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APPENDIXES

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Student group differences in Arkansas' indicators of postsecondary readiness and success

Appendix A. Data and Methods

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Appendix C. Supplemental analyses

See https://ies.ed.gov/ncee/rel/Products/Publication/100916 for the full report.

Appendix A. Data and methods

This appendix describes data sources, data elements, and data preparation, as well as the analysis methods used in this study.

Data sources

The data used to address the research questions came from four sources:

- Arkansas Department of Education (ADE).
- Arkansas Division of Higher Education.
- National Student Clearinghouse.
- National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).
- These data follow grade 6 students in Arkansas public schools in 2008/09 or 2009/10[1] through 2016/17 (the 2008/09 cohort) or 2017/18 (the 2009/10 cohort) (two years past expected on-time high school graduation). ADE provided data on student background characteristics, student academic and behavioral measures in middle and high school (including attendance, assessment records, discipline records, and course transcript records), and ACT scores. The Arkansas Division of Higher Education and the National Student Clearinghouse provided college enrollment and persistence records. District locale is from the Common Core of Data (U.S. Department of Education, n.d.). ADE linked the records using student- and school-level identifiers across data sources and years. The data were processed for the analyses presented in Hester et al. (2021).

Data elements

Independent variables. The study team used data from ADE to construct the study's independent variables for all four research questions, including student background characteristics and status on the middle school and high school indicators. The data included in each file are described in this section.

- *Demographic records.* These data include the student's district in grade 6 and background characteristics, including gender, race/ethnicity, eligibility for the National School Lunch Program, English learner student status, disability status, age, and grade level for each academic year. The study team used data exclusively from the grade 6 year and constructed an additional variable, "entered grade 6 after age 13" (defined following Arkansas guidelines as being age 13 or older on August 1 before the student's grade 6 year). This threshold allows for students to enter kindergarten (and subsequent grades) a year later than the state standard without

[1] If a student was enrolled in grade 6 in both 2008/09 and 2009/10 (that is, the student repeated grade 6), the student was treated as a member of the 2008/09 cohort and appeared as a single case in the analyses.

yet being coded as older than the typical age in grade 6. Univariate distributions for student background characteristics are in table A1.

Table A1. Background characteristics and district locales for Arkansas students in each cohort and overall, 2008/09 and 2009/10 grade 6 cohorts

Background characteristic or district locale	Percentage
Male	51.1
Race/ethnicity	
Black	22.9
Hispanic	8.9
Other race/ethnicity	3.0
White	65.2
Eligible for National School Lunch Program	60.1
English learner student	5.9
Student with disabilities	11.2
Entered grade 6 after age 13	18.4
District locale	
City	28.3
Suburb	9.0
Town	23.8
Rural area	39.0

Note: The characteristics are based on student grade 6 information (2008/09 or 2009/10). Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.
Source: Authors' analysis of data for 2008/09 and 2009/10 from the Arkansas Department of Education and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

- *Attendance records.* These data include information on the number of enrolled days a student was present or absent for the first academic year in which students were in a particular grade. The percentage of days present was calculated for each grade level by dividing the days present by the total days enrolled (the sum of days present and days absent). Attendance indicator variables were created separately for middle school and high school. A first indicator variable was created that recorded a value of 1 if the student was present more than 95 percent of the days for all years of the grade band (middle school or high school). A second indicator variable was created that recorded a value of 1 if the student was present 90 percent or fewer days in at least one year of the grade band (absent 10 percent of days enrolled, referred to as chronically absent). These two indicator variables left a remaining reference category that included students who were present 95 percent of the days enrolled or less in at least one year of the grade band but more than 90 percent in each year of the grade level. These categorizations follow the guidance in the Arkansas Every Student Succeeds Act (ESSA) state plan and establish a reference group category for regression models that adheres to the definition of chronic absence used in Arkansas and other states (Chang et al., 2019; Jordan & Miller, 2017).
- *Student assessment records.* These data include whether students demonstrated proficiency as established by ADE on state English language arts, mathematics, and science assessments during middle school, as well as mathematics and science assessments during high school. State assessments of mathematics and English language arts are administered in all three middle school grades, whereas assessments of middle school and high school science and high school mathematics are typically administered in a particular grade or for a particular course. The specific assessments include the Arkansas Comprehensive Testing, Assessment, and Accountability Program through 2013/14 (the year on-time students in the study cohorts were in grades 10 and 11, respectively) and the Partnership for Assessment of Readiness for College and Careers through 2014/15 (the

year on-time students in the study cohorts were in grades 11 and 12, respectively). In 2015/16, ADE switched to the ACT Aspire, but the two grade 6 cohorts had already moved beyond high school testing by then.

  - The middle school English language arts indicator measures whether a student scored proficient or above in grade 8; if no testing information was available for the student in grade 8 (which was the case for 6 percent of the observations), the study team based the indicator on grade 7 information (which was available for 44 percent of the missing cases). If grade 7 information was missing, the study team used grade 6 information (which was available for an additional 30 percent of the missing cases). If information on grades 6, 7, or 8 was unavailable, the student was considered not to have demonstrated proficiency.
  - The middle school mathematics indicator measures whether a student scored proficient or above in grade 8; if no testing information was available for the student in grade 8 (which was the case for 34 percent of the observations), the study team based the indicator on grade 7 information (which was available for 85 percent of the missing cases). If grade 7 information was missing, the study team used grade 6 information (which was available for an additional 11 percent of the missing cases). If information on grades 6, 7, or 8 was unavailable, the student was considered not to have demonstrated proficiency.
  - The middle school science indicator measures whether a student scored proficient or above on the physical science assessment. Students typically take this assessment in grade 7, and all available data for science were for grade 7.
  - The high school science indicator measures whether a student scored proficient or above on the biology assessment. Students typically take this assessment in grade 10.
  - The high school mathematics indicator measures whether a student scored proficient or above on either the algebra assessment (typically taken in grade 9) or the geometry assessment (typically taken in grade 10). Students considered proficient may fall into one of three categories: passed the algebra assessment only, passed the geometry assessment only, or passed both the algebra and geometry assessments.
  - No high school English language arts assessment was available for the relevant cohorts.

- *Discipline records*. These data include the number of suspensions and expulsions by grade. These tallies were used to create indicators for students who were never suspended or never expelled during the middle school and high school grades.
- *High school course transcript records*. These data include information used to identify enrollment in an advanced course. Consistent with the Arkansas ESSA state plan, Advanced Career Education, Advanced Placement, and International Baccalaureate courses were classified as advanced. The indicator of enrollment in an advanced course measures whether a student enrolled in at least one advanced course. High school course transcript records also were used to construct an indicator measuring whether a student enrolled in at least one community service learning course. ADE includes two courses under this category: Community Service Learning and Leadership and Service Learning. These courses provide an opportunity for students to learn and develop through organized service. Finally, high school course transcript records were used to identify students who earned an average high school grade point average of 2.8 or higher, calculated as an average of yearly grade point averages across the relevant high school years.
- *Common Core of Data*. Geographic locale records were used to identify each district's locale as city, suburb, town, or rural area in the year in which a student was in grade 6 (U.S. Department of Education, n.d.). The study team collapsed town and rural area into a single category.
- *Outcome variables.* The three study postsecondary readiness and success outcome variables were constructed using data from ADE, the Arkansas Division of Higher Education, and the National Student Clearinghouse.
- *Postsecondary readiness (ACT score of 19 or higher)*. Student scores on ACT postsecondary readiness exams are from ADE. The ACT is typically taken in grade 11, but some students took it multiple times—sometimes over multiple grades. The study team used the highest score available to identify whether students were ready for postsecondary education (the same practice followed by colleges), defined in the Arkansas ESSA state plan benchmark as an ACT score of 19 or higher. Students with missing ACT scores were excluded from the descriptive

statistics and estimation of models for postsecondary readiness. Data from those students were included in an alternative set of analyses, with missing ACT scores coded as 0 (see tables C1–C5 in appendix C).

- *Postsecondary success (college enrollment and persistence).* Data from the Arkansas Division of Higher Education include information on enrollment in colleges in Arkansas, including public, private, nonprofit, and for-profit colleges. Enrollment was defined to include students pursuing or earning an associate's or a bachelor's degree or an academic or a technical certificate. National Student Clearinghouse records include credential attainment records from colleges nationwide, including public, private, nonprofit, and for-profit colleges. The study team used these data to generate an indicator of whether a student ever enrolled in college (enrollment) and another for whether the student was enrolled for more than one term or received a credential (persistence). Students who did not have records of college enrollment in more than one academic term were coded as not attaining persistence. Because the available National Student Clearinghouse records include only credential attainment, all students in the National Student Clearinghouse records were considered to have persisted according to the decision rules. Students who lacked records of enrollment in college from either data source were coded as 0 (not attaining college enrollment or persistence).

For all three outcomes, students who did not finish high school within eight years of beginning grade 6 were coded as failing to attain postsecondary readiness and success.

Data preparation

After removing duplicates, the data file had 72,929 records. Next, 9,250 records were removed for students who were deceased; enrolled in home school, private school, or in another school out of state; or withdrew because of health problems. The final analytical sample included 63,679 students for each postsecondary success model, and 37,930 students for the postsecondary readiness outcome model (only students with ACT records).[2]

To prepare the data to answer the research questions, the study team performed four primary tasks:

- Prepared data for merging, including making a single record per student ID for each data source.
- Identified grade 6 students in 2008/09 and 2009/10 from the demographic data file and removed excluded cases.
- Merged multiple data sources using student ID and year.
- Aggregated variables and created indicators for the analysis.

The stages are described in additional detail in this section and in Hester et al. (2021).

Preparing data for merging. Records on student background characteristics, academic, attendance, and discipline as received from ADE were sorted by grade level, retained when describing grades 6–12, and deduplicated to a single annual record per student. Discipline variables were condensed by summing suspensions and expulsions separately across individual schools and the types of discipline (in-school or out-of-school suspensions) by year. Attendance records were condensed first by removing pure duplicate records; then, for students who appeared at multiple schools in a year but at the same grade level, by using the student's days present and absent summed across all schools in a given year.

Demographic records were condensed by removing duplicate records and then by taking records only for the lowest grade level. Grade 6 records were used to establish gender, race/ethnicity, eligibility for the National School Lunch Program, English learner student status, and disability status unless a student had multiple grade 6 records that conflicted with one another, in which case the study team used records for the next grade to reach a determination.

The grade point average records had fewer than 0.1 percent duplicates, so duplicates were dropped randomly until each student had a unique grade point average record.

Identifying students in grade 6 in 2008/09 and 2009/10 from the demographics file and removing excluded cases. Students were identified as in grade 6 in 2008/09 (n = 36,477) or 2009/10 (n = 36,667) based on being listed as in

[2] Students with missing ACT scores were excluded from the models of postsecondary readiness.

grade 6 in the associated school year's demographic data file. When a student was listed as in grade 6 in both years' demographic files, only the 2008/09 record was kept (n = 215). After duplicates were removed, the data file had 72,929 records.

Students' data were dropped from the records if the coded reasons they left school were "deceased," "enrolled in home school," "enrolled in private school," "enrolled in another school out of state," or "health problems." After this removal, the final sample size was 63,679.

Merging multiple data sources using student ID and year. All files were merged to the cohort level based on the anonymized student ID provided by the state. Because files were made unique by year and student ID before this step, these merges were all simple one-to-one merges without complication.

Aggregating variables and creating indicators for the analysis. Records were aggregated to the student or student/grade band level. Information about student background characteristics was taken from the demographic data for grade 6, the time of cohort formation. Using later information risked using an indicator observed after baseline—for example, exiting English learner student status—as a predictor. The only exception was that the study team looked ahead to the next grade to adjudicate cases when multiple grade 6 demographic records conflicted with one another.

For models that included high school indicators as predictors of postsecondary readiness (ACT score of 19 or higher), the study team used information from grades 9 and 10 to construct high school indicators because the readiness outcome was assessed in the spring of grade 11 for most students. The study team used information from grades 9–12 to construct high school indicators to predict the postsecondary success outcomes because college enrollment and persistence were measured after high school completion.[3]

Analysis methods

Research question 1. Does the percentage of Arkansas students who attain indicators of postsecondary readiness and success vary by student group?

Research question 2. Does the percentage of Arkansas students who attain postsecondary readiness and success outcomes vary by student group?

The study team used descriptive statistics to analyze patterns of intergroup differences in the attainment of indicators and outcomes. For research question 1, the study team examined the percentage of students attaining each indicator by student background characteristics, including gender, race/ethnicity, eligibility for the National School Lunch Program, English learner student status, disability status, whether the student entered grade 6 after age 13, and district locale. For research question 2, the study team examined the percentage of students who met or exceeded a score of 19 on the ACT (a measure of postsecondary readiness), the percentage who enrolled in at least one term of college according to Arkansas Division of Higher Education records (a measure of college enrollment), and the percentage who enrolled in more than one term or who completed a credential according to Arkansas Division of Higher Education or National Student Clearinghouse records (a measure of college persistence).

[3] For the main results, the study team used information from grades 9–12 to construct high school indicators to predict postsecondary success to include data across the high school experience. Several of these indicators cannot be measured until a student finishes high school and, thus, cannot be directly used to target services during high school. As a subanalysis, the study team used information from grades 9 and 10 to construct high school indicators and ran a separate analysis to predict the accuracy and specificity of these indicators for postsecondary outcomes. The results show that model accuracy grows incrementally with grade level (for example, the overall model accuracy of predicting college enrollment is .72 using middle school indicators, .75 using grades 9 and 10 indicators, and .76 using grades 9–12 indicators). There are similar patterns for accuracy and specificity for postsecondary outcomes overall and by student group. Moreover, the accuracy and specificity of the model using indicators from grades 9 and 10 is very close to the model using indicators from grades 9–12, suggesting that the main results using the grades 9–12 indicators can be applied to grades 9 and 10.

The study team calculated the proportions of students attaining each outcome across student groups, based on gender, race/ethnicity, National School Lunch Program eligibility, English learner student status, disability status, whether the student entered grade 6 after age 13, and district locale. In alignment with Hester et al. (2021), the study team adopted a uniform benchmark of 10 percentage points as the minimum threshold for substantial differences. The team analyzed the statistical significance of intergroup differences in the rates of attainment using *t* tests for proportions. Pairwise comparisons were conducted for binary (yes/no) variables (for example, male versus female, those who are eligible for the National School Lunch Program versus those who are not) and against the majority category for racial/ethnic groups and district locale.

Research question 3. How accurately and specifically do the indicators predict attainment of postsecondary readiness and success outcomes for different student groups?

For research question 3, the study team used logistic regression models to predict postsecondary outcomes on the basis of student characteristics and indicators of postsecondary readiness and success. This method aligns with the approach Hester et al. (2021) used.

For each postsecondary outcome, two logistic regressions were set up: one including the middle school indicator variables and another including the high school indicator variables. Both models included student background characteristics. To study student group differences, the team introduced an interaction between the set of indicators and the relevant student characteristics (gender, race/ethnicity, National School Lunch Program eligibility, English learner student status, disability status, whether the student entered grade 6 after age 13, and district locale). The general form of the models used in the analysis is as follows:

$$\Phi(y_i) = \boldsymbol{x_i'\beta} + \boldsymbol{x_i\alpha} + \boldsymbol{xz_i\delta} + \gamma_s + \varepsilon_{is} \quad (1)$$

where $\Phi(y_i)$ represents the logit transformation of an outcome variable, $\boldsymbol{x_i}$ is the vector of student characteristics, z_i is the indicator (predictor) variable, $\boldsymbol{xz_i}$ is the vector of interaction terms, and γ_s is the district random effect.

Using the estimated models, the study team predicted outcomes for each observation (that is, for each student in the dataset). The estimated probability of achieving 1 (success) above 50 percent was treated as predicted success and as failure otherwise.

These numbers were used to calculate model accuracy, defined as the percentage of correct predictions (cases in which actual and predicted outcomes were the same; the results of these analyses are in table B2 in appendix B). In addition to overall model accuracy, the study team estimated model specificity (that is, the proportion of correctly predicted failures). This metric can inform education leaders about the diagnostic model's capacity to identify students at risk of failing to attain the desired outcomes. The use of actual and predicted student outcomes to calculate model accuracy and specificity is illustrated in figure A1. Calculating model accuracy for subsets of students belonging to each student group answers research question 3. Comparisons of model specificity across groups employed the same criterion of substantial difference in magnitude introduced earlier (differences of 10 percentage points or more; results of these analyses are in table 4 in the main report).

Figure A1. Prediction matrix for assessing model accuracy of a logistic regression

Actual outcomes (percentage)	Predicted outcomes (percentage)	
	Negative	**Positive**
Negative	True negative (TN)	False positive (FP)
Positive	False negative (FN)	True positive (TP)

$$Accuracy = \frac{TP+TN}{TP+TN+FN+FP}$$

$$Specificity = \frac{TN}{TN+FP}$$

Source: Hastie et al. (2009).

The results are presented as tables showing accuracy and specificity for each indicator–outcome model and for each student group. Substantial differences (those exceeding 10 percentage points) are highlighted in the text. The study team did not calculate the statistical significance of differences in predictive accuracy and specificity, and some differences discussed may not be statistically significant. In addition, the study team did not calculate model sensitivity because it does not have the same policy value as accuracy and specificity (that is, identifying students who are highly likely to achieve college readiness and success outcomes).

Alternative models were estimated by restricting the sample to only certain groups of students, defined by gender, race/ethnicity, and other characteristics of interest. The team compared the accuracy of these models to the accuracy of predictions made by the single model to determine if the improvements in predictive power were substantial enough to justify adoption of a more complex approach involving many group models instead of a single, encompassing model (results are in tables C6 and C7 in appendix C).

Research question 4. How does the strength of the indicators for predicting postsecondary readiness and success outcomes vary by student group?

For research question 4, the study team used the model developed to address research question 3, focusing on the association between individual indicators and outcomes for each student group. For logistic regression models, a readily interpretable measure of this association is the marginal effect of an indicator on the probability of the outcome. Marginal effect is the change in the probability of an outcome (success rate) when the indicator changes by one unit and all other covariates are held the same. Because all indicators and most student characteristics included in this model are binary (yes/no), the marginal effects can be understood as the difference in outcomes caused by the difference in the indicator or characteristic. For example, a 30-point marginal effect of middle school English language arts proficiency on postsecondary readiness (score of 19 or higher on the ACT) for Hispanic students means that the probability of achieving postsecondary readiness was higher for Hispanic students who attained English language arts proficiency in middle school by 30 percentage points than for Hispanic students who did not attain proficiency. For White students, this difference was estimated to be 18 percentage points. Therefore, the predictive strength of middle school English language arts proficiency for postsecondary readiness is substantial for both groups of students but is higher for Hispanic students. The results in this example reflect only the partial contribution of middle school English language arts proficiency to postsecondary readiness. The overall difference in postsecondary readiness between the two groups of students results from the combination of all factors and student characteristics and cannot be inferred from marginal effects. Marginal effects therefore separate the effect of a single indicator on the probability of success when many interrelated factors affect the outcome. The analysis of predictive strength in the current study focuses on the differences of marginal effects across student groups. The same measure was used in Hester et al. (2021). Marginal effects were calculated for each student group and each model using R package *margins* (Leeper, 2021; results of these analyses are in tables B3–B8 in appendix B).

A sensitivity analysis was performed to assess the extent to which the results may be affected by different assumptions about missing values of postsecondary readiness indicators, which constitute about 40 percent of all observations. It is possible that students who were less focused on college or did not expect to attain a passing score on the test either chose not to take the ACT or dropped out of high school before they had a chance to take it. In the absence of information on the true causes of the unavailability of ACT scores, the only option is to perform an analysis on the whole dataset with 63,679 observations, replacing missing values with zeros. This analysis answers a counterfactual question: What if all missing scores belong to students who did not attain postsecondary readiness? Information about differences in the characteristics of students with ACT scores and students without ACT scores are in table A2, and the results of alternative analyses are in tables C1–C5 in appendix C.

Table A2. Characteristics of Arkansas students with and without ACT scores (percentage), 2008/09 and 2009/10 grade 6 cohorts

Background characteristic or district locale	Students with ACT scores	Students without ACT scores
Male	45.0	60.1*
Race/ethnicity		
Black	20.2	27.0
Hispanic	7.1	11.5
Other	3.0	2.9
White	69.7	58.7*
Eligible for the National School Lunch Program	49.0	76.5*
English learner student	4.1	8.6
Student with disabilities	5.0	20.4*
District locale		
City	25.8	32.0
Town or rural area	61.3	57.4
Suburb	13.0	10.6

* denotes differences of 10 percentage points or more between students with and without ACT scores.

Note: The sample included 37,930 students with ACT scores and 25,749 students without ACT scores in grade 6 in 2008/09 or 2009/10. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education, the Arkansas Division of Higher Education, the National Student Clearinghouse, and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

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Appendix B. Supporting analyses

This appendix includes supplementary tables that support the findings in the main report. The tables include information about the percentages of students achieving postsecondary readiness and success outcomes by student group (table B1), the predictive accuracy of models using middle and high school indicators of postsecondary readiness and success by student group (table B2), and the predictive strength of academic and behavioral indicators of postsecondary readiness, college enrollment, and college persistence by student group (tables B3–B8).

Table B1. Percentages of Arkansas students achieving postsecondary readiness and success outcomes by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Postsecondary readiness	College enrollment	College persistence
Gender			
Female	64.8[a]	64.1*	55.5*
Male^	64.2	52.3	43.1
Race/ethnicity			
Black	33.3*	51.7*	41.4*
Hispanic	50.6*	43.1*	37.3*
Other	74.2[a]	55.7	48.1
White^	74.6	62.4	53.5
Eligible for the National School Lunch Program			
Yes	49.2*	47.9*	38.7*
No^	79.3	73.3	64.8
English learner student			
Yes	38.4*	35.1*	30.2*
No^	65.6	59.5	50.3
Disability status			
Yes	22.9*	30.2*	22.5*
No^	66.7	61.6	52.5
Entered grade 6 after age 13			
Yes	41.3*	35.7*	28.1*
No^	67.5	63.1	53.9
District locale			
City	64.5	49.5*	41.0*
Town or rural area	63.0	61.4[a]	52.2[a]
Suburb^	71.6	61.5	52.9

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.

Note: The sample included 37,930 students for postsecondary readiness and 63,679 students for college enrollment and persistence in grade 6 in 2008/09 or 2009/10. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

a. Not significantly different from the reference group at $p < 0.05$.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education, the Arkansas Division of Higher Education, the National Student Clearinghouse, and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table B2. Predictive accuracy (in percentage points) of models using middle and high school indicators of postsecondary readiness and success by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Middle school			High school		
	Postsecondary readiness	College enrollment	College persistence	Postsecondary readiness	College enrollment	College persistence
Gender						
Female	82.4	73.5	70.3	83.8	77.0	75.2
Male^	82.3	70.5	70.1	83.1	75.1	75.5
Race/ethnicity						
Black	79.1	68.9	70.0	81.0	71.9	73.6
Hispanic	77.0	68.5	69.4	80.5	72.3	73.9
Other	84.9	72.0	68.2	84.3	76.3	74.1
White^	83.7	73.5	70.5	84.4	78.0	76.2
Eligible for the National School Lunch Program						
Yes	78.7	68.6	69.6	80.6	73.3	74.9
No^	85.9	76.9	71.0	86.3	80.2	76.0
English learner student						
Yes	74.2	69.7	72.5	79.0	73.2	75.7
No^	82.7	72.1	70.0	83.7	76.2	75.3
Disability status						
Yes	86.4	71.0	77.8	85.2	73.3	79.6
No^	82.1	72.1	69.2	83.4	76.4	74.8
Entered grade 6 after age 13						
Yes	82.0	71.7	76.2	84.0	75.7	79.9
No^	82.4	72.0	68.8	83.4	76.1	74.3
Locale						
City	83.2	69.8	69.8	84.3	75.1	75.2
Town or rural area	81.5	72.5	70.2	82.9	76.0	75.1
Suburb^	84.5	74.0	71.0	84.6	78.4	76.7

^ denotes the reference group.

Note: The sample included 37,930 students for postsecondary readiness and 63,679 students for college enrollment and persistence in grade 6 in 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness and information from grades 9-12 to construct high school indicators to predict college enrollment and persistence. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education, the Arkansas Division of Higher Education, the National Student Clearinghouse, and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table B3. Predictive strength (in percentage points) of academic indicators of postsecondary readiness by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Middle school			High school		
	Mathematics proficiency	Science proficiency	English language arts proficiency	Mathematics proficiency	Science proficiency	Grade point average 2.8+
Gender						
Female	24.0	23.9	21.1	13.8	24.2	15.1
Male^	18.7	22.3	20.5	11.1	23.1	15.5
Race/ethnicity						
Black	24.0	25.7	26.1	14.3	25.2	16.9
Hispanic	25.3	27.6	30.4*	11.7	28.5	17.4
Other	23.3	20.9	16.6	6.9	23.2	14.7
White^	20.4	22.1	18.5	12.4	22.8	14.6
Eligible for the National School Lunch Program						
Yes	25.3	26.2	25.3	15.3	26.8	16.5
No^	18.0	20.3	16.6	9.9	20.8	14.2
English learner student						
Yes	26.1	28.1	29.4	11.2	29.7	18.1
No^	21.4	23.0	20.5	12.6	23.5	15.2
Disability status						
Yes	15.9	14.1	15.4	9.2	20.6	12.3
No^	21.9	23.7	21.1	12.7	23.9	15.4
Entered grade 6 after age 13						
Yes	19.1	23.6	21.1	15.7	23.7	15.1
No^	21.9	23.1	20.8	12.2	23.7	15.3
District locale						
City	18.6	21.9	17.9	8.1	22.6	15.0
Town or rural area	23.1	24.1	23.1	13.8	24.6	16.0
Suburb^	20.3	21.4	15.8	15.7	22.0	12.4

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.

Note: The sample included 37,930 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table B4. Predictive strength (in percentage points) of academic indicators of college enrollment by student group, 2008/09 and 2009/10 grade 6 cohorts

	Middle school			High school				
Student group	Mathematics proficiency	Science proficiency	English language arts proficiency	Mathematics proficiency	Science proficiency	Grade point average 2.8+	Enrollment in advanced courses	Enrollment in community service learning courses
Gender								
Female	10.8	5.5	15.5	7.0	2.0	14.1	19.3	3.9
Male^	9.0	8.6	12.8	10.4	2.7	14.3	20.8	0.3
Race/ethnicity								
Black	7.7	3.5	13.5	7.4	-1.2[a]	17.4	19.6	9.7*
Hispanic	10.3	9.9	14.4	9.2	5.3	8.6	18.5	0.2[a]
Other	10.8	0.2[a]	23.9*	15.5	3.9	14.2	17.9	0.2[a]
White^	10.6	8.3	13.8	8.9	3.2	13.8	20.5	-0.3
Eligible for the National School Lunch Program								
Yes	9.1	7.0	13.7	8.0	2.6	15.7	20.6	3.1
No^	11.1	7.3	14.7	9.9	2.1	11.9	19.3	0.5
English learner student								
Yes	9.9	8.6	11.6	9.6	5.1	9.2	15.4	0.2[a]
No^	9.9	7.0	14.3	8.7	2.2	14.5	20.4	2.2
Disability status								
Yes	6.0	-9.9*	6.3	4.9	-9.1*	8.4	26.0	-5.3[a]
No^	10.4	9.3	15.1	9.2	3.8	14.9	19.3	3.0
Entered grade 6 after age 13								
Yes	9.0	6.9	8.8	8.3	0.8[a]	13.5	21.7	0.4[a]
No^	10.1	7.2	15.3	8.8	2.7	14.3	19.7	2.4
Locale								
City	10.3	6.8	14.2	9.4	2.2	14.4	17.7	3.4
Town or rural area	9.7	7.3	13.4	8.5	2.5	13.7	21.2	1.6[a]
Suburb^	9.9	7.1	17.6	8.5	2.3	15.8	20.4	1.2

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.

Note: The sample included 63,679 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9–12 to construct high school indicators to predict college enrollment and persistence. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

[a] Not significantly different from zero at $p < 0.05$.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education, the Arkansas Division of Higher Education, the National Student Clearinghouse, and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table B5. Predictive strength (in percentage points) of academic indicators of college persistence by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Middle school			High school				
	Mathematics proficiency	Science proficiency	English language arts proficiency	Mathematics proficiency	Science proficiency	Grade point average 2.8+	Enrollment in advanced courses	Enrollment in community service learning courses
Gender								
Female	11.6	5.5	18.1	7.2	1.3	15.4	19.2	3.2
Male^	11.4	7.8	11.9	9.6	2.3	14.5	18.9	-0.4
Race/ethnicity								
Black	9.5	2.2[a]	13.2	7.2	-1.5[a]	15.8	16.9	6.4
Hispanic	11.1	8.5	13.2	9.9	4.0	10.2	16.8	-1.2[a]
Other	12.0	0.6[a]	24.3	16.2	3.1	11.4	18.9	0.0[a]
White^	12.3	8.3	15.3	8.3	2.6	15.5	20.1	0.0
Eligible for the National School Lunch Program								
Yes	10.5	5.9	13.0	7.1	2.0	15.3	18.3	0.7[a]
No^	13.0	7.9	17.9	10.4	1.6	14.4	20.1	2.2
English learner student								
Yes	10.2	7.1	12.7	9.4	3.7	9.8	15.4	-1.2[a]
No^	11.6	6.7	15.1	8.4	1.7	15.3	19.2	1.5
Disability status								
Yes	9.0	-7.9*	4.0*	3.7	-7.0*	7.4	21.3	-5.9[a]
No^	11.8	8.5	16.3	9.0	3.0	15.9	18.7	2.2
Entered grade 6 after age 13								
Yes	9.7	5.7	8.9	6.6	2.5	13.3	17.4	-0.6[a]
No^	11.9	6.9	16.3	8.8	1.7	15.3	19.4	1.8
Locale								
City	11.2	6.0	15.0	8.5	1.4	15.3	16.2	2.3
Town or rural area	11.6	7.0	14.3	7.8	2.0	14.6	20.8	0.9[a]
Suburb^	11.6	7.0	18.0	11.1	1.9	15.8	16.8	1.1

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.

Note: The sample included 63,679 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9–12 to construct high school indicators to predict college enrollment and persistence. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

[a] Not significantly different from zero at $p < 0.05$.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education, the Arkansas Division of Higher Education, the National Student Clearinghouse, and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table B6. Predictive strength (in percentage points) of behavioral indicators of postsecondary readiness by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Middle school				High school			
	Never suspended	Never expelled	95 percent attendance or more	90 percent attendance or less	Never suspended	Never expelled	95 percent attendance or more	90 percent attendance or less
Gender								
Female	5.1	na	1.1	2.1	3.0	3.0[a]	0.9[a]	0.8[a]
Male^	5.2	na	1.1	2.8	3.0	3.1	-0.5	0.6
Race/ethnicity								
Black	5.2	na	1.1	-0.1[a]	4.7	3.5[a]	2.7	1.7[a]
Hispanic	5.6	na	3.5	3.1[a]	3.8	3.7[a]	0.3[a]	-7.1[a]
Other	4.9	na	1.6	2.2[a]	7.4	3.0[a]	-3.8[a]	1.3[a]
White^	5.1	na	0.9	3.1	2.2	2.9	-0.2	1.2
Eligible for the National School Lunch Program								
Yes	4.1	na	1.5	0.2[a]	3.6	3.6[a]	0.6[a]	0.4[a]
No^	6.1	na	0.8	4.6	2.4	2.6	0.0	0.9
English learner student								
Yes	5.9	na	5.9	6.5[a]	5.0	3.8[a]	-0.1[a]	-6.1[a]
No^	5.1	na	0.9	2.2	2.9	3.0	0.3	1.0
Disability status								
Yes	1.9[a]	na	0.8	2.8	3.0	3.0[a]	0.0[a]	-7.6[a]
No^	5.3	na	1.1	2.4	3.0	3.1	0.3	1.1
Entered grade 6 after age 13								
Yes	5.1	na	1.2	8.6	2.8	3.1[a]	-0.3[a]	0.0[a]
No^	5.1	na	1.1	1.6	3.0	3.1	0.3	0.8
Locale								
City	6.5	na	1.4	0.4[a]	4.8	3.0[a]	1.4	0.0[a]
Town or rural area	4.2	na	1.1	3.6	2.0	3.2[a]	-0.4[a]	1.0[a]
Suburb^	6.7	na	0.9	0.7	4.2	2.8	1.0	0.6

^ denotes the reference group.

na is not applicable.

Note: The sample included 37,930 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races. A code of 0 for never expelled in middle school was so rare the study team excluded this indicator from the analysis.

[a] Not significantly different from zero at $p < 0.05$.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table B7. Predictive strength (in percentage points) of behavioral indicators of college enrollment by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Middle school				High school			
	Never suspended	Never expelled	95 percent attendance or more	90 percent attendance or less	Never suspended	Never expelled	95 percent attendance or more	90 percent attendance or less
Gender								
Female	10.2	na	6.1	-12.0	1.1	16.5	2.3	-9.9
Male^	10.9	na	6.1	-12.6	3.3	18.0	2.3	-13.0
Race/ethnicity								
Black	7.9	na	8.8	-17.5	0.7[a]	15.2	4.2	-16.1
Hispanic	7.2	na	5.2	-11.0	3.0	45.7*	4.1	-13.0
Other	5.5	na	11.5	-10.2	2.5	10.5	2.1	-9.8
White^	12.2	na	5.0	-10.8	2.6	14.4	1.3	-9.7
Eligible for the National School Lunch Program								
Yes	9.9	na	7.5	-14.1	2.2	20.8	2.8	-14.1
No^	11.5	na	4.0	-9.7	2.2	11.9	1.5	-7.5
English learner student								
Yes	6.7	na	7.6	-10.5	3.0	40.5*	5.7	-12.8
No^	10.8	na	6.0	-12.4	2.2	15.8	2.1	-11.4
Disability status								
Yes	8.8	na	4.0	-13.0	2.6	21.6	2.2	-13.4
No^	10.8	na	6.4	-12.2	2.2	16.7	2.3	-11.2
Entered grade 6 after age 13								
Yes	10.4	na	4.7	-12.6	2.5	28.8*	1.3[a]	-12.3
No^	10.6	na	6.4	-12.3	2.1	14.7	2.5	-11.3
Locale								
City	9.4	na	6.6	-11.5	2.1	12.7	3.0	-12.4
Town or rural area	10.6	na	5.7	-13.3	2.3	21.2*	2.0	-11.3
Suburb^	13.4	na	7.0	-9.4	2.2	8.5	1.8	-10.0

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.
na is not applicable.
Note: The sample included 63,679 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9–12 to construct high school indicators to predict college enrollment and persistence. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races. A code of 0 for never expelled in middle school was so rare the study team excluded this indicator from the analysis.
a. Not significantly different from zero at $p < 0.05$.
Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education, the Arkansas Division of Higher Education, the National Student Clearinghouse, and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table B8. Predictive strength (in percentage points) of behavioral indicators of college persistence by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Middle school				High school			
	Never suspended	Never expelled	95 percent attendance or more	90 percent attendance or less	Never suspended	Never expelled	95 percent attendance or more	90 percent attendance or less
Gender								
Female	10.6	na	6.6	-12.9	2.7	18.3	3.5	-10.8
Male^	11.7	na	6.2	-12.3	5.1	19.2	3.2	-10.3
Race/ethnicity								
Black	8.6	na	8.3	-17.1	4.0	19.5	4.9	-15.2
Hispanic	7.8	na	8.0	-11.1	4.1	19.5	5.6	-14.7
Other	4.5[a]	na	11.3	-11.3	4.0	17.4	3.5	-10.0
White^	12.9	na	5.3	-11.3	3.8	18.4	2.5	-8.3
Eligible for the National School Lunch Program								
Yes	10.5	na	7.5	-13.3	3.8	19.6	3.7	-12.9
No^	12.2	na	4.8	-11.6	4.1	17.5	2.7	-6.9
English learner student								
Yes	6.9	na	9.4	-10.3	3.8	18.2	7.4	-17.0
No^	11.5	na	6.2	-12.7	3.9	18.8	3.1	-10.1
Disability status								
Yes	7.5	na	5.4	-10.5	3.6	22.5	2.6	-12.7
No^	11.6	na	6.6	-12.9	3.9	18.3	3.4	-10.3
Entered grade 6 after age 13								
Yes	9.5	na	5.5	-10.7	3.5	35.7*	1.7	-9.8
No^	11.6	na	6.6	-13.0	4.0	14.9	3.7	-10.7
Locale								
City	9.8	na	6.8	-12.9	4.3	17.5	4.0	-11.3
Town or rural area	10.9	na	6.4	-12.6	3.0	19.4	3.1	-10.4
Suburb^	15.8	na	5.7	-11.9	7.5	18.3	2.9	-9.2

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.
na is not applicable.

Note: The sample included 63,679 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9–12 to construct high school indicators to predict college enrollment and persistence. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races. A code of 0 for never expelled in middle school was so rare the study team excluded this indicator from the analysis.

[a] Not significantly different from the zero at $p < 0.05$.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education, the Arkansas Division of Higher Education, the National Student Clearinghouse, and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Reference

U.S. Department of Education. (n.d.). *Elementary/secondary information system*. https://nces.ed.gov/ccd/elsi/

Appendix C. Supplemental analyses

This appendix presents the findings of two series of alternative analyses. The first series used an alternative approach to handling missing data for postsecondary readiness. The main report used complete case analysis, removing any cases with missing ACT scores.[4] This alternative analysis was performed under an assumption that students with missing ACT scores chose not to take the ACT and would not have been found to be "postsecondary ready" (as defined in this report) had they taken the ACT. Therefore, in this alternative analysis, all missing values were treated as zeros. The results in tables C1-C5 reveal similar patterns to the results of the main analyses, but the differences in model accuracy and predictive strength of indicators are substantial between the main and alternative analyses. The tendency noted in the main analyses (higher specificity of models with respect to Black students, Hispanic students, students with disabilities, and English learner students) is more pronounced in the alternative analysis, with specificity exceeding 95 percent in some cases. These results suggest that the validity of the main analysis is not adversely affected by the presence of missing values for postsecondary readiness, but the availability of more complete data could further increase the specificity of the results for some groups of students.

The second series of alternative analyses used an alternative estimation strategy. The main analyses applied a complex model to the whole dataset and used interaction terms to identify differences in indicator strength across student groups, but the alternative analyses applied simpler models—without the interaction terms (denoted xz_i in the model specification formula in appendix A)—to smaller datasets limited to particular student groups. The alternative approach could lead to improvements in predictive strength if the differences in learning processes across student groups are too deep to be adequately accounted for using a single model. The results in tables C6 and C7 show that the alternative strategy does not present a clear advantage. In both cases, the following pattern emerges: The strategy adopted in the main analysis produces better results using high school indicators, whereas the alternative strategy tends to produce better results using middle school indicators. However, no consistent improvements are observed under the alternative strategy for student groups of particular interest, including Black students, Hispanic students, English learner students, and students with disabilities. Differences in accuracy between the two approaches were both positive and negative and were mostly in the single-digit percentage point range. It is therefore preferable to use the strategy adopted in the main analysis, which may be used to develop a compact predictive tool for practitioners that would be applicable to all student groups. At the same time, the results suggest that additional middle school indicators could be identified to improve the accuracy of the early warning models.

[4] The characteristics of students with and without ACT scores are in table A2 in appendix A.

Table C1. Predictive accuracy and specificity (in percentage points) of postsecondary readiness in the main analysis and with missing data as zeros by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Middle school postsecondary readiness indicators				High school postsecondary readiness indicators			
	Predictive accuracy		Predictive specificity		Predictive accuracy		Predictive specificity	
	Readiness in main analysis	Readiness with zeros	Readiness in main analysis	Readiness with zeros	Readiness in main analysis	Readiness with zeros	Readiness in main analysis	Readiness with zeros
Gender								
Female	82.4	79.7	67.0	81.8	83.8	83.5	74.6	85.0
Male^	82.3	80.6	68.7	84.6	83.1	84.3	74.2	89.3
Race/ethnicity								
Black	79.1	86.7	90.2*	95.8*	81.0	88.1	89.9*	95.9*
Hispanic	77.0	82.0	73.9*	91.6*	80.5	84.6	80.6*	91.7
Other	84.9	77.6	56.0	76.8	84.3	82.8	63.8	83.4
White^	83.7	77.8	50.1	75.2	84.4	82.4	61.9	82.0
Eligible for National School Lunch Program								
Yes	78.7	81.9	76.0*	91.8*	80.6	85.0	81.4*	92.9*
No^	85.9	77.6	48.4	59.0	86.3	82.2	58.1	71.3
English learner student								
Yes	74.2	86.2	83.2*	96.2*	79.0	87.8	87.2*	94.5
No^	82.7	79.8	66.6	82.2	83.7	83.7	73.4	86.7
Disability status								
Yes	86.4	93.9*	93.2*	99.6*	85.2	94.1*	94.9*	99.9*
No^	82.1	78.5	64.7	80.0	83.4	82.6	71.9	84.8
Entered grade 6 after age 13								
Yes	82.0	89.5*	85.8*	96.0*	84.0	91.3	86.3*	96.6*
No^	82.4	78.1	63.7	79.1	83.4	82.2	71.7	84.2
Locale								
City	83.2	81.8	72.0	86.1	84.3	84.9	77.6	89.2
Town or rural area	81.5	79.6	66.7	83.0	82.9	83.6	74.0	87.2
Suburb^	84.5	79.2	63.8	77.5	84.6	83.1	68.7	82.9

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.

Note: The sample in the main analysis included 37,930 grade 6 students in 2008/09 or 2009/10; the sample with missing data as zeroes included the full sample of 63,679 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table C2. Predictive strength (in percentage points) of academic indicators of postsecondary readiness in middle school in the main analysis and with missing data as zeros by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Mathematics proficiency in main analysis	Mathematics proficiency with zeros	Science proficiency in main analysis	Science proficiency with zeros	ELA proficiency in main analysis	ELA proficiency with zeros
Gender						
Female	24.0	26.0	23.9	18.0	21.1	26.8
Male^	18.7	19.1	22.3	16.5	20.5	21.0
Race/ethnicity						
Black	24.0	15.7	25.7	13.7	26.1	19.5
Hispanic	25.3	19.7	27.6	16.1	30.4*	26.5
Other	23.3	24.4	20.9	14.3	16.6	23.7
White^	20.4	25.2	22.1	18.8	18.5	25.0
Eligible for National School Lunch Program						
Yes	25.3	20.6	26.2	14.9	25.3	22.6
No^	18.0	25.4	20.3	20.8	16.6	25.6
English learner student						
Yes	26.1	15.7	28.1	12.3	29.4	20.3
No^	21.4	22.9	23.0	17.6	20.5	24.1
Disability status						
Yes	15.9	7.3*	14.1	1.4*	15.4	7.5*
No^	21.9	24.4	23.7	19.3	21.1	25.9
Entered grade 6 after age 13						
Yes	19.1	12.6*	23.6	11.2	21.1	13.2*
No^	21.9	24.7	23.1	18.6	20.8	26.2
Locale						
City	18.6	19.0	21.9	15.9	17.9	20.4
Town or rural area	23.1	23.7	24.1	17.9	23.1	25.9
Suburb^	20.3	24.7	21.4	17.5	15.8	21.3

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.
ELA is English language arts.
Note: The sample in the main analysis included 37,930 grade 6 students in 2008/09 or 2009/10; the sample with missing data as zeroes included the full sample of 63,679 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.
Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table C3. Predictive strength (in percentage points) of academic indicators of postsecondary readiness in high school in the main analysis and with missing data as zeros by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	Mathematics proficiency in main analysis	Mathematics proficiency with zeros	Science proficiency in main analysis	Science proficiency with zeros	GPA 2.8+ in main analysis	GPA 2.8+ with zeros
Gender						
Female	13.8	13.6	24.2	19.1	15.1	19.0
Male^	11.1	11.4	23.1	16.3	15.5	17.5
Race/ethnicity						
Black	14.3	10.0	25.2	13.6	16.9	12.3
Hispanic	11.7	8.1	28.5	17.0	17.4	16.6
Other	6.9	7.9	23.2	19.9	14.7	20.8
White^	12.4	14.1	22.8	19.1	14.6	20.5
Eligible for National School Lunch Program						
Yes	15.3	11.5	26.8	15.7	16.5	15.7
No^	9.9	13.9	20.8	20.6	14.2	22.1
English learner student						
Yes	11.2	6.0	29.7	15.1	18.1	13.4
No^	12.6	12.9	23.5	17.8	15.2	18.6
Disability status						
Yes	9.2	4.3*	20.6	4.2*	12.3	5.5*
No^	12.7	13.5	23.9	19.4	15.4	19.9
Entered grade 6 after age 13						
Yes	15.7	10.1	23.7	10.9	15.1	10.4
No^	12.2	13.0	23.7	19.2	15.3	20.0
District locale						
City	8.1	7.8	22.6	16.7	15.0	17.3
Town or rural area	13.8	13.7	24.6	18.0	16.0	18.9
Suburb^	15.7	17.1	22.0	18.3	12.4	17.2

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.
GPA is grade point average.
Note: The sample in the main analysis included 37,930 grade 6 students in 2008/09 or 2009/10; the sample with missing data as zeroes included the full sample of 63,679 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.
Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table C4. Predictive strength (in percentage points) of behavioral indicators of postsecondary readiness in middle school in the main analysis and with missing data as zeros by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	No suspensions in main analysis	No suspensions with zeros	95 percent attendance or more in main analysis	95 percent attendance or more with zeros	90 percent attendance or less in main analysis	90 percent attendance or less with zeros
Gender						
Female	5.1	9.1	1.1	4.6	2.1	-5.2
Male^	5.2	8.7	1.1	4.2	2.8	-4.8
Race/ethnicity						
Black	5.2	4.6	1.1	3.1	-0.1	-4.0
Hispanic	5.6	7.3	3.5	5.4	3.1[a]	-2.5
Other	4.9	10.2	1.6	5.7	2.2	-5.5
White^	5.1	10.6	0.9	4.7	3.1	-5.6
Eligible for National School Lunch Program						
Yes	4.1	6.6	1.5	4.0	0.2	-4.3
No^	6.1	12.4	0.8	5.0	4.6	-6.0
English learner student						
Yes	5.9	5.9	5.9	5.6	6.5[a]	0.5
No^	5.1	9.1	0.9	4.3	2.2	-5.3
Disability status						
Yes	1.9	1.6	0.8	1.5	2.8	-1.7
No^	5.3	9.8	1.1	4.8	2.4	-5.4
Entered grade 6 after age 13						
Yes	5.1	6.4	1.2	2.5	8.6	-2.8
No^	5.1	9.5	1.1	4.8	1.6	-5.5
Locale						
City	6.5	8.3	1.4	5.2	0.4	-6.3
Town or rural area	4.2	9.0	1.1	3.8	3.6	-4.4
Suburb^	6.7	9.9	0.9	5.7	0.7	-4.7

^ denotes the reference group.

Note: The sample in the main analysis included 37,930 grade 6 students in 2008/09 or 2009/10; the sample with missing data as zeroes included the full sample of 63,679 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

a. Not significantly different from zero at $p < 0.05$.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table C5. Predictive strength (in percentage points) of behavioral indicators of postsecondary readiness in high school in the main analysis and with missing data as zeros by student group, 2008/09 and 2009/10 grade 6 cohorts

Student group	No suspensions in main analysis	No suspensions with zeros	No expulsions in main analysis	No expulsions with zeros	95 percent attendance or more in main analysis	95 percent attendance or more with zeros	90 percent attendance or less in main analysis	90 percent attendance or less with zeros
Gender								
Female	3.0	4.9	3.0	8.5	0.9	3.2	0.8	-4.5
Male^	3.0	4.6	3.1	7.8	-0.5	2.9	0.6	-4.3
Race/ethnicity								
Black	4.7	3.6	3.5	6.1	2.7	3.4	1.7	-3.6
Hispanic	3.8	4.5	3.7	7.5	0.3	3.9	-7.1	-4.6
Other	7.4	5.6	3.0	9.1	-3.8	3.9	1.3	-5.6
White^	2.2	5.1	2.9	8.9	-0.2	2.8	1.2	-4.6
Eligible for National School Lunch Program								
Yes	3.6	4.3	3.6	7.5	0.6	2.9	0.4	-4.0
No^	2.4	5.3	2.6	9.1	0.0	3.2	0.9	-4.9
English learner student								
Yes	5.0	3.8	3.8	6.1	-0.1	4.2	-6.1	-4.0
No^	2.9	4.8	3.0	8.3	0.3	3.0	1.0	-4.4
Disability status								
Yes	3.0	3.8	3.0	3.5	0.0	1.3	-7.6	-5.9
No^	3.0	4.8	3.1	8.7	0.3	3.3	1.1	-4.2
Entered grade 6 after age 13								
Yes	2.8	2.9	3.1	4.7	-0.3	1.6	0.0	-3.0
No^	3.0	5.1	3.1	8.9	0.3	3.4	0.8	-4.7
Locale								
City	4.8	5.2	3.0	7.6	1.4	4.4	0.0	-6.2
Town or rural area	2.0	4.2	3.2	8.4	-0.4	2.2	1.0	-3.6
Suburb^	4.2	5.9	2.8	8.5	1.0	4.4	0.6	-3.8

^ denotes the reference group.

Note: The sample in the main analysis included 37,930 grade 6 students in 2008/09 or 2009/10; the sample with missing data as zeroes included the full sample of 63,679 grade 6 students in 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table C6. Predictive accuracy (in percentage points) of models using middle and high school indicators of postsecondary readiness and success by student group, alternate specification, 2008/09 and 2009/10 grade 6 cohorts

Student group	Middle school			High school		
	Postsecondary readiness	College enrollment	College persistence	Postsecondary readiness	College enrollment	College persistence
Gender						
Female	83.7	76.9	75.1	82.5	73.1	70.1
Male^	83.0	74.7	75.3	82.2	70.2	69.8
Race/ethnicity						
Black	81.1	71.6	73.4	79.1	68.9	69.7
Hispanic	80.3	72.1	73.9	77.2	68.3	69.3
Other	84.7	76.1	74.3	84.2	71.9	67.8
White^	84.5	77.8	76.2	83.7	73.0	70.3
Eligible for National School Lunch Program						
Yes	80.4	72.7	74.6	78.7	68.3	69.4
No^	86.1	79.9	76.0	85.9	76.7	70.7
English learner student						
Yes	79.3	73.4	75.5	75.4	68.9	72.5
No^	83.5	75.9	75.1	82.6	71.7	69.7
Disability status						
Yes	85.3	73.6	79.5	86.4	71.0	77.8
No^	83.3	76.3	74.7	82.2	72.0	69.1
Entered grade 6 after age 13						
Yes	83.9	75.3	79.9	82.0	71.4	75.7
No^	83.3	75.8	74.1	82.4	71.7	68.7
Locale						
City	84.1	74.8	74.8	83.3	69.7	69.4
Town or rural area	84.5	78.4	76.5	84.1	73.4	71.0
Suburb^	82.9	75.6	75.0	81.6	72.1	69.8

^ denotes the reference group.

Note: The sample included 37,930 students for postsecondary readiness and 63,679 students for college enrollment and persistence in grade 6 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness and information from grades 9-12 to construct high school indicators to predict college enrollment and persistence. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education, the Arkansas Division of Higher Education, the National Student Clearinghouse, and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Table C7. Predictive specificity (in percentage points) of models using middle and high school indicators of postsecondary readiness and success by student group, alternate specification, 2008/09 and 2009/10 grade 6 cohorts

Student group	Middle school			High school		
	Postsecondary readiness	College enrollment	College persistence	Postsecondary readiness	College enrollment	College persistence
Gender						
Female	73.7	64.1	69.1*	68.9	46.7*	56.3*
Male^	73.2	76.9	81.7	68.2	64.2	74.6
Race/ethnicity						
Black	90.5*	74.5	83.3*	91.9*	63.9*	76.6*
Hispanic	80.3*	79.0	82.2	77.7*	74.3*	82.3*
Other	65.5	67.4	70.8	56.0	55.8	61.9
White^	60.6	69.3	72.8	50.9	49.4	60.2
Eligible for National School Lunch Program						
Yes	81.7*	79.2*	83.9*	78.5*	67.4*	79.4*
No^	55.9	50.4	57.2	46.9	27.8	33.9
English learner student						
Yes	85.7*	85.3*	87.8*	85.8*	87.6*	92.3*
No^	72.4	70.8	75.4	67.0	53.4	64.3
Disability status						
Yes	93.9*	94.6*	96.5*	92.4*	95.9*	99.0*
No^	71.1	67.6	72.4	65.6	49.9	61.3
Entered grade 6 after age 13						
Yes	86.1*	88.6*	92.8*	84.6*	87.2*	92.2*
No^	70.7	64.7	70.6	64.8	45.6	57.9
Locale						
City	76.7	77.2	80.1	73.1	66.7*	76.8*
Town or rural area	66.5	71.4	73.5	64.2	53.1	60.4
Suburb^	73.9	69.2	74.9	66.4	50.9	62.2

^ denotes the reference group. * denotes differences of 10 percentage points or more from the reference group.

Note: The sample included 37,930 students for postsecondary readiness and 63,679 students for college enrollment and persistence in grade 6 in 2008/09 or 2009/10. The study team used information from grades 9 and 10 to construct high school indicators to predict postsecondary readiness and information from grades 9–12 to construct high school indicators to predict college enrollment and persistence. Other race/ethnicity includes students who were Asian, Native American/Alaska Native, Native Hawaiian/Pacific Islander, and two or more races.

Source: Authors' analysis of data from 2008/09 to 2017/18 from the Arkansas Department of Education, the Arkansas Division of Higher Education, the National Student Clearinghouse, and the National Center for Education Statistics' Common Core of Data (U.S. Department of Education, n.d.).

Reference

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