRL				
(Black#1) vs (Black#0)	0.010	0.003	3.42	0.001
(Hispanic#0) vs (Black#0)	0.002	0.004	0.55	0.58
(Hispanic#1) vs (Black#0)	0.008	0.003	2.46	0.014
(Other#0) vs (Black#0)	-0.004	0.004	-0.86	0.391
(Other#1) vs (Black#0)	0.018	0.005	3.96	0.000
(White#0) vs (Black#0)	-0.005	0.003	-1.73	0.084
(White#1) vs (Black#0)	0.024	0.003	8.05	0.000
(Hispanic#0) vs (Black#1)	-0.007	0.004	-1.99	0.047
(Hispanic#1) vs (Black#1)	-0.001	0.003	-0.48	0.635
(Other#0) vs (Black#1)	-0.013	0.004	-3.34	0.001
(Other#1) vs (Black#1)	0.008	0.004	2.07	0.039
(White#0) vs (Black#1)	-0.014	0.002	-7.43	0.000
(White#1) vs (Black#1)	0.014	0.002	6.65	0.000
(Hispanic#1) vs (Hispanic#0)	0.006	0.004	1.65	0.099
(Other#0) vs (Hispanic#0)	-0.006	0.005	-1.25	0.211
(Other#1) vs (Hispanic#0)	0.016	0.005	3.25	0.001
(White#0) vs (Hispanic#0)	-0.007	0.003	-2.05	0.041
(White#1) vs (Hispanic#0)	0.022	0.004	5.95	0.000
(Other#0) vs (Hispanic#1)	-0.012	0.004	-2.88	0.004
(Other#1) vs (Hispanic#1)	0.010	0.004	2.47	0.014
(White#0) vs (Hispanic#1)	-0.013	0.002	-5.4	0.000
(White#1) vs (Hispanic#1)	0.016	0.003	5.77	0.000
(Other#1) vs (Other#0)	0.022	0.005	4.19	0.000
(White#0) vs (Other#0)	-0.001	0.004	-0.23	0.819
(White#1) vs (Other#0)	0.028	0.004	7	0.000
(White#0) vs (Other#1)	-0.023	0.004	-5.8	0.000
(White#1) vs (Other#1)	0.006	0.004	1.46	0.145
(White#1) vs (White#0)	0.029	0.002	16.22	0.000
Is GT 1 vs 0	-0.015	0.002	-7.33	0.000
Is LEP 1 vs 0	-0.009	0.002	-4.33	0.000
Is SPED 1 vs 0	-0.041	0.001	-38.83	0.000