Making Connections

Understanding the role of noncognitive skills and school environments in students' transitions to high school

Ginger Stoker
Feng Liu
Brenda Arellano
American Institutes for Research

Key findings

This study used data from high school students in New Mexico to examine how their perceptions of their noncognitive skills and school environments are related to three outcomes shown by previous research to be predictive of a successful transition to high school—grade 9 grade point average, course failures, and absences. The study found that:

- American Indian students had statistically significantly higher scores than White students on survey scales measuring preparation for the future, school discipline, student respect, peer support, academic monitoring, and future orientation.
- Hispanic students had statistically significantly higher scores than White students on survey scales measuring future orientation and student respect.
- Students' perceptions of most of the noncognitive skills and school environments assessed by the survey were statistically significantly associated with their grade 9 outcomes.
- Student race/ethnicity had statistically significant indirect effects on students' grade 9 outcomes through students' perceptions of their noncognitive skills and school environments.

IES NATIONAL CENTER FOR EDUCATION EVALUATION AND REGIONAL ASSISTANCE

Institute of Education Sciences
U.S. Department of Education

REL SOUTHWEST
Regional Educational Laboratory
At SEDL

Summary

New Mexico has one of the lowest graduation rates in the United States. Although high school graduation rates increased by about 7 percentage points between 2010 and 2016, only about 71 percent of New Mexico students in the 2015/16 graduation cohort earned a high school diploma (New Mexico Public Education Department, 2017). This graduation rate is considerably lower than the U.S. average of more than 83 percent. New Mexico's graduation rates vary considerably by race/ethnicity. Whereas 76 percent of White students in the 2015/16 graduation cohort graduated in four years, only 71 percent of Hispanic students and 63 percent of American Indian students did so (New Mexico Public Education Department, 2017).

Members of the New Mexico Achievement Gap Research Alliance[1] expressed interest in learning whether improving the transition to high school for American Indian and Hispanic students could close these achievement gaps. Alliance members were particularly interested in relationships between noncognitive skills and school environments and student success in grade 9. To address this interest, Regional Educational Laboratory Southwest, together with alliance members, designed a study to determine how grade 9 students' perceptions of their noncognitive skills and school environments are related to success in grade 9.

The study used student data from 14 high schools in 10 school districts in New Mexico to examine how students' perceptions of their noncognitive skills (for example, academic perseverance, self-efficacy, and study habits) and school environments (for example, school discipline, student respect, and teacher support) relate to three grade 9 outcomes identified in the literature as being most predictive of a successful transition to high school: grade 9 grade point average, course failures, and absences (Allensworth and Easton, 2005). The study included comparisons between American Indian and Hispanic students and White students, who together comprise about 98 percent of New Mexico students in the sample.

Key findings include the following:
- American Indian students had statistically significantly higher scores than White students on survey scales measuring students' perceptions of academic monitoring, peer support, future orientation, preparation for the future, school discipline, and student respect.
- Hispanic students had statistically significantly higher scores than White students on survey scales measuring students' perceptions of their future orientation and student respect.
- Students who had higher scores on survey scales measuring students' perceptions of their academic perseverance, parent involvement, study habits, future orientation, and teacher support were statistically significantly less likely to fail courses in grade 9 than other students.
- Students who had higher scores on survey scales measuring students' perceptions of their sense of belonging were statistically significantly less likely to be absent or to fail courses during grade 9.
- Student race/ethnicity had statistically significant indirect effects on students' grade 9 outcomes through students' perceptions of their noncognitive skills and school environments.

The results of this study can inform stakeholders in New Mexico and beyond in making decisions about how to help students transition successfully to high school. Several of the noncognitive skills and school environments measured by the survey were shown to be predictive of grade 9 outcomes. Schools and districts may benefit by implementing programs or other forms of assistance targeting these skills and factors.

Contents

Figures

Tables

Why this study?

New Mexico has one of the lowest graduation rates in the United States. Although high school graduation rates increased by about 7 percentage points between 2010 and 2016, only about 71 percent of New Mexico students in the 2015/16 graduation cohort earned a high school diploma (New Mexico Public Education Department, 2017). This graduation rate is considerably lower than the U.S. average of more than 83 percent. New Mexico's graduation rates vary considerably by race/ethnicity. Whereas 76 percent of White students in the 2015/16 graduating cohort graduated in four years, only 71 percent of Hispanic students and 63 percent of American Indian students did so (New Mexico Public Education Department, 2017).

Members of the New Mexico Achievement Gap Research Alliance[2] expressed interest in learning whether improving high school transitions for American Indian and Hispanic students could close these achievement gaps.[3] Given the research linking grade 9 performance and high school graduation, alliance members were particularly interested in issues concerning academic preparation for high school and the relationships between noncognitive skills and high school environment and student success in grade 9. In response, Regional Educational Laboratory (REL) Southwest, along with alliance members, designed a study of grade 9 students' perceptions of their noncognitive skills and high school environments and of how those perceptions are related to academic success in grade 9.

This study used student data from 14 high schools in 10 school districts in New Mexico to examine how students' perceptions of their noncognitive skills and school environments relate to grade 9 grade point average, number of course failures in grade 9, and number of grade 9 absences

This study used student data from 14 high schools in 10 school districts in New Mexico to examine how students' perceptions of their noncognitive skills (for example, academic perseverance, self-efficacy, and study habits) and school environments (for example, school discipline, student respect, and teacher support) relate to three outcomes that have been identified as being associated with a successful transition to high school: grade 9 grade point average, number of course failures in grade 9, and number of grade 9 absences (Allensworth and Easton, 2005). The study included comparisons between American Indian and Hispanic students and White students, who together comprise about 98 percent of New Mexico students in the sample.

Because investigating differences in students' perceptions by racial/ethnic group was the primary focus of the study, schools were recruited based on their racial/ethnic composition. In particular, the study sought to recruit at least one predominantly American Indian district, at least one predominantly Hispanic district, and at least one district with a mixed population of White, American Indian, and Hispanic students. (See table A1 in appendix A for districts, predominant racial/ethnic groups, and numbers of participating students.)

Links between student noncognitive skills and school environments and transitions to high school

More than one-third of the nation's recent high school dropouts never progressed beyond grade 9 (Edwards, 2006). The high dropout rate in grade 9 suggests that many incoming freshmen are not ready for high school and lack the academic skills and knowledge necessary to do well. Yet research also shows that many students who performed well in middle school drop out of high school after grade 9 (Neild & Balfanz, 2006). In fact, middle school academic indicators identify only about half of eventual high school dropouts, suggesting that both previously high-achieving and previously low-achieving students may struggle in grade 9 (Neild & Balfanz, 2006).

A range of factors have been linked to increased dropout rates, including high absenteeism, weak school engagement, increased student academic expectations, reduced support from teachers, problematic or deviant behavior, work or family responsibilities, moving to a new school in grade 9, and attending a school with lower achievement scores (Allensworth & Easton, 2005; Christle, Jolivette, & Nelson, 2007; Dweck, Walton, & Cohen, 2011; Suh & Suh, 2007). Researchers have concluded that students need more than just strong academic preparation to succeed in high school. They also need strong nonacademic preparation, which includes noncognitive skills that help them regulate their academic behaviors, learn and study effectively, persist in school, and achieve a sense of belonging.

Noncognitive skills comprise the student attitudes, beliefs, skills, and dispositions about school and learning that are associated with positive academic outcomes and school success.[4] Students who score high on measures of noncognitive skills such as academic perseverance and self-efficacy, learning strategies, and sense of belonging perform better in school than other students (Dweck et al., 2011; Wigfield & Eccles, 1992). Motivation, time management, and self-regulation are critical for later life outcomes, including success in the labor market (Heckman, 2008). Social investments in these noncognitive skills could result in improved education outcomes and reduced racial/ethnic and gender disparities in school performance and educational attainment (Heckman, Stixrud, & Urzua, 2006). Moreover, a recent study found that even though prior grades and standardized achievement test scores are the strongest predictors of high school academic success, adding measures of noncognitive skills to the prediction model results in a statistically significant increase in the proportion of variance explained (Casillas et al., 2011).

School environments, too, can support students' successful transition to high school. A positive school environment has been associated with better student behavior, academic achievement, and graduation rates (Allensworth & Easton, 2005; Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010; Voight, Austin, & Hanson, 2013; Wigfield & Eccles, 1992, 2002). School learning environments can complement noncognitive skills by fostering such traits as grit, tenacity, and perseverance (Schechtman, DeBarger, Dornsife, Rosier, & Yarnell, 2013).

For students just entering high school (and beyond), an additional set of factors, combining noncognitive skills and school environments, are also important for success in grade 9. These "transition" factors, such as peer fit, school safety, and sense of belonging, can help students feel a part of their school. Students who feel a part of their school are less likely to be absent. Fewer absences means more opportunity to learn, which can result in higher grade point averages and fewer course failures.

How this study adds to previous studies

This study built on existing studies of noncognitive skills and school environments in three ways. First, earlier studies focused largely on student test scores or longer-term academic outcomes. This study looked at relationships between noncognitive skills and school environments and three outcomes widely considered to be indicative of a successful transition to high school: grade 9 grade point average, course failures, and absences. Second, earlier studies did not focus on American Indian and Hispanic students. This study adds to the research on noncognitive skills and school environment by examining American Indian and Hispanic students' perceptions of their noncognitive skills and school environments, as well as how those perceptions are related to successful transitions to high

This study adds to the research on noncognitive skills and school environment by examining American Indian and Hispanic students' perceptions of their noncognitive skills and school environments, as well as how those perceptions are related to successful transitions to high school

2

school. Third, this study used a path model to investigate and quantify both direct and indirect effects between students' background characteristics, perceptions of noncognitive skills and school environments, and grade 9 outcomes. Previous studies have not used path analysis to investigate these relationships.

Stakeholders in New Mexico and beyond can use the results of this study to help students transition successfully to high school. The study demonstrated that specific noncognitive skills and school environments are associated with grade 9 outcomes. Schools and districts can benefit by implementing programs or other forms of assistance targeted at strengthening these noncognitive skills and improving school environments. Investing in the noncognitive skills and school environments that are strongly related to grade 9 outcomes for American Indian and Hispanic students, two groups with lower high school graduation rates, may improve the transition to high school for these students and reduce dropout rates.

What the study examined

The study used student-level administrative data and student survey data from the Beginning High School Survey to investigate students' perceptions of their noncognitive skills and school environments. The study also examined whether these perceptions were related to students' grade 9 grade point average, course failures, and absences. The Beginning High School Survey was administered to grade 9 students in 14 schools in 10 school districts in New Mexico during fall 2015. (Box 1 describes the data and methods used to conduct the study.)

The study addressed three research questions:

1. How do grade 9 students' perceptions of their noncognitive skills differ between American Indian and Hispanic students and White students in New Mexico, on average?

2. How do grade 9 students' perceptions of their school environments differ between American Indian and Hispanic students and White students in New Mexico, on average?

3. Are there relationships between grade 9 students' noncognitive skills and school environments and successful transitions to high school after student background characteristics and achievement are controlled for? Are relationships between grade 9 outcomes and student race/ethnicity moderated by students' perceptions of their noncognitive skills and school environments?

Students' perceptions of their noncognitive skills and school environments were collected using the Beginning High School Survey, which was created for this project (see appendix A for a description of the survey and appendix B for the survey questionnaire). The survey was composed primarily of survey scales validated in other studies focused on this topic. The scales on the survey were selected to measure one noncognitive skills indicator (Academic Mindsets, Behaviors, and Supports), one school environment indicator (School Environment), and one combined noncognitive skills and school environments indicator measuring student transition (Transition to High School).

Investing in the noncognitive skills and school environments that are strongly related to grade 9 outcomes for American Indian and Hispanic students, two groups with lower high school graduation rates, may improve the transition to high school for these students and reduce dropout rates

Box 1. Data and methods

Data

The study used merged data from two sources: student responses to the Beginning High School Survey and student- and school-level data obtained from the databases of participating school districts. For this study, the Beginning High School Survey was administered to grade 9 students in 14 high schools in 10 school districts across New Mexico during fall 2015. Overall, 2,995 students completed the survey, a response rate of 83 percent. Individual school response rates ranged from 74 percent to 94 percent. (See appendix A for a description of how the study sample was constructed and appendix B for the survey questionnaire.)

Student data included student background characteristics, grade 9 grade point average, grade 9 course failures, and grade 9 absences. Student background characteristics included race/ethnicity, gender, English learner status, special education status, eligibility for the federal school lunch program (a proxy for socioeconomic status), and grade 8 state assessment scores in reading and math as evidence of prior student achievement. School data included district, location within New Mexico (central, northern, southern), racial/ethnic composition, and enrollment.

Data from all 14 participating high schools were used in the survey analyses. However, because outcome data were not available from two of the high schools, data on students in these schools were not included in the analyses for research question 3, which focuses on relationships between noncognitive skills and school environments and successful transitions to high school. The participating districts, their location in the state, and their predominant racial/ethnic composition are shown in table A1 in appendix A.

Methods

Data analyses consisted of an assessment of the measurement properties of the survey scales, descriptive and regression analyses of students' responses on the Beginning High School Survey, and analyses using structural equation modeling to assess whether there were statistically significant relationships between noncognitive skills and school environments and grade 9 outcomes after student background characteristics (such as, gender, socioeconomic status, English learner status, and race/ethnicity) and achievement (scores on the state grade 8 mathematics assessment) were controlled for.

Item response theory modeling techniques were used to assess whether the items appeared to be measuring the same underlying trait, to estimate scale reliability, and to create individual-person scores for each scale. The individual-person scores were rescaled to have a mean of 50 and a standard deviation of 10. A two-parameter model that takes into account item difficulty and item discrimination was used. Analyses were first run for the entire sample and then run separately by racial/ethnic group—American Indian, Hispanic, and White. Item-fit statistics showed that only two items, one on the school safety scale and one on the self-efficacy scale, did not fit well with the overall construct they were intended to measure. These items were omitted from further analyses.

To answer research questions 1 and 2, descriptive statistics were used to calculate students' perceptions of their noncognitive skills and school environments on each survey scale (see table D1 in appendix D). Then, with White students as the reference group, a series of regression analyses were conducted to determine whether students of other racial/ethnic groups differed from White students in their survey responses. These were run as multilevel models. The models did not control for other covariates, as the goal was to explore overall

(continued)

Box 1. Data and methods *(continued)*

differences between student groups. Means, standard deviations, and number of students responding to items on each survey scale by race/ethnicity are shown in table D1 in appendix D. Because the goal was to investigate differences between American Indian and Hispanic students and White students, the analysis omitted students of other racial/ethnic groups (approximately 2 percent of the total sample).

To answer research question 3, a series of path models were analyzed to assess relationships between students' perceptions of their noncognitive skills and school environments and their grade 9 outcomes. For each of the three indicators of noncognitive skills and school environments—Academic Mindsets, Behaviors, and Supports; Transition to High School; and School Environment—the study team investigated relationships between scales measuring these indicators and the grade 9 outcomes—grade 9 grade point average, course failures, and absences—controlling for student background characteristics and achievement. Models included student race/ethnicity to assess whether there were differences in relationships among the variables by racial/ethnic groups. Although 14 high schools in 10 districts participated in the survey and provided student background data, 2 districts declined to provide outcome data. Therefore, the analyses conducted to answer research question 3 used data for 2,696 students in 12 high schools in 8 districts.

Path analysis, a type of structural equation modeling, is an extension of multiple regression that simultaneously analyzes relationships among numerous predictors and outcomes. These relationships are generally displayed in a path diagram that uses boxes to represent the variables, with arrows showing the direction of the predicted relationships among variables. The results of a path analysis are generally presented as standardized beta coefficients—regression coefficients that have been standardized so that the variances of the dependent and independent variables are 1. The coefficient is measured in standard deviation units. These units provide estimates of the magnitude and significance of relationships between these sets of variables. Two types of relationships are generally examined in path analysis—direct effects and indirect effects. Direct effects describe the relationships between two variables; that is, the effect of one variable on another variable. Each of the standardized beta coefficients represents a direct effect. Indirect effects describe relationships between two variables that occur through a third variable. These are calculated by multiplying the coefficients for each path. These analyses are correlational, not causal; that is, the results of a path analysis do not tell whether the correlation between two variables represents a causal effect of variable 1 on variable 2.

The tables in appendix D display standardized path coefficient estimates for the direct effects of the variables in the model. Simple indirect effects for race/ethnicity also are shown in tables in appendix D.

Additional details about the analyses are included in appendix A.

Seven survey scales measured Academic Mindsets, Behaviors, and Supports: academic monitoring, academic perseverance, class participation, parent involvement, peer support, self-efficacy, and study habits. Four survey scales measured Transition to High School: grade 9 transition, peer fit, school safety, and sense of belonging. Five survey scales measured School Environment: future orientation, preparation for the future, school discipline, student respect, and teacher support. Descriptions of the survey scales measuring each of the indicators, including the score range for each scale, are in box 2. (See appendix C for item parameters and survey scale reliabilities.)

Box 2. Indicators, survey scales, and survey score ranges

The survey scales used to measure each of the three indicators, including the survey score ranges, are listed below. Survey scales measuring Academic Mindsets, Behaviors, and Supports focus on noncognitive skills, survey scales measuring Transition to High School focus on both noncognitive skills and school environments, and survey scales measuring School Environment focus on school environments.

Academic Mindsets, Behaviors, and Supports

Academic monitoring: Six-item scale measuring students' perceptions of their ability to use strategies to organize, understand, and complete their school work. Score range: 19.25–73.16

Academic perseverance: Eight-item scale measuring students' ability to focus on and complete projects and goals. Score range: 17.99–73.30

Class participation: Four-item scale measuring students' participation in class discussions and group work. Score range: 31.85–68.65

Parent involvement: Seven-item scale measuring students' interactions with their parents concerning school work, activities, grades, and future plans. Score range: 21.84–67.68

Peer support: Six-item scale measuring students' support from peers regarding academic work. Score range: 21.62–70.49

Self-efficacy: Five-item scale measuring students' beliefs that they can complete their school work. Score range: 21.26–68.80

Study habits: Seven-item scale measuring the extent to which students participate in and prioritize studying. Score range: 18.95–73.30

Transition to High School

Grade 9 transition: Six-item scale measuring students' participation in activities associated with a successful transition to high school. Score range: 38.74–73.86

Peer fit: Five-item scale measuring students' interactions with other students in their school. Score range: 35.40–74.65

School safety: Five-item scale measuring students' perception of the level of safety of their school. Score range: 28.79–74.83

Sense of belonging: Five-item scale measuring students' perception that they fit in well with staff and students at their school. Score range: 21.84–74.17

School Environment

Future orientation: Five-item scale measuring students' beliefs that high school is relevant for success in the future. Score range: 21.45–63.74

Preparation for the future: Six-item scale measuring students' beliefs that teachers at their school are preparing all students for the future. Score range: 21.30–67.70

School discipline: Five-item scale measuring students' beliefs that the discipline at their school is fair. Score range: 22.70–72.46

Student respect: Five-item scale measuring students' beliefs that students at their school are treated with respect. Score range: 22.78–70.90

Teacher support: Nine-item scale measuring students' beliefs that their teachers are supportive of them. Score range: 19.34–74.05

What the study found

This study revealed statistically significant differences in students' perceptions of their non-cognitive skills and school environments by student race/ethnicity. Several of the survey scales used to measure students' perceptions of their noncognitive skills and school environments were strongly associated with three outcomes previously shown to be indicative of a successful transition to high school (grade 9 grade point average, course failures, and absences), particularly for American Indian and Hispanic students. Additionally, students' race/ethnicity was indirectly related to the three grade 9 outcomes through students' perceptions of their noncognitive skills and school environments, as well as their grade 8 math score.

American Indian students had statistically significantly lower scores on survey scales measuring their perceptions of their academic perseverance and class participation than White students and statistically significantly higher scores on survey scales measuring their perceptions of their academic monitoring and peer support

There were statistically significant differences in responses between American Indian and Hispanic students and White students on survey scales measuring Academic Mindsets, Behaviors, and Supports (figure 1). Compared with White students, American Indian students had statistically significantly lower scores on survey scales measuring students' perceptions of their academic perseverance (2.33 points lower) and class participation (2.25 points lower) and statistically significantly higher scores on survey scales measuring students' perceptions of their academic monitoring (1.45 points higher) and peer support (1.03 points higher). For Hispanic students, the only statistically significant difference from White students was for class participation (2.13 points lower). There were no statistically significant differences between student racial/ethnic groups on the parent involvement, self-efficacy, or study habits survey scales (see table D1 in appendix D for means and standard deviations on these scales).

American Indian students had statistically significantly lower scores on survey scales measuring their perceptions of their school safety and sense of belonging than White students, whereas Hispanic students had statistically significantly lower scores on survey scales measuring their perceptions of their grade 9 transition and school safety than White students

There were statistically significant differences in responses between American Indian and Hispanic students and White students on survey scales measuring Transition to High School (figure 2). Compared with White students, American Indian students had statistically significantly lower scores on survey scales measuring students' perceptions of their school safety (1.06 points lower) and sense of belonging (1.12 points lower); Hispanic students had statistically significantly lower scores on survey scales measuring students' perceptions of their grade 9 transition (1.42 points lower) and school safety (0.98 point lower). There were no statistically significant differences between student groups on peer fit.

American Indian and Hispanic students had statistically significantly higher scores on survey scales measuring students' perceptions of their future orientation, preparation for the future, school discipline, and student respect than White students

There were statistically significantly differences in responses between American Indian and Hispanic students and White students on the survey scales measuring School

There were statistically significant differences in responses between American Indian and Hispanic students and White students on survey scales measuring all three indicators of students' perceptions of their noncognitive skills and school environments

Figure 1. On survey scales measuring Academic Mindsets, Behaviors, and Supports, there were statistically significant differences in responses between American Indian and Hispanic students and White students in 14 New Mexico high schools, 2015

Difference from White students' scale score (points)
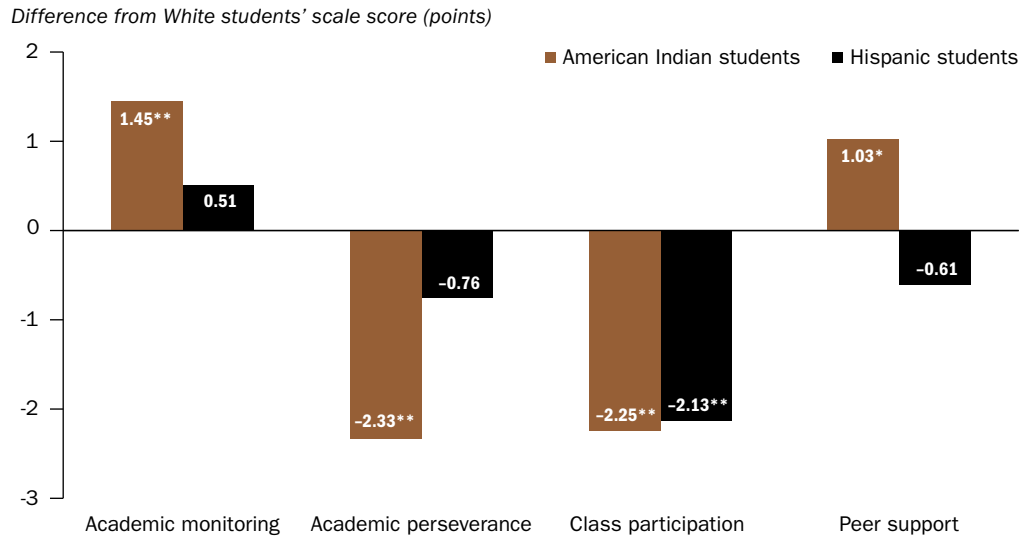
* Significant at $p < .05$; ** significant at $p < .01$.

Note: Scale scores were rescaled to have a mean of 50 and a standard deviation of 10. Group means for White students, who served as the reference group, were as follows: academic monitoring = 49.38, academic perseverance = 50.98, class participation = 51.65, and peer support = 50.04. There were no statistically significant differences between student racial/ethnic groups on scores on parent involvement, self-efficacy, or study habits.

Source: Authors' compilation using data from the Beginning High School Survey, 2015.

Figure 2. On survey scales measuring Transition to High School, there were statistically significant differences in responses between American Indian and Hispanic students and White students in 14 New Mexico high schools, 2015

Difference from White students' scale score (points)
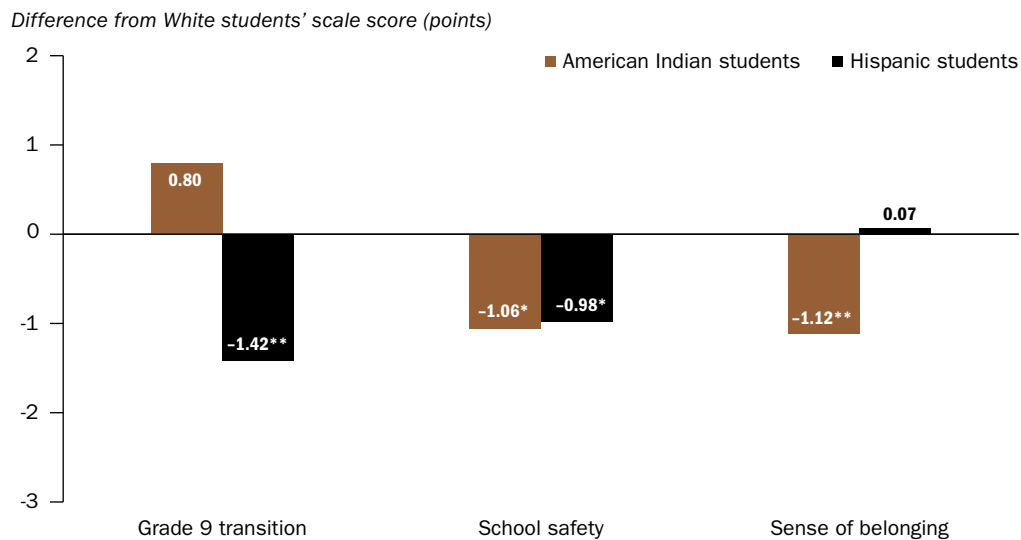
* Significant at $p < .05$; ** significant at $p < .01$.

Note: Scale scores were rescaled to have a mean of 50 and a standard deviation of 10. Group means for White students, who served as the reference group, were as follows: grade 9 transition = 50.53, school safety = 50.74, and sense of belonging = 50.22. There were no statistically significant differences between student groups on peer fit.

Source: Authors' compilation using data from the Beginning High School Survey, 2015.

Environment (figure 3). Compared with White students, American Indian students had statistically significantly higher scores on survey scales measuring students' perceptions of their future orientation (2.93 points higher), preparation for the future (3.58 points higher), school discipline (1.23 points higher), and student respect (2.21 points higher). Hispanic students also had statistically significantly higher scores than White students on survey scales measuring students' perceptions of their future orientation (1.27 points higher) and student respect (1.37 point higher). There were no statistically significant differences between student groups on teacher support.

Students' scores on six of the seven survey scales measuring Academic Mindsets, Behaviors, and Supports were related to the three grade 9 outcomes in the expected direction

After student background characteristics and prior achievement were controlled for, students' scores on the survey scales measuring Academic Mindsets, Behaviors, and Supports, with the exception of peer support, had statistically significant direct effects on each of the three grade 9 outcomes (grade 9 grade point average, course failures, and absences; figure 4). (See figure A1 in appendix A for the path model used to examine these relationships.)

Students with higher scores on the survey scales measuring students' perceptions of their academic perseverance, parent involvement, self-efficacy, and study habits had statistically significantly higher grade point averages than students with lower scores on these survey scales. Similarly, students with higher scores on survey scales measuring students' perceptions of their study habits had statistically significantly fewer grade 9 absences than other students, while students with more positive perceptions of their academic perseverance,

American Indian students and Hispanic students had statistically significantly higher scores than White students on survey scales measuring students' perceptions of their future orientation and student respect; American Indian students also had statistically significantly higher scores on survey scales measuring students' preparation for the future and school discipline

Figure 3. On survey scales measuring School Environment, there were statistically significant differences in responses between American Indian and Hispanic students and White students in 14 New Mexico high schools, 2015

Difference from White students' scale score (points)
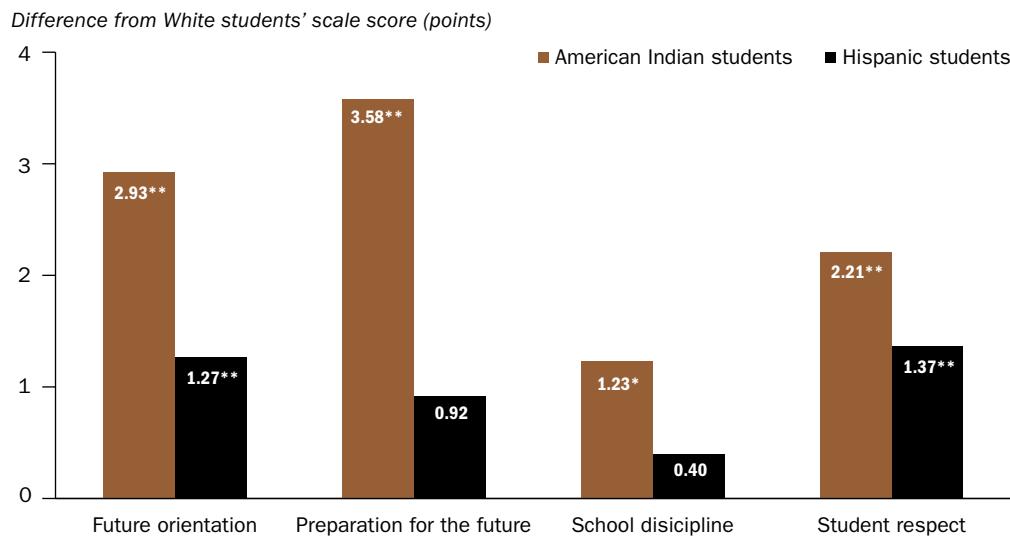
* Significant at *p* < .05; ** significant at *p* < .01.

Note: Scale scores were rescaled to have a mean of 50 and a standard deviation of 10. Group means for White students, who served as the reference group, were as follows: future orientation = 48.60, preparation for the future = 48.57, school discipline = 49.40, and student respect = 48.76. There were no statistically significant differences between student groups on teacher support.

Source: Authors' compilation using data from the Beginning High School Survey, 2015.

Figure 4. Model estimates show that survey scales measuring Academic Mindsets, Behaviors, and Supports had statistically significant direct effects on grade 9 outcomes for students in 12 New Mexico high schools, 2015/16
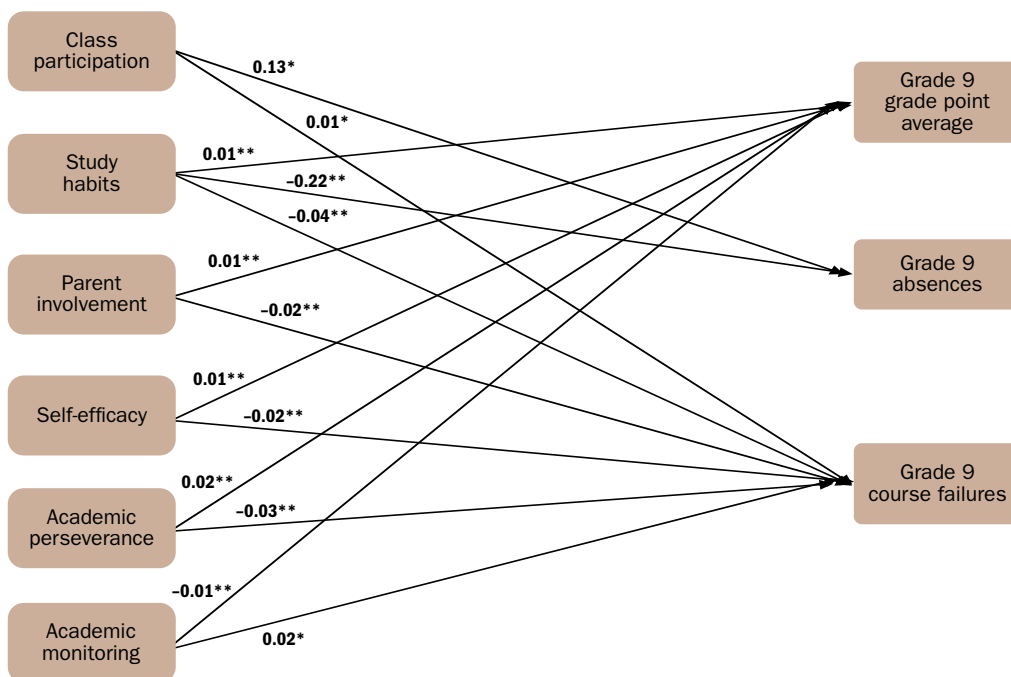
* Significant at $p < .05$; ** significant at $p < .01$.

Note: The results shown are standardized beta coefficients. Two districts declined to provide outcome data, so the analysis is based on data for 2,696 students in 12 high schools in eight districts. No statistically significant direct effects were found for peer support.

Source: Authors' compilation using data from the Beginning High School Survey, 2015, and district data, 2015/16.

After student background characteristics and prior achievement were controlled for, students with higher scores on the survey scales measuring students' perceptions of their academic perseverance, parent involvement, self-efficacy, and study habits had statistically significantly higher grade point averages than students with lower scores on these survey scales

parent involvement, self-efficacy, and study habits had statistically significantly fewer grade 9 course failures.

Counterintuitively, students with higher scores on the survey scale measuring students' perceptions of their academic monitoring were statistically significantly more likely to have lower grade 9 grade point averages and fail more grade 9 courses than students with lower scores on this survey scale. Given the content of the items that make up this scale, one possible explanation for these relationships is that students who reported performing academic monitoring activities (such as putting what they are learning in their own words, carefully reviewing their notes, and stopping to make sure they understand what they are doing) were students who needed extra time and help with their studies. Similarly, students with higher scores on the survey scales measuring students' perceptions of their class participation were statistically significantly more likely to fail more grade 9 courses and have more grade 9 absences. There is no clear explanation for these relationships.

Student race/ethnicity had statistically significant direct effects on survey scales measuring Academic Mindsets, Behaviors, and Supports and on grade 9 outcomes. After student background characteristics and prior achievement were controlled for, being an American Indian student was statistically significantly and positively associated with three of the survey scales measuring Academic Mindsets, Behaviors, and Supports—academic

monitoring, peer support, and study habits—meaning that American Indian students were likely to have higher scores on these survey scales than White students (figure 5). Being an American Indian student was also statistically significantly but negatively associated with academic perseverance and class participation, meaning that American Indian students were likely to have lower scores on these survey scales than White students. American Indian students also were statistically significantly more likely to have lower grade 9 grade point averages and higher grade 9 course failures than White students.

Being a Hispanic student had a statistically significant and negative direct effect on class participation. That is, Hispanic students had statistically significantly lower scores than White students on the survey scale measuring students' perceptions of their class participation. Being a Hispanic student was also statistically significantly and negatively associated with grade 8 math achievement.

Student race/ethnicity had statistically significant indirect effects on grade 9 outcomes through its relationships with survey scales measuring Academic Mindsets, Behaviors, and Supports and through grade 8 math achievement. Students' race/ethnicity also had statistically significant indirect effects on all three grade 9 outcomes through three

Figure 5. Model estimates show that student race/ethnicity had statistically significant direct and indirect effects on survey scales measuring Academic Mindsets, Behaviors, and Supports and on grade 9 outcomes for students in 12 New Mexico high schools, 2015/16

* Significant at $p < .05$; ** significant at $p < .01$.

Note: The results shown are standardized beta coefficients. Statistically significant direct effects of race/ethnicity on variables are indicated by black arrows. Statistically significant indirect effects of race/ethnicity on variables are indicated by brown arrows. Two districts declined to provide outcome data, so the analysis is based on data for 2,696 students in 12 high schools in eight districts. No statistically significant direct or indirect effects were found for parent involvement or self-efficacy.

Source: Authors' compilation using data from the Beginning High School Survey, 2015, and district data, 2015/16.

of the survey scales measuring Academic Mindsets, Behaviors, and Supports—academic monitoring, academic perseverance, and class participation—as well as through grade 8 math achievement. Simple indirect effects can be viewed as the increase or decrease in an outcome that occurs through the predictor variable's relationship with another variable of interest. Being an American Indian student had statistically significant and negative indirect effects on grade 9 grade point average through its relationships with academic monitoring and academic perseverance, as well as a statistically significant positive relationship with grade 9 course failures through its relationship with academic perseverance. Being a Hispanic student had a statistically significant and negative indirect effect on grade 9 grade point average through its relationship with grade 8 math achievement and on grade 9 absences through its relationship with class participation. In addition, being Hispanic had statistically significant and positive indirect effects on both grade 9 absences and grade 9 course failures through its relationship with grade 8 math achievement. (The full results of the analyses of the direct and indirect effects are in table D2 in appendix D.)

Students' scores on several of the survey scales measuring Transition to High School had statistically significant direct effects in the expected direction on the three grade 9 outcomes

Students' scores on survey scales measuring Transition to High School had statistically significant direct effects on all three grade 9 outcomes (figure 6). (See figure A2 in appendix A for the path model used to examine these relationships.) Students who had higher scores on the survey scale measuring students' perceptions of their sense of belonging had statistically significantly higher grade 9 grade point averages and statistically significantly fewer grade 9 absences and grade 9 course failures than other students. Counterintuitively, students who had higher scores on the survey scales measuring students' perceptions of their grade 9 transition and school safety had statistically significantly lower grade 9 grade point averages. No statistically significant direct effects were found for peer fit.

Student race/ethnicity had statistically significant direct effects on survey scales measuring Transition to High School and on grade 9 outcomes. After student background

Students who had higher scores on the survey scale measuring students' perceptions of their sense of belonging had statistically significantly higher grade 9 grade point averages and statistically significantly fewer grade 9 absences and grade 9 course failures than other students

Figure 6. Model estimates show that survey scales measuring Transition to High School had statistically significant direct effects on grade 9 outcomes for students in 12 New Mexico high schools, 2015/16
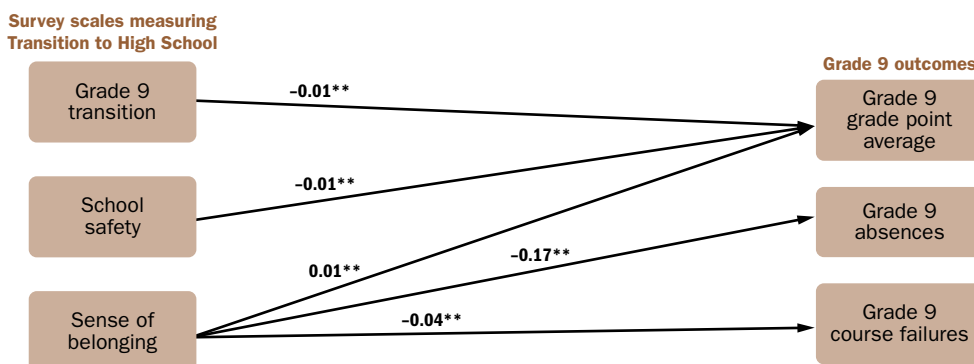
* Significant at *p* < .05; ** significant at *p* < .01.

Note: The results shown are standardized beta coefficients. Two districts declined to provide outcome data, so this path analysis is based on data for 2,696 students in 12 high schools in eight districts. No statistically significant direct effects were found for peer fit.

Source: Authors' compilation using data from the Beginning High School Survey, 2015, and district data, 2015/16.

characteristics and prior achievement were controlled for, being an American Indian student was statistically significantly and negatively associated with scores on the survey scale measuring students' perceptions of their school safety and with grade 9 grade point average and grade 9 absences. This means that American Indian students were statistically significantly more likely to have lower scores on the survey scale measuring students' perceptions of their school safety than White students and statistically significantly more likely to have lower grade 9 grade point averages (figure 7). However, American Indian students were likely to have statistically significantly fewer grade 9 absences than White students. Being a Hispanic student was statistically significantly and negatively associated with students' scores on the survey scales measuring students' perceptions of their grade 9 transition and school safety, as well as with grade 8 math achievement. This means that Hispanic students were more likely to have lower scores on these survey scales and lower grade 8 math achievement scores than White students. In this model, being a Hispanic student did not have any statistically significant direct effects on any of the grade 9 outcomes.

Student race/ethnicity had statistically significant indirect effects on grade 9 outcomes through its relationships with survey scales measuring Transition to High School and through grade 8 math achievement. Being a Hispanic student had statistically significant indirect effects related to each of the grade 9 outcomes through scores on the survey scale measuring grade 9 transition and grade 8 math achievement. That is, being a Hispanic

After student background characteristics and prior achievement were controlled for, American Indian students were statistically significantly more likely to have lower scores on the survey scale measuring students' perceptions of their school safety than White students and more likely to have lower grade 9 grade point averages but were likely to have statistically significantly fewer grade 9 absences

Figure 7. Model estimates show that student race/ethnicity had statistically significant direct and indirect effects on survey scales measuring Transition to High School and on grade 9 outcomes for students in 12 New Mexico high schools, 2015/16

* Significant at $p < .05$; ** significant at $p < .01$.

Note: The results shown are standardized beta coefficients. Statistically significant direct effects of race/ethnicity on variables are indicated by black arrows. Statistically significant indirect effects of race/ethnicity on variables are indicated by brown arrows. Two districts declined to provide outcome data, so this path analysis is based on data for 2,696 students in 12 high schools in eight districts. No statistically significant direct or indirect effects were found for peer fit or sense of belonging.

Source: Authors' compilation using data from the Beginning High School Survey, 2015, and district data, 2015/16.

student had a statistically significant and negative effect on grade 9 grade point average through its relationship with grade 8 math achievement, as well as statistically significant positive effects on grade 9 absences and grade 9 course failures through its association with grade 8 math achievement. Finally, being Hispanic had a statistically significant and positive effect on grade 9 grade point average through its relationship with scores on the grade 9 transition survey scale. Being an American Indian student did not have any statistically significant indirect effects on the grade 9 outcomes. (The full results of the analyses of the direct and indirect effects are in table D3 in appendix D.)

Students' scores on survey scales measuring School Environment were directly related to all three grade 9 outcomes

Students' scores on three of the survey scales measuring School Environment—future orientation, student respect, and teacher support—had statistically significant direct effects on at least one of the grade 9 outcomes (figure 8). (See figure A3 in appendix A for the path model used to examine these relationships.) No statistically significant direct effects were found for the preparation for the future and school discipline survey scales.

After student background characteristics and prior achievement were controlled for, students who had higher scores on survey scales measuring students' perceptions of their future orientation, student respect, and teacher support had statistically significantly higher grade 9 grade point averages than other students. In addition, students who had higher scores on survey scales measuring students' perceptions of their future orientation and teacher support had statistically significantly fewer grade 9 course failures than other students. Finally, students who had higher scores on the survey scale measuring students' perceptions of their future orientation had statistically significantly fewer grade 9 absences.

Student race/ethnicity had statistically significant direct effects on survey scales measuring School Environment and on grade 9 outcomes. After student background

After student background characteristics and prior achievement were controlled for, students who had higher scores on survey scales measuring students' perceptions of their future orientation, student respect, and teacher support had statistically significantly higher grade 9 grade point averages than other students

Figure 8. Model estimates show that scales measuring School Environment had statistically significant direct effects on grade 9 outcomes for students in 12 New Mexico high schools, 2015/16
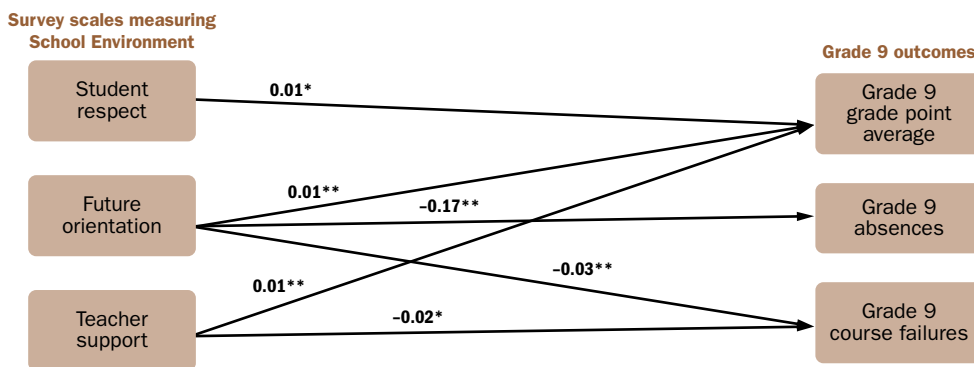
* Significant at $p < .05$; ** significant at $p < .01$.

Note: The results shown are standardized beta coefficients. Two districts declined to provide outcome data, so this path analysis is based on data for 2,696 students in 12 high schools in eight districts. No statistically significant direct effects were found for preparation for the future or school discipline.
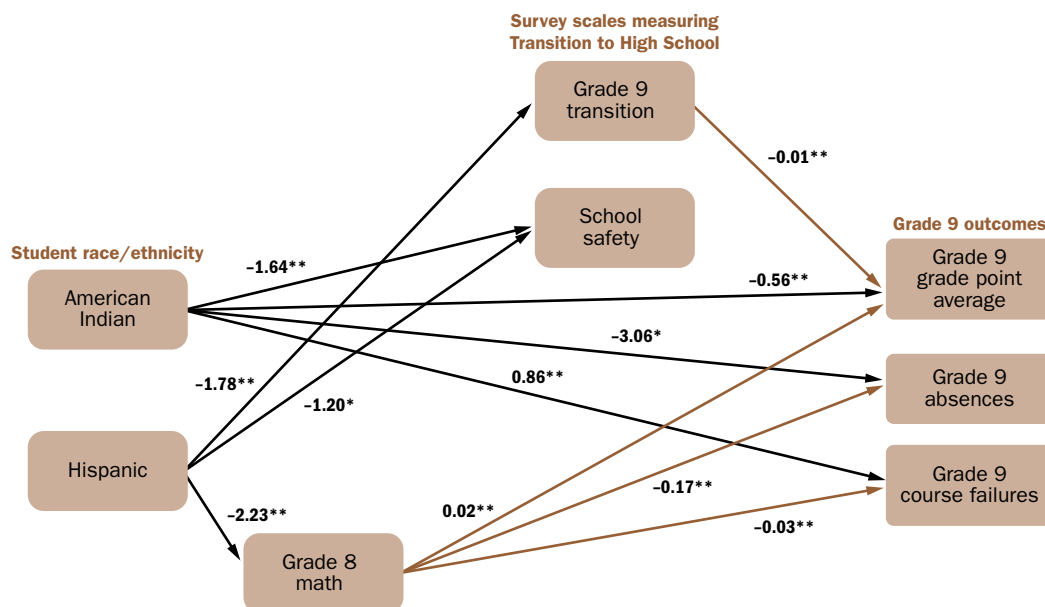
Source: Authors' compilation using data from the Beginning High School Survey, 2016, and district data, 2015/16.

characteristics and prior achievement were controlled for, being an American Indian student had statistically significant and positive direct effects on four of the survey scales measuring School Environment—future orientation, preparation for the future, school discipline, and student respect (figure 9). Similarly, being a Hispanic student had statistically significant and positive direct effects on survey scales measuring students' perceptions of their future orientation and student respect. That means that American Indian and Hispanic students were likely to have higher scores on these survey scales than White students. Being an American Indian student was statistically significantly and negatively associated with grade 9 grade point average and statistically significantly and positively associated with grade 9 course failures. That means that American Indian students were statistically significantly more likely to have lower grade 9 grade point averages and statistically significantly more grade 9 course failures than White students. Being a Hispanic student was statistically significantly and positively associated with grade 9 grade point average, meaning that Hispanic students were statistically significantly more likely to have higher grade 9 grade point averages than White students. However, being a Hispanic student was statistically significantly and negatively associated with grade 8 math achievement.

Student race/ethnicity had statistically significant direct effects on survey scales measuring School Environment and on grade 9 outcomes

Student race/ethnicity had statistically significant indirect effects on grade 9 outcomes through its relationships with survey scales measuring School Environment and through grade 8 math achievement. Students' race/ethnicity also had statistically significant

Figure 9. Model estimates show that student race/ethnicity had statistically significant direct and indirect effects on survey scales measuring School Environment and grade 9 outcomes for students in 12 New Mexico high schools, 2015/16
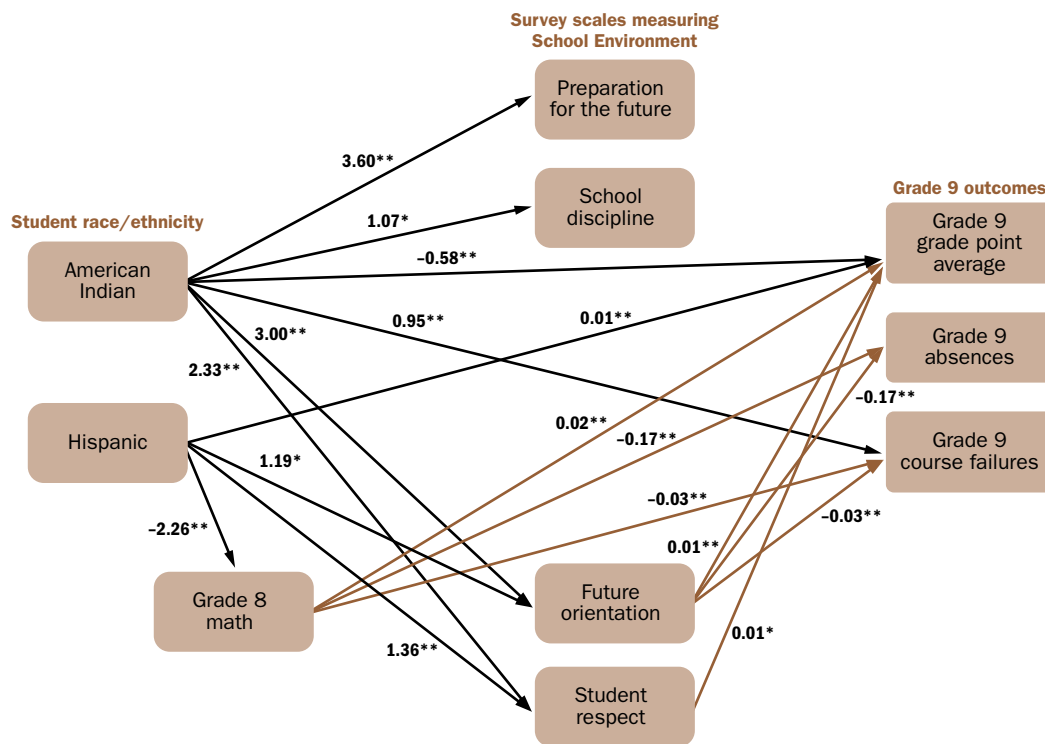
* Significant at *p* < .05; ** significant at *p* < .01.

Note: The results shown are standardized beta coefficients. Statistically significant direct effects of race/ethnicity on variables are indicated by black arrows. Statistically significant indirect effects of race/ethnicity on variables are indicated by brown arrows. Two districts declined to provide outcome data, so this path analysis is based on data for 2,696 students in 12 high schools in eight districts.

Source: Authors' compilation using data from the Beginning High School Survey, 2015, and district data, 2015/16.

indirect effects related to all three of the grade 9 outcomes through two of the survey scales measuring School Environment—future orientation and student respect—as well as through grade 8 math achievement. Being an American Indian student had a statistically significant and positive effect on grade 9 grade point average through its relationships with future orientation and student respect, as well as statistically significant and negative effects on grade 9 absences and grade 9 course failures through its relationship with future orientation. Being a Hispanic student had a statistically significant and negative effect on grade 9 grade point average through its relationship with grade 8 math achievement, as well as statistically significant and positive effects on grade 9 grade point average through its relationships with future orientation and student respect. Being a Hispanic student also had statistically significant and positive indirect effects on both grade 9 course failures and grade 9 absences through its relationships with grade 8 math achievement. (The full results of the analyses of the direct and indirect effects are in table D4 in appendix D.)

Implications of the study findings

The results of this study revealed statistically significant differences in students' perceptions of their noncognitive skills and school environments by race/ethnicity. The study also found that most of these perceptions were associated with three outcomes shown to be indicative of a successful transition to high school—grade 9 grade point average, course failures, and absences. Finally, the study showed that several relationships between grade 9 outcomes and student race/ethnicity were moderated by students' perceptions of their noncognitive skills.

While most of the relationships between the survey scales measuring students' perceptions of their noncognitive skills and the grade 9 outcomes were in the expected directions, a few were not. It was expected that students' scores on the survey scales measuring students' perceptions of their noncognitive skills and school environments would be positively related to students' grade 9 grade point averages and negatively related to their grade 9 course failures and grade 9 absences. In most cases, the relationships were in the expected directions or there were no statistically significant relationships between scores on the survey scales and the grade 9 outcomes. Of the sixteen survey scales included on the Beginning High School Survey, students' scores on eight had a statistically significant relationship with at least one of the grade 9 outcomes, while students' scores on four were not statistically significantly related to any of the grade 9 outcomes.

For three of the survey scales (classroom participation, grade 9 transition, and school safety) the relationships between students' scores on the survey scales and the grade 9 outcomes were in the opposite direction from what was expected. That is, higher scores on the survey scales were related to lower grade 9 grade point averages, a higher number of grade 9 course failures, or higher grade 9 absences. For one additional survey scale, academic monitoring, the direction of the relationship was opposite from what was originally expected, but after a review of the content of the items on that scale, the direction of the relationship appeared to make sense. It is not unexpected that students who reported spending more time putting what they learned into their own words, carefully reviewing their notes, and stopping to make sure they understood what they were doing would have lower grade 9 grade point averages and fail more grade 9 courses than students who did not, as these are activities that may be done by lower achieving students. Higher achieving

For three of the survey scales (classroom participation, grade 9 transition, and school safety) the relationships between students' scores on the survey scales and the grade 9 outcomes were in the opposite direction from what was expected

students are not likely to spend as much time monitoring what they are doing, since they are less likely to have difficulty with their schoolwork.

Although no causal relationships can be derived from this study, the results can support schools or districts in their efforts to help students transition successfully to high school. Several of the indicators of noncognitive skills and school environments measured by the survey were statistically significantly associated with more than one of the grade 9 outcomes included in the study. For example, the study found that study habits, sense of belonging, and future orientation were statistically significantly related to all three grade 9 outcomes. To see the greatest gains in student performance, schools or districts could implement programs designed to improve students' study habits, increase their sense of belonging, or increase their sense that high school work was relevant to their future by creating links between high school courses and college and career plans.

Limitations of the study

There are some limitations associated with this study and its design. First, the study used data from 14 high schools within 10 school districts in New Mexico, recruited based on demographic characteristics of the schools, as well as recommendations from the New Mexico Public Education Department and members of the New Mexico Achievement Gap Research Alliance. Schools were selected to include adequate numbers of American Indian, Hispanic, and White students to represent New Mexico's demographic diversity. Therefore, schools with large populations of American Indian and Hispanic students were a major focus of recruitment. In the process, students from these racial/ethnic groups were oversampled. Thus, the results of this study are not generalizable beyond the study sample to the entire state of New Mexico.

Second, because the survey was not administered until November or December, when students had completed three to four months of grade 9, it was not possible to sample students who dropped out before high school. Practitioners in New Mexico informed the study team that many students drop out after grade 8. But if the survey had been administered at the end of grade 8, the study could not have assessed students' perceptions of their high school environment, a crucial element of the study.

Third, all data regarding students' perceptions of their noncognitive skills and school environments were self-reported. Although the study team assured students that their survey responses were confidential and would not be shared with others at their school or made public, students may have reported socially acceptable answers rather than their true opinions or perceptions.

Moreover, although the configuration of the latent survey scales was invariant across groups, it is possible that the metric of the scales may not be the same across groups, as the equivalence of difficulty and discrimination parameters was not examined.

Finally, the relationships examined in this study cannot be considered causal. Only studies in which participants are randomly assigned to differing treatment conditions can estimate causal relationships. Therefore, in this study, the relationships among variables are considered to be correlational—a change in one variable will not necessarily cause a change in another variable.

To see the greatest gains in student performance, schools or districts could implement programs designed to improve students' study habits, increase their sense of belonging, or increase their sense that high school work was relevant to their future by creating links between high school courses and college and career plans

Appendix A. Data and methodology

This appendix describes the data sources, explains the analytic sample, and details the study methodology.

Data sources, instruments, and collection methods

This study utilized data from two sources: the Beginning High School Survey, which measures students' perceptions of their noncognitive skills and school environments, and student- and school-level datasets obtained from the databases of school districts.

The Beginning High School Survey was created with the participation of members of the New Mexico Achievement Gap Research Alliance as part of a survey development technical assistance workshop series during spring 2014. The student survey is divided into seven sections:

1. Your school.

2. Your schoolwork.

3. Your grade 9 school year.

4. Your teachers.

5. Your peers.

6. Your parents.

7. Your future.

The survey asks students to respond to a series of survey scale items measuring important noncognitive skills and school environments. The survey is available in English and Spanish versions.[5] (See appendix B for the survey.)

Grade 9 students in 14 public high schools from 10 districts across New Mexico completed the Beginning High School Survey during fall 2015. The study team traveled to participating high schools in teams of one to three researchers. At least one week before the survey was administered, participating schools were provided parent/guardian consent forms for students to take home to their parents. The consent forms detailed the nature of the study as well as the types of items included on the survey. Parents or guardians needed to sign the form only if they did not wish to have their child participate in the study. Only 11 students from all participating schools returned signed consent forms excusing them from taking the survey.

All surveys were collected by a study team member trained in the data collection methods specific to this study. In three high schools, the survey was administered online in response to requests from the districts (in these high schools, all students had been issued personal laptops). Data from the paper surveys were manually entered by trained study team members using the online survey platform created previously. Study team members

reviewed the data entered for approximately 20 percent of the surveys and found few data entry errors.

Data on student characteristics were obtained from participating districts. Student data included student background characteristics (race/ethnicity, gender, English learner status, special education status, and socioeconomic status as measured by eligibility for the federal school lunch program), prior student achievement (grade 8 state assessment scores for math), and the three outcome variables: grade 9 course failures, grade 9 absences, and grade 9 grade point average. The student race/ethnicity variable was used in the regression analyses, and most of the student characteristics were included in the path models. Because of multicollinearity issues, only students' grade 8 math achievement scores were included in the path models. All grade 9 grade point averages were standardized to a traditional 0.0 to 4.0 scale. School characteristics included student racial/ethnic composition, enrollment, location within New Mexico (central, northern, and southern), and district. Data from the districts were merged with data from the Beginning High School Survey.

Sampling strategy

Schools were recruited for the study based on their racial/ethnic composition because a primary goal was to assess differences in students' perceptions on indicators of noncognitive skills and school environments by racial/ethnic group. The study team sought to recruit at least one predominantly Hispanic district, at least one predominantly American Indian district, and at least one district with a mixed population of White, Hispanic, and American Indian students. Recruiting was completed in only about one month because the survey had to be administered in fall semester 2015 and Office of Management and Budget approval to administer it was not obtained until September. Albuquerque Public Schools, the largest school district in New Mexico, was not part of the study because the study team's research application was not approved in time. The districts, number of students, and predominant racial/ethnic groups for the schools that participated in the study are shown in table A1.

Table A1. Location, predominant racial/ethnic composition, and number of students participating in the survey for participating districts, 2015

District	Location within New Mexico	Predominant racial/ethnic composition	Number of participating students
1	Central	Hispanic (76%), White (19%)	238
2	Central	Hispanic (56%), American Indian (38%)	159
3	Northern	American Indian (91%)	383
4	Northern	American Indian (67%), Hispanic (31%)	48
5*	Northern	Hispanic (93%)	203
6	Northern	White (40%), American Indian (31%), Hispanic (28%)	737
7	Southern	Hispanic (68%), White (26%),	637
8*	Southern	Hispanic (65%), White (23%)	26
9	Central	Hispanic (65%), White (23%)	520
10	Central	Hispanic (98%)	44

* Districts that were not included in the outcomes analyses for research question 3.

Source: Authors' compilation using data provided from participating districts, 2015/16.

Although 14 high schools in 10 districts participated in the survey and provided student background data, 2 districts declined to provide outcome data—grade 9 grade point average, course failures, and absences. Therefore, data from these districts were not included in analyses for research question 3. The survey analyses for research questions 1 and 2 included data for 2,920 students in 14 high schools in 10 districts, whereas the analyses for research question 3 (the path model structural equation model analyses) included data for 2,696 students in 12 high schools in 8 districts. Because the goal of the study was to uncover differences between American Indian and Hispanic students and White students, students in other racial/ethnic groups (about 2 percent of the sample) were omitted from all analyses. The characteristics of students included in the survey analyses are shown in table A2, and the characteristics of students included in the path model analyses are shown in table A3.

Table A2. Characteristics of students included in the survey analyses, 2015

Characteristic	Percentage of students completing the survey (n = 2,920)
Gender	
Male	51.4
Female	48.6
Race/ethnicity	
White	23.3
Hispanic	51.8
American Indian	24.9
Special programs	
English learner	10.5
Special education	12.4
Eligible for the federal school lunch program	65.2

Source: Authors' compilation using district data, 2015/16.

Table A3. Characteristics and outcomes of students included in the path model analyses, 2015

Characteristic	Percentage of students in the analyses (n = 2,696)
Gender	
Male	47.9
Female	52.1
Race/ethnicity	
White	24.7
Hispanic	48.4
American Indian	26.9
Special programs	
English learner	8.7
Special education	10.1
Eligible for the federal school lunch program	59.1
Outcomes	**Mean values on outcomes (n= 2,696)**
Grade 9 outcomes	
Mean grade 9 grade point average (scale 0.0–4.0)	2.65
Mean grade 9 course failures	1.10
Mean grade 9 absences	15.64

Source: Authors' compilation using district data, 2015/16.

Data analysis

Data analyses for this study consisted of an assessment of the measurement properties of the survey scales, descriptive analyses of students' responses on components of the indicators of noncognitive skills and school environments, and analyses investigating relationships between those components and grade 9 outcomes according to structural equation modeling. Definitions of terms used in this appendix are shown in box A1.

Box A1. Key terms used in this appendix

Differential item functioning: the extent to which an item might be measuring different opinions for members of separate groups.

Direct effect: a term used in structural equation modeling to identify a statistically significant relationship between two variables.

Indirect effect: a term used in structural equation modeling to identify a relationship between two variables that is moderated by one or more other variables.

Item difficulty parameter: the level of ability or attitude of an individual, or the underlying trait needed to have a 0.5 probability of endorsing or agreeing with the item.

Item discrimination parameter: indicates how well an item is at separating individuals into different ability or attitude levels. The more an item discriminates among individuals with different amounts of the underlying ability or attitude on the underlying trait, the higher the discrimination parameter.

Item fit indices: indicate how well the items contribute to measurement of the underlying ability or attitude on the underlying trait.

Item response theory: a statistical method used to evaluate items in tests, surveys, and other instruments and to score respondents on their abilities, attitudes, or other underlying traits.

Latent variable: variables that are not directly observed but are estimated, using a mathematical model, from other variables that can be directly measured.

Path: a line in a path model indicating a relationship among variables in the model.

Path coefficients: standardized linear regression coefficients that indicate the strength of the relationship between two variables in a structural equation model in standard deviation units.

Path model: a figure or diagram showing relationships among the dependent, independent, and intermediate variables included in the model.

Person score: a measure of an individual's ability or attitude on the underlying construct. Person scores are in log odds units, with an average person score being 0.0.

Rating scale model: a model that specifies that each item in the scale shares the same rating scale structure.

Reliability: the consistency or repeatability of survey scales.

Survey scale: a group of survey items intended to measure the same underlying construct or conceptual idea.

Two-parameter item response theory model: an item response theory model that estimates and utilizes item difficulty and item discrimination.

Measurement properties of the survey scales. The study team began the analyses by assessing the measurement properties of the survey scales included on the Beginning High School Survey. Although most of the scales on the survey had been validated in other surveys, modifications were made to most of the survey scales to better meet the needs of our target audience—grade 9 students.

Item response theory (IRT) modeling techniques were used to assess whether the items appeared to be measuring the same underlying trait, to estimate scale reliability, and to create individual person scores for each scale. The items asked students to rate the extent to which they agreed or disagreed with the scale items, or the frequency with which they performed particular behaviors described in the survey items. For these analyses, a statistical model was used that took into account both the difficulty of the item and how well the item discriminates among study participants. An item with a high difficulty parameter value is one that is endorsed by few respondents. An item that has a high discrimination parameter is better at differentiating respondents (separating individuals by underlying ability or attitude on the trait) around the difficulty value.

The study team conducted analyses of the entire sample and then separated the sample by racial/ethnic group—Hispanic, American Indian, and White—and conducted the analyses separately by group. Estimates of item fit and difficulty between groups were examined, and evidence of differential item functioning also was investigated. The goal of these analyses was to examine whether the items had the same relationships with each other across racial/ethnic groups. Finally, the individual person scores were rescaled to have a mean of 50 and a standard deviation of 10. All analyses were conducted using the rescaled scores.

Overall, the survey scales demonstrated adequate item fit and IRT-based reliabilities.[6] Item fit statistics showed that only two items, one on the school safety scale and one on the self-efficacy scale, did not fit well with the overall construct they were intended to measure; they were omitted from all other analyses. In addition, the estimated IRT-based reliabilities for the scales ranged from 0.63 to 0.89, with only two scales achieving reliability estimates lower than 0.70—academic perseverance (0.63) and grade 9 transition (0.64) —likely because of low agreement between responses to the questions measuring these scales. Although the reliability estimates for these two scales are below 0.70, they were retained in the analyses. Grade 9 transition was retained because when Cronbach's alpha, rather than the IRT-based estimate, was used, the scale reliability was 0.70. Academic perseverance was retained in the analysis because this scale has shown to have reliability estimates above 0.70 in other research (Duckworth & Quinn, 2009).

Tables showing item parameter estimates and scale reliabilities for each scale are in appendix C.

Descriptive analyses of students' responses on survey scales measuring students' perceptions of their noncognitive skills and school environments. To answer research questions 1 and 2, the study team calculated descriptive statistics by race/ethnicity for students' scores on each of the survey scales. As part of these analyses, the study team tested whether there were statistically significant differences on these scales between Hispanic, American Indian, and White students. Using White students as the reference group, the study team conducted a series of multilevel regression analyses to determine whether American

Indian and Hispanic students differed from White students in their responses. The models comprised two levels—students and schools. Other than dummy variables for racial/ethnic group, no other variables were included in the models. Differences that were statistically significant at the $p < .01$ and $p < .05$ levels were flagged. Means, standard deviations, and numbers of students for each racial/ethnic group are presented in table D1 in appendix D.

Relationships between survey scales measuring noncognitive skills and school environments and grade 9 outcomes using path models and structural equation modeling. To answer research question 3, the study team used path models to investigate relationships between New Mexico grade 9 students' background characteristics, perceptions of their noncognitive skills and school environments, and outcomes indicative of successful transitions to high school (grade 9 grade point average, grade 9 course failures, and grade 9 absences).

The study team started by investigating a series of path models designed to assess relationships between students' perceptions of their noncognitive skills and school environments and their grade 9 outcomes. For each of the three indicators, the study team investigated relationships between student scores on the survey scales measuring the indicator and the grade 9 outcome. These models also included paths for student background characteristics and grade 8 math achievement.[7] Models were estimated for all students and then separately for White, American Indian, and Hispanic students. Because these analyses did not include latent variables, as the latent scores from the IRT analyses were saved and used in the models, measurement models were not estimated.

To begin, the study team looked at between-school variation to determine whether a multilevel analysis was warranted: if there was little or no variation between schools and all variation in the outcome was accounted for within students, then a single-level—student-level—analysis would be sufficient. Results showed minimal between-school variation. Accordingly, all path models were analyzed using single-level models.

Next, the study team estimated the path structure of the model. Path models were analyzed to estimate relationships among the variables. Models for all three indicators were run using the same model—a saturated model, with the scale variables changed to investigate relationships between scores on survey scales measuring each of the three indicators and the grade 9 outcomes. Analyses investigating indirect effects among variables also were conducted. The path models used in each of the analyses are shown in figures A1–A3.

Socioeconomic status and English learner status were included as control variables and are not discussed in the findings section because the focus of the report is differences between racial/ethnic groups.

Path coefficients indicating the strength of relationships among variables in the path models are shown in tables D2–D4 in appendix D, as well as fit statistics for the model. Only paths representing statistically significant relationships are shown in figures 4–9 in the main report. For ease of visualization, race/ethnicity is shown as a single box in the path model figures in this appendix. However, dummy variables indicating students of American Indian and Hispanic race/ethnicity were included in the model, with White race/ethnicity as the omitted category. Similarly, the three grade 9 outcomes are shown as a single box, although each of the outcomes was included in the model (grade 9 grade point average, course failures, and absences). In the models all outcome variables were entered as continuous variables.

Figure A1. Path model for Academic Mindsets, Behaviors, and Supports analysis, 2015/16
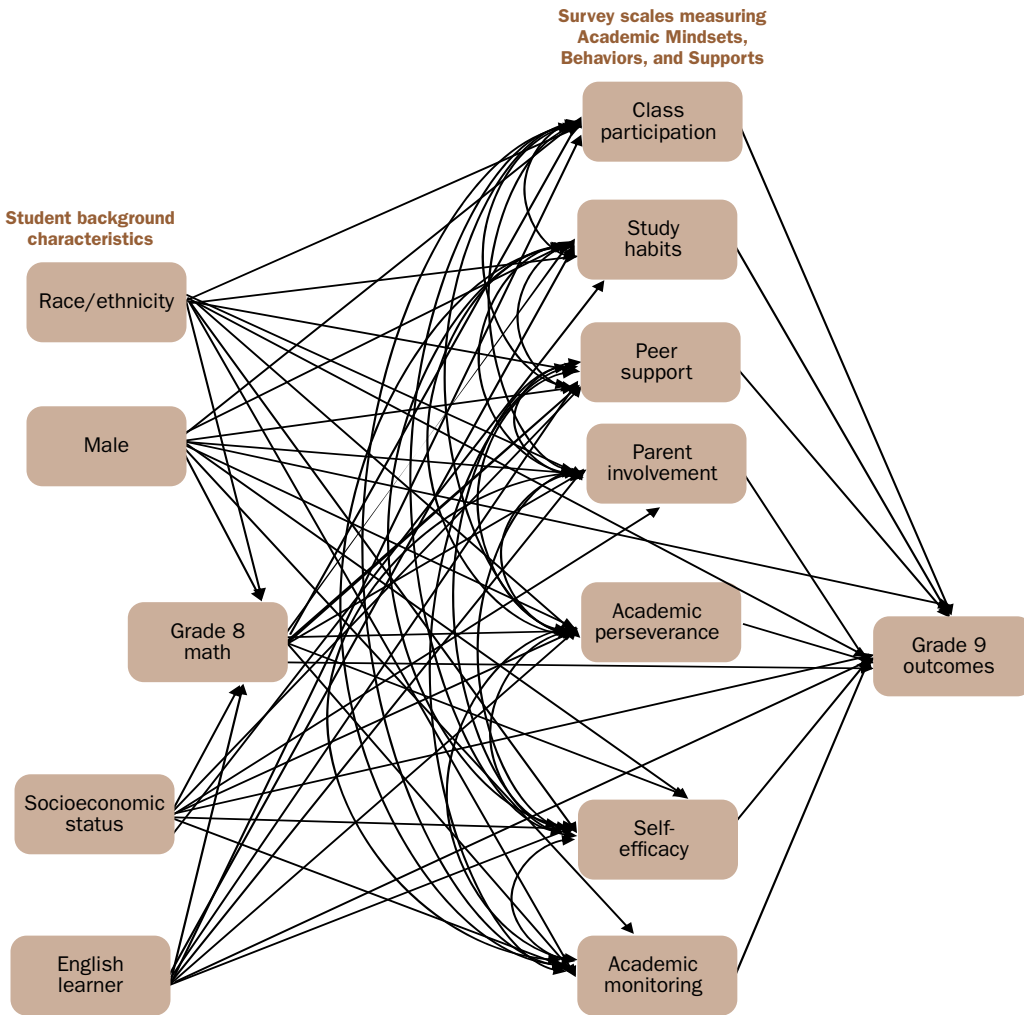
Note: Dummy variables indicating American Indian and Hispanic students were included in the analysis in place of the race/ethnicity variable. "Grade 9 outcomes" represents all grade 9 outcomes included in the analysis—grade 9 grade point average, course failures, and absences.

Source: Authors' depiction of path model analyzed, 2017.

Figure A2. Path model for Transition to High School analysis, 2015/16
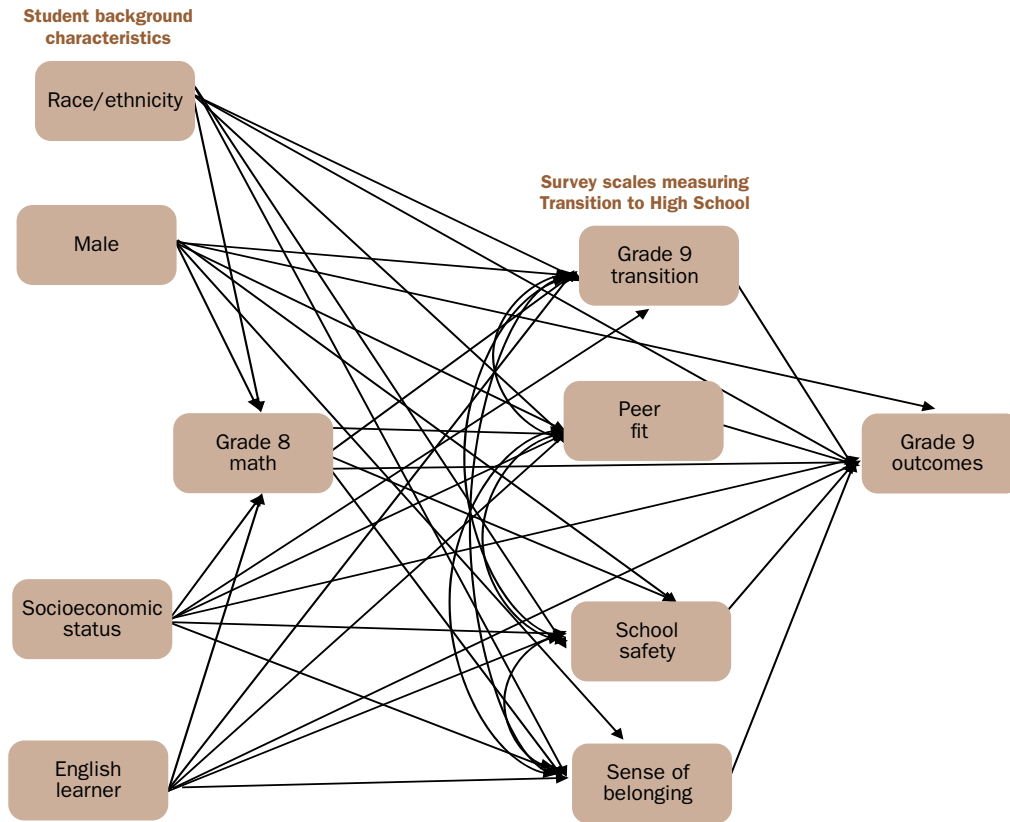
Note: Dummy variables indicating American Indian and Hispanic students were included in the analysis in place of the race/ethnicity variable. "Grade 9 outcomes" represents all grade 9 outcomes included in the analysis—grade 9 grade point average, course failures, and absences.

Source: Authors' depiction of path model analyzed, 2017.

Figure A3. Path model for School Environment analysis, 2015/16
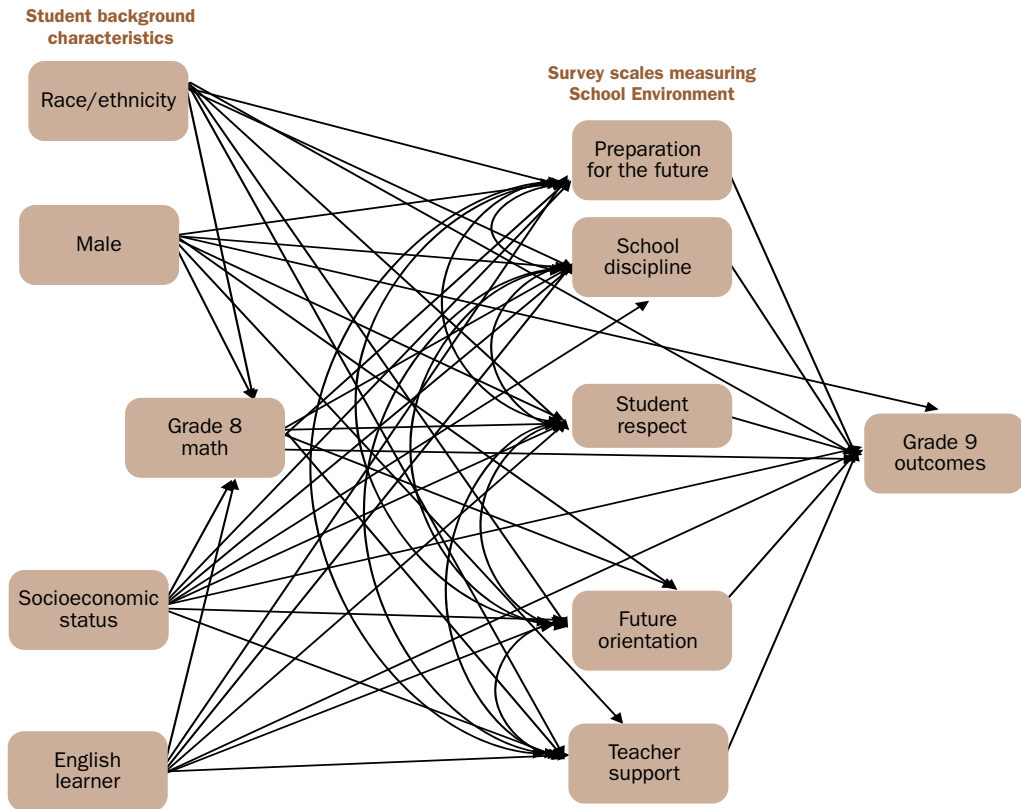
Note: Dummy variables indicating American Indian and Hispanic students were included in the analysis in place of the race/ethnicity variable. "Grade 9 outcomes" represents all grade 9 outcomes included in the analysis—grade 9 grade point average, course failures, and absences.

Source: Authors' depiction of path model analyzed, 2017.

Appendix B. Beginning High School Survey

The appendix contains the Beginning High School Survey that was administered to participating students. The headings in the shaded bars correspond to scale titles used in the analyses.

We would like to know your thoughts about ninth grade.

This is a questionnaire, not a test. There are no right or wrong answers.

This survey is voluntary. We hope that you will answer all of the questions, but you can skip any questions that you do not want to answer.

All of your answers are confidential. No one will be told how you answered any of the questions. Your responses will be combined with those of the other students in your school to help us describe students' experiences in ninth grade.

Thank you for completing this survey!

Instructions: Please read each of the questions carefully and select the response that is most true for you. Please fill in the circles completely.

QA1. How much do you agree with the following statements about your school?
(Fill in one circle on each row)

Sense of Belonging	Strongly disagree	Disagree	Agree	Strongly agree
a. I feel like a real part of my school.	1	2	3	4
b. People at my school notice when I'm good at something.	1	2	3	4
c. Other students in my school take my ideas seriously.	1	2	3	4
d. People at this school are friendly to me.	1	2	3	4
e. I'm included in lots of activities at my school.	1	2	3	4
School Safety				
f. I worry about crime and violence in school.	1	2	3	4
g. Students at this school are often teased or picked on.	1	2	3	4
h. Students at this school are often threatened or bullied.	1	2	3	4
i. I sometimes stay home because I don't feel safe at school.	1	2	3	4
j. I feel safe at this school.	1	2	3	4
k. Students often spread mean rumors or lies about others at this school on the internet (i.e., Facebook, email, instant message).	1	2	3	4
Student Respect				
l. All students are treated the same, regardless of whether their parents are rich or poor.	1	2	3	4
m. Boys and girls are treated equally.	1	2	3	4
n. The school provides instructional materials (e.g., textbooks, handouts) that reflect my cultural background.	1	2	3	4
o. Adults working at this school treat all students respectfully.	1	2	3	4
p. People of different cultural backgrounds, races, and ethnicities get along well at this school.	1	2	3	4

QA2. How much do you agree with the following statements? (Fill in one circle on each row)

School Discipline	Strongly disagree	Disagree	Agree	Strongly agree
a. My teachers make it clear to me when I have misbehaved in class.	1	2	3	4
b. Adults working in this school reward students for positive behavior.	1	2	3	4
c. Adults working in this school help students to understand and control their feelings and actions.	1	2	3	4
d. School rules are applied equally to all students.	1	2	3	4
e. Discipline is fair.	1	2	3	4

B: Your Schoolwork

QB1. How often do you: (Fill in one circle on each row)

Class Participation	Rarely	About half the time	Usually	Always
a. Participate in class discussions?	1	2	3	4
b. Participate in group work inside or outside of class time?	1	2	3	4
c. Raise your hand in class to ask questions?	1	2	3	4
d. Complete your homework?	1	2	3	4

QB2. How much do you agree with the following statements?
(Fill in one circle on each row)

Study Habits	Strongly disagree	Disagree	Agree	Strongly agree
a. I always study for tests.	1	2	3	4
b. I set aside time to do my homework or study.	1	2	3	4
c. I try to do well on my schoolwork even when it's boring.	1	2	3	4
d. I don't go out with my friends if I need to study.	1	2	3	4
e. I keep track of my assignments so I know when to turn them in.	1	2	3	4
f. I manage my time well enough to get all my work done.	1	2	3	4
g. I set goals for my performance in my classes.	1	2	3	4

QB3. How much do you agree with the following statements? (Fill in one circle on each row)

Academic Monitoring	Strongly disagree	Disagree	Agree	Strongly agree
a. I have a method for organizing my school work.	1	2	3	4
b. I stop to make sure I understand what I'm doing when I do my school work.	1	2	3	4
c. I put what I am studying into my own words to help me understand it.	1	2	3	4
d. I review my notes carefully to make sure that I understand them.	1	2	3	4
e. I quiz myself on the material to prepare for a test	1	2	3	4
f. When I finish an assignment, I check my work before I turn it in.	1	2	3	4

QB4. About how many hours per week do you spend studying or doing homework for ALL of your classes? (Fill in one circle)

None	1–2 hours	3–5 hours	6–9 hours	10–14 hours	15+ hours
0	1	2	3	4	5

QB5. Please indicate how much each of the following statements describes you.
(Fill in one circle on each row)

Academic Perseverance	Not at all like me	Not much like me	Somewhat like me	Mostly like me	Very much like me
a. New ideas and projects sometimes distract me from completing current work.	1	2	3	4	5
b. Delays and obstacles don't discourage me.	1	2	3	4	5
c. I often focus on a certain idea or project for a short time but later lose interest.	1	2	3	4	5
d. I am a hard worker.	1	2	3	4	5
e. I often set a goal but later follow a different one.	1	2	3	4	5
f. I have difficulty keeping my focus on projects that take more than a few days to complete.	1	2	3	4	5
g. I finish whatever I begin.	1	2	3	4	5
h. I am a careful worker.	1	2	3	4	5

QB6. Thinking about your classes this year, to what extent do you agree with each of the following statements? (Fill in one circle on each row)

Self-Efficacy	Strongly disagree	Disagree	Agree	Strongly agree
a. I'm certain I can master the skills taught in my classes this year.	1	2	3	4
b. I'm certain I can figure out how to do even the most difficult classwork.	1	2	3	4
c. I can do almost all the work in my classes if I don't give up.	1	2	3	4
d. Even if the work in my classes is hard, I can learn it.	1	2	3	4
e. I can do even the hardest work in class if I try.	1	2	3	4
f. I do badly in school whether or not I study.	1	2	3	4

QB7. Indicate how much you agree or disagree with the following statements?
(Fill in one circle on each row)

	Strongly disagree	Disagree	Agree	Strongly agree
a. I am good at math.	1	2	3	4
b. I will get better at math if I work at it.	1	2	3	4
c. You have to be born with the ability to be good at math.	1	2	3	4
d. I am good at reading and writing.	1	2	3	4
e. I will get better at writing if I work at it.	1	2	3	4
f. You have to be born with the ability to be good at reading and writing.	1	2	3	4
g. I am good at science.	1	2	3	4
h. I will get better at science if I work at it.	1	2	3	4
i. You have to be born with the ability to be good at science.	1	2	3	4

C: Your 9th Grade School Year

QC1. Since the beginning of this school year, how difficult has it been for you to do the following things? (Fill in one circle on each row)

Grade 9 Transition	Not at all difficult	Somewhat difficult	Difficult
a. Figure out what classes to take	1	2	3
b. Complete your school work	1	2	3
c. Make friends	1	2	3
d. Fit in with other students	1	2	3
e. Participate in school activities (clubs or sports)	1	2	3
f. Get along with your teachers	1	2	3

QC2. Which of the following people have you talked to about which courses to take THIS YEAR?

(Mark all that apply)

a. Parents/guardian	◯
b. Other family members	◯
c. School counselor	◯
d. Teachers	◯
e. Friends	◯
f. Other community members	◯
g. I haven't talked to anyone about this	◯

QC3. Which of the following people have you talked to about which courses you need to graduate from high school?

(Mark all that apply)

a. Parents/guardian	◯
b. Other family members	◯
c. School counselor	◯
d. Teachers	◯
e. Friends	◯
f. Other community members	◯
g. I haven't talked to anyone about this	◯

QD1. How much do you agree with the following statements?
(Fill in one circle on each row)

Teacher Support	Strongly disagree	Disagree	Agree	Strongly agree
a. I get along well with most of my teachers.	1	2	3	4
b. Most of my teachers are interested in how I'm doing.	1	2	3	4
c. Most of my teachers really listen to what I have to say.	1	2	3	4
d. If I need extra help, I will receive it from my teachers.	1	2	3	4
e. Most of my teachers treat me fairly.	1	2	3	4
f. My teachers praise me when I work hard in school.	1	2	3	4
g. My teachers give me individual attention when I need it.	1	2	3	4
h. My teachers often connect what I am learning to life outside the classroom.	1	2	3	4
i. My teachers expect me to do my best all the time.	1	2	3	4

QD2. How much do you agree with the following statements? (Fill in one circle on each row)

Preparation for the Future	Strongly disagree	Disagree	Agree	Strongly agree
a. Teachers make sure that all students are planning for life after high school graduation.	1	2	3	4
b. Teachers work hard to make sure that all students are learning.	1	2	3	4
c. Teachers see high school as preparation for the future.	1	2	3	4
d. All students are encouraged to go to college.	1	2	3	4
e. Teachers pay attention to all students, not just the smart ones.	1	2	3	4
f. Teachers work hard to make sure that students stay in school.	1	2	3	4

QE1. How much do you agree with the following statements? (Fill in one circle on each row)

Peer Support	Strongly disagree	Disagree	Agree	Strongly agree
a. My friends try hard in school.	1	2	3	4
b. My friends and I talk about what we did in class.	1	2	3	4
c. My friends and I help each other prepare for tests.	1	2	3	4
d. My friends think that it is important to do well in school.	1	2	3	4
e. My friends and I help each other with homework assignments.	1	2	3	4
f. My friends think it is important to attend every class.	1	2	3	4

QE2. How much do you agree with the following statements? (Fill in one circle on each row)

Peer Fit	Strongly disagree	Disagree	Agree	Strongly agree
a. I feel like I don't fit in with other students in my school.	1	2	3	4
b. I feel like students in my school are unfriendly.	1	2	3	4
c. I feel ignored by students in my school.	1	2	3	4
d. I feel like students in my school disrespect me.	1	2	3	4
e. I feel bullied by students in my school.	1	2	3	4

F: Your Parents

QF1. Since the beginning of the school year, how often have you discussed the following with either or both of your parents or guardians? (Fill in one circle on each row)

Parent Involvement	Never	Rarely	Sometimes	Often
a. Selecting courses or programs at school.	1	2	3	4
b. School activities	1	2	3	4
c. Things you've studied in class	1	2	3	4
d. Your grades	1	2	3	4
e. Your homework	1	2	3	4
f. Plans and preparations for ACT or SAT tests	1	2	3	4
g. Going to college	1	2	3	4

QG1. How much do you agree with the following statements? (Fill in one circle on each row)

Future Orientation	Strongly disagree	Disagree	Agree	Strongly agree
a. Grades in high school matter for success in college.	1	2	3	4
b. My classes give me useful preparation for what I plan to do in life.	1	2	3	4
c. High school teaches me valuable skills.	1	2	3	4
d. Working hard in high school matters for success in the workforce.	1	2	3	4
e. What we learn in class is necessary for success in the future.	1	2	3	4

QG2. How sure are you that you will graduate from high school?

(Fill in one circle)

Very sure you will graduate	4
You will probably graduate	3
You probably will not graduate	2
Very sure you will not graduate	1

QG3. What do you plan to do following high school graduation?

(Fill in one circle)

Continue my education at a 4-year college	5
Continue my education at a 2-year college or vocational school	4
Work full-time	3
Join the military	2
Other	1

QG4. What is the highest level of education you plan to complete?

(Fill in one circle)

Not planning to complete high school	1
GED	2
High school	3
2-year community college or career/technical school	4
4-year college or university	5
Master's degree	6
Ph.D., M.D., law degree or other high level professional degree	7
I haven't decided yet	0

Appendix C. Item parameter estimates and scale reliabilities

Item parameter and item response theory (IRT) scale reliabilities for each of the survey scales included on the Beginning High School Survey are shown in tables C1–C16. The *a* parameters indicate the item discrimination estimate, while *b* parameters are the item difficulty values between categories. That is, the *b* parameter estimates indicate the person score (in logits) at which a person has a 50 percent chance of selecting that category or higher. Survey scale titles are in the shaded bars in the reproduction of the survey in appendix B.

Academic Mindsets, Behaviors, and Supports scales

Table C1. Academic monitoring item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
I have a method for organizing my schoolwork.	1.46	–2.59	–0.63	1.64
I stop to make sure I understand what I'm doing when I do my schoolwork.	2.02	–2.83	–1.23	1.30
I put what I am studying into my own words to help me understand it.	1.72	–2.66	–0.86	1.46
I review my notes carefully to make sure that I understand them.	2.52	–2.24	–0.76	1.19
I quiz myself on the material to prepare for a test	1.47	–2.07	0.07	2.04
When I finish an assignment, I check my work before I turn it in.	1.56	–2.43	–0.73	1.38

Note: Scale reliability estimate: 0.80.

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Items modified from the Consortium on Chicago School Research (2012), CPS My Voice, My School Student Survey.

Table C2. Academic perseverance item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3	b_4
New ideas and projects sometimes distract me from completing current work.	0.27	–8.48	–3.54	3.37	8.68
I often focus on a certain idea or project for a short time but later lose interest.	0.65	–3.34	–1.13	1.14	3.75
I often set a goal but later follow a different one.	0.25	–8.01	–2.44	3.11	9.44
I have difficulty keeping my focus on projects that take more than a few days to complete.	0.69	–2.55	–0.75	1.02	3.14
Delays and obstacles don't discourage me.	0.57	–4.43	–1.67	1.13	3.93
I am a hard worker.	2.03	–2.81	–1.95	–0.55	0.62
I finish whatever I begin.	2.14	–2.59	–1.52	–0.17	1.00
I am a careful worker.	2.05	–2.57	–1.53	–0.11	1.05

Note: Scale reliability estimate: 0.63.

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Items modified from Duckworth & Quinn (2009).

Table C3. Class participation item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
Participate in class discussions?	3.19	−0.88	−0.20	1.13
Participate in group work inside or outside of class time?	1.70	−1.23	−0.45	1.18
Raise your hand in class to ask questions?	1.55	−0.87	−0.05	1.34
Complete your homework?	0.77	−3.04	−1.43	1.34

Note: Scale reliability estimate: 0.72.

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Author-developed scale.

Table C4. Parent involvement item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
Selecting courses or programs at school	1.59	−1.77	−0.60	1.08
School activities	1.56	−2.01	−0.99	0.43
Things you've studied in class	1.96	−1.80	−0.65	0.80
Your grades	1.91	−2.73	−1.60	−0.34
Your homework	2.25	−1.90	−0.92	0.28
Plans and preparations for ACT or SAT tests	1.62	−1.08	0.01	1.15
Going to college	1.84	−2.15	−1.32	−0.27

Note: Scale reliability estimate: 0.82.

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Author-developed scale.

Table C5. Peer support item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
My friends try hard in school.	2.31	−2.54	−1.24	1.11
My friends and I talk about what we did in class.	1.93	−2.02	−0.66	1.30
My friends and I help each other prepare for tests.	1.99	−1.69	−0.19	1.49
My friends think that it is important to do well in school.	2.95	−2.15	−1.20	0.79
My friends and I help each other with homework assignments.	1.97	−2.02	−0.81	1.01
My friends think it is important to attend every class.	2.32	−2.11	−0.85	0.92

Note: Scale reliability estimate: 0.85.

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Items modified from the Consortium on Chicago School Research (2009), Survey of Chicago Public Schools.

Table C6. Self-efficacy item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
I'm certain I can master the skills taught in my classes this year.	2.21	−2.25	−0.96	1.30
I'm certain I can figure out how to do even the most difficult classwork.	2.46	−2.05	−0.70	1.32
I can do almost all the work in my classes if I don't give up.	2.47	−2.55	−1.45	0.72
Even if the work in my classes is hard, I can learn it.	3.10	−2.27	−1.26	0.76
I can do even the hardest work in class if I try.	2.85	−2.20	−1.04	0.76

Note: Scale reliability estimate: 0.85

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Items modified from the Midgley (2000), Patterns of Adaptive Learning Scales.

Table C7. Study habits item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
I always study for tests.	1.84	−1.89	−0.20	1.93
I set aside time to do my homework or study.	2.27	−2.06	−0.57	1.40
I try to do well on my schoolwork even when it's boring.	1.53	−3.43	−2.11	0.71
I don't go out with my friends if I need to study.	1.42	−1.99	−0.03	1.79
I keep track of my assignments so I know when to turn them in.	2.26	−2.31	−0.77	1.07
I manage my time well enough to get all my work done.	2.14	−2.26	−0.67	1.33
I set goals for my performance in my classes.	1.50	−2.78	−1.04	0.95

Note: Scale reliability estimate: 0.84

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Items modified from the Consortium on Chicago School Research (2012), CPS My Voice, My School Student Survey.

Transition to High School scales

Table C8. Grade 9 transition item discrimination estimates and item difficulty values

Item	a	b_1	b_2
Figure out what classes to take	0.63	−0.62	4.59
Complete your schoolwork	0.70	−0.78	3.09
Make friends	3.90	0.60	1.43
Fit in with other students	3.85	0.27	1.20
Participate in school activities (clubs or sports)	1.26	0.30	1.74
Get along with your teachers	0.70	0.54	3.49

Note: Scale reliability estimate: 0.64.

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Author-developed scale.

Table C9. Peer fit item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
I feel like I don't fit in with other students in my school.	3.14	−0.51	0.71	1.65
I feel like students in my school are unfriendly.	3.45	−0.70	0.74	1.78
I feel ignored by students in my school.	4.52	−0.52	0.86	1.63
I feel like students in my school disrespect me.	4.00	−0.48	0.93	1.69
I feel bullied by students in my school.	2.87	−0.13	1.40	2.12

Note: Scale reliability estimate: 0.89.

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Items modified from the National Center for Education Statistics (n.d.), ED School Climate Surveys, Student Survey.

Table C10. School safety item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
Students at this school are often teased or picked on.	1.10	−4.12	−2.25	1.51
Students at this school are often threatened or bullied.	1.44	−2.01	−0.03	2.24
I sometimes stay home because I don't feel safe at school.	1.99	−1.94	−0.52	1.69
I feel safe at this school.	2.07	−2.02	−0.95	0.92
Students often spread mean rumors or lies about others at this school on the Internet (i.e., Facebook, email, instant message).	1.70	−2.13	−0.86	1.40

Note: Scale reliability estimate: 0.75.

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Items modified from the Consortium on Chicago School Research (2012), CPS My Voice, My School Student Survey.

Table C11. Sense of belonging item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
I feel like a real part of my school.	1.98	−2.40	−0.87	1.57
People at my school notice when I'm good at something.	1.94	−2.08	−0.48	1.64
Other students in my school take my ideas seriously.	1.69	−2.02	0.05	2.53
People at this school are friendly to me.	1.48	−3.05	−1.54	1.29
I'm included in lots of activities at my school.	1.31	−2.20	−0.26	1.68

Note: Scale reliability estimate: 0.75.

Source: Authors' compilation using data from the Beginning High School Survey, 2015. Items modified from the Consortium on Chicago School Research (2012), CPS My Voice, My School Student Survey.

Table C12. Future orientation item discrimination estimates and item difficulty values

Item	a	b₁	b₂	b₃
Grades in high school matter for success in college.	1.96	−3.02	−2.30	−0.42
My classes give me useful preparation for what I plan to do in life.	2.92	−1.94	−1.01	0.49
High school teaches me valuable skills.	3.52	−1.90	−1.09	0.57
Working hard in high school matters for success in the workforce.	2.71	−2.49	−1.62	0.13
What we learn in class is necessary for success in the future.	3.17	−1.89	−1.07	0.32

Note: Scale reliability estimate: 0.85

Source: Authors' compilation. Modified from the Consortium on Chicago School Research (2012), CPS My Voice, My School Student Survey.

Table C13. Preparation for the future item discrimination estimates and item difficulty values

Item	a	b₁	b₂	b₃
Teachers make sure that all students are planning for life after high school graduation.	2.21	−1.98	−0.75	0.90
Teachers work hard to make sure that all students are learning.	3.44	−2.02	−1.00	0.67
Teachers see high school as preparation for the future.	2.46	−2.55	−1.49	0.62
All students are encouraged to go to college.	1.44	−3.00	−1.28	0.72
Teachers pay attention to all students, not just the smart ones.	2.57	−1.80	−0.71	0.86
Teachers work hard to make sure that students stay in school.	3.04	−1.89	−0.83	0.79

Note: Scale reliability estimate: 0.87.

Source: Authors' compilation. Modified from the Consortium on Chicago School Research (2012), CPS My Voice, My School Student Survey.

Table C14. School discipline item discrimination estimates and item difficulty values

Item	a	b₁	b₂	b₃
My teachers make it clear to me when I have misbehaved in class.	1.10	−4.12	−2.25	1.51
Adults working in this school reward students for positive behavior.	1.44	−2.01	−0.03	2.24
Adults working in this school help students to understand and control their feelings and actions.	1.99	−1.94	−0.52	1.69
School rules are applied equally to all students.	2.07	−2.02	−0.95	0.92
Discipline is fair.	1.70	−2.13	−0.86	1.40

Note: Scale reliability estimate: 0.75.

Source: Authors' compilation. Modified from the National Center for Education Statistics (n.d.), ED School Climate Surveys, Student Survey.

Table C15. Student respect item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
All students are treated the same, regardless of whether their parents are rich or poor.	1.94	−1.50	−0.23	1.51
Boys and girls are treated equally.	2.32	−1.81	−0.66	1.22
The school provides instructional materials (for example, textbooks, handouts) that reflect my cultural background.	1.00	−3.67	−1.52	1.82
Adults working at this school treat all students respectfully.	1.38	−2.48	−0.99	1.23
People of different cultural backgrounds, races, and ethnicities get along well at this school.	1.61	−2.72	−1.44	1.11

Note: Scale reliability estimate: 0.75.

Source: Authors' compilation. Modified from the National Center for Education Statistics (n.d.), ED School Climate Surveys, Student Survey.

Table C16. Teacher support item discrimination estimates and item difficulty values

Item	a	b_1	b_2	b_3
I get along well with most of my teachers.	1.81	−2.55	−1.42	0.88
Most of my teachers are interested in how I'm doing.	2.61	−1.81	−0.45	1.39
Most of my teachers really listen to what I have to say.	3.00	−1.65	−0.45	1.32
If I need extra help, I will receive it from my teachers.	2.23	−2.15	−1.02	1.02
Most of my teachers treat me fairly.	2.54	−2.27	−1.23	0.97
My teachers praise me when I work hard in school.	1.81	−1.74	−0.01	1.85
My teachers give me individual attention when I need it.	1.98	−1.84	−0.47	1.58
My teachers often connect what I am learning to life outside the classroom.	1.56	−1.87	−0.18	1.83
My teachers expect me to do my best all the time.	1.41	−3.39	−2.24	0.29

Note: Scale reliability estimate: 0.89.

Source: Authors' compilation. Modified from the Organisation for Economic Co-operation and Development (2009), Programme for International Student Assessment, Student Questionnaire.

Appendix D. Detailed results of the analyses

This appendix contains tables displaying the detailed results of the analyses. Descriptive statistics showing the means, standard deviations, and numbers of students for each of the survey scales by race/ethnicity are shown in table D1. The results of the path models are shown in tables D2–D4. Due to differences in the scaling and types of variables included in the path models, only standardized path coefficients are presented in the tables.

Table D1. Means, standard deviations, and number of students responding for each survey scale by race/ethnicity, 2015

Scale	Statistic	Race/ethnicity		
		White	Hispanic	American Indian
Academic Mindsets, Behaviors, and Supports				
Academic monitoring	Mean	49.38	49.89	50.83**
	Standard deviation	9.11	8.78	8.87
	No. of observations	673	1,507	727
Academic perseverance	Mean	50.98	50.22	48.65**
	Standard deviation	9.15	8.73	8.36
	No. of observations	673	1,503	727
Class participation	Mean	51.65	49.52**	49.40**
	Standard deviation	8.71	8.86	8.38
	No. of observations	676	1,510	728
Parent involvement	Mean	49.50	50.16	50.21
	Standard deviation	9.17	8.98	9.11
	No. of observations	671	1,481	719
Peer support	Mean	50.04	49.43	51.07*
	Standard deviation	9.75	8.81	9.40
	No. of observations	673	1,485	717
Self-efficacy	Mean	50.20	49.72	50.24
	Standard deviation	10.01	8.94	8.72
	No. of observations	670	1,499	722
Study habits	Mean	49.60	50.03	50.37
	Standard deviation	9.58	8.80	9.36
	No. of observations	676	1,509	727
Transition to High School				
Grade 9 transition	Mean	50.53	49.11**	51.33
	Standard deviation	8.74	8.11	8.77
	No. of observations	675	1,501	723
Peer fit	Mean	50.27	49.86	50.13
	Standard deviation	9.96	8.99	9.47
	No. of observations	673	1,479	714
School safety	Mean	50.74	49.76*	49.68*
	Standard deviation	9.19	9.00	9.01
	No. of observations	676	1,504	727
Sense of belonging	Mean	50.22	50.29	49.10**
	Standard deviation	9.02	8.39	8.78
	No. of observations	677	1,507	724
School Environment				
Future orientation	Mean	48.60	49.87**	51.53**
	Standard deviation	9.36	9.08	8.87
	No. of observations	673	1,484	722
Preparation for the future	Mean	48.57	49.49	52.15**
	Standard deviation	9.27	9.17	9.03
	No. of observations	672	1,494	720
School discipline	Mean	49.40	49.80	50.63*
	Standard deviation	9.00	8.60	8.24
	No. of observations	676	1,512	728
Student respect	Mean	48.76	50.13**	50.97**
	Standard deviation	8.62	8.67	8.63
	No. of observations	675	1,505	727
Teacher support	Mean	49.97	49.86	50.23
	Standard deviation	9.71	9.40	8.93
	No. of observations	673	1,500	723

* Significant at $p < .05$; ** significant at $p < .01$

Note: Statistical significance is in comparison with White students.

Source: Authors' compilation using data from the Beginning High School Survey, 2015, and district data, 2015/16.

Table D2. Standardized model results for Academic Mindsets, Behaviors, and Supports path model, 2015/16

Path	Estimate	Standard error	Estimate/ standard error	*p*-value
Direct effects				
Academic monitoring on…				
Male	−2.35	0.36	−6.58	0.00**
English learner	0.47	0.66	0.71	0.48
Socioeconomic status	−0.16	0.40	−0.41	0.68
American Indian	1.58	0.56	2.84	0.01*
Hispanic	0.53	0.47	1.14	0.25
Grade 8 math	0.03	0.02	1.37	0.17
Academic perseverance on…				
Male	−0.52	0.35	−1.47	0.14
English learner	−1.35	0.65	−2.09	0.04*
Socioeconomic status	−0.05	0.40	−0.12	0.90
American Indian	−1.98	0.55	−3.59	0.00**
Hispanic	−0.16	0.46	−0.35	0.73
Grade 8 math	0.10	0.02	5.06	0.00**
Class participation on…				
Male	0.02	0.35	0.07	0.94
English learner	−0.87	0.63	−1.39	0.26
Socioeconomic status	−0.58	0.40	−1.45	0.13
American Indian	−1.59	0.55	−2.88	0.00**
Hispanic	−1.60	0.46	−3.46	0.00**
Grade 8 math	0.06	0.02	3.10	0.00**
Parent involvement on…				
Male	−0.99	0.37	−2.72	0.01*
English learner	−0.52	0.67	−0.78	0.39
Socioeconomic status	−0.20	0.41	−0.48	0.55
American Indian	0.90	0.57	1.58	0.11
Hispanic	0.71	0.48	1.48	0.13
Grade 8 math	0.05	0.02	2.14	0.04*
Peer support on…				
Male	−3.05	0.36	−8.40	0.00**
English learner	−0.71	0.67	−1.06	0.29
Socioeconomic status	−0.11	0.41	−0.28	0.78
American Indian	1.42	0.57	2.50	0.01*
Hispanic	−0.39	0.48	−0.83	0.41
Grade 8 math	0.02	0.02	1.16	0.25
Self-efficacy on…				
Male	−0.19	0.37	−0.51	0.61
English learner	−0.74	0.67	−1.10	0.27
Socioeconomic status	−0.21	0.41	−0.51	0.61
American Indian	0.48	0.57	0.83	0.41
Hispanic	−0.09	0.48	−0.19	0.85
Grade 8 math	0.10	0.02	4.69	0.00**

(continued)

Table D2. Standardized model results for Academic Mindsets, Behaviors, and Supports path model, 2015/16 *(continued)*

Path	Estimate	Standard error	Estimate/ standard error	*p*-value
Study habits on…				
Male	−2.14	0.37	−5.87	0.00**
English learner	0.03	0.67	0.04	0.95
Socioeconomic status	−0.17	0.41	−0.41	0.66
American Indian	1.16	0.57	2.02	0.04*
Hispanic	0.63	0.48	1.31	0.19
Grade 8 math	0.02	0.02	0.73	0.52
Grade 8 math on…				
Male	−0.80	0.44	−1.82	0.07
English learner	−4.45	0.83	−5.36	0.00**
Socioeconomic status	−1.22	0.50	−2.43	0.02*
American Indian	0.22	0.59	0.32	0.75
Hispanic	−2.28	0.69	−3.89	0.00**
Grade 9 grade point average on…				
Male	−0.16	0.03	−4.88	0.00**
English learner	−0.25	0.06	−4.02	0.00**
Socioeconomic status	−0.24	0.04	−6.55	0.00**
American Indian	−0.53	0.05	−10.64	0.00**
Hispanic	0.01	0.04	0.25	0.80
Grade 8 math	0.02	0.00	11.38	0.00**
Peer support	−0.00	0.00	−1.03	0.30
Parent involvement	0.01	0.00	3.26	0.00**
Study habits	0.01	0.00	4.84	0.00**
Class participation	−0.00	0.00	−0.87	0.38
Self-efficacy	0.01	0.00	3.37	0.00**
Academic perseverance	0.02	0.00	8.19	0.00**
Academic monitoring	−0.01	0.00	−4.18	0.00**
Grade 9 absences on…				
Male	−1.72	0.82	−2.10	0.04*
English learner	−2.11	1.45	−1.46	0.14
Socioeconomic status	6.16	0.94	6.57	0.00**
American Indian	−2.51	1.28	−1.96	0.05
Hispanic	0.81	1.06	0.44	0.44
Grade 8 math	−0.17	0.05	−3.67	0.00**
Peer support	−0.08	0.05	−1.46	0.14
Parent involvement	−0.05	0.05	−0.91	0.36
Study habits	−0.22	0.07	−3.03	0.00**
Class participation	0.13	0.06	2.40	0.02*
Self-efficacy	−0.04	0.06	−0.72	0.47
Academic perseverance	−0.04	0.06	−0.64	0.52
Academic monitoring	0.03	0.07	0.39	0.70

(continued)

Table D2. Standardized model results for Academic Mindsets, Behaviors, and Supports path model, 2015/16 *(continued)*

Path	Estimate	Standard error	Estimate/ standard error	*p*-value
Grade 9 course failures on...				
Male	0.34	0.08	4.14	0.00**
English learner	0.48	0.17	2.86	0.00**
Socioeconomic status	0.34	0.09	3.75	0.00**
American Indian	0.88	0.13	6.95	0.00**
Hispanic	−0.06	0.11	−0.53	0.63
Grade 8 math	−0.03	0.00	−5.74	0.00**
Peer support	0.00	0.01	0.48	0.61
Parent involvement	−0.02	0.01	−2.94	0.00**
Study habits	−0.04	0.01	−5.05	0.00**
Class participation	0.01	0.01	2.07	0.04*
Self-efficacy	−0.02	0.01	−3.10	0.00**
Academic perseverance	−0.03	0.01	−4.98	0.00**
Academic monitoring	0.02	0.01	2.30	0.02*
Indirect effects				
Male				
Male → Study habits → Grade 9 grade point average	−0.03	0.01	−3.73	0.00**
Male → Academic monitoring → Grade 9 grade point average	0.03	0.01	3.53	0.00**
Male → Parent involvement → Grade 9 grade point average	−0.01	0.00	−2.09	0.04*
Male → Study habits → Grade 9 absences	0.48	0.18	2.69	0.01*
Male → Study habits → Grade 9 course failures	0.08	0.02	3.83	0.00**
Male → Academic monitoring → Grade 9 course failures	−0.04	0.02	−2.17	0.03*
English learner				
English learner → Academic perseverance → Grade 9 grade point average	−0.03	0.01	−2.03	0.04*
English learner → Grade 8 math → Grade 9 grade point average	−0.09	0.02	−4.88	0.00**
English learner → Grade 8 math → Grade 9 absences	0.75	0.25	2.99	0.00**
English learner → Grade 8 math → Grade 9 course failures	0.11	0.03	3.91	0.00**
Socioeconomic status				
Socioeconomic status → Grade 8 math → Grade 9 grade point average	−0.02	0.01	−2.37	0.02*
Socioeconomic status → Grade 8 math → Grade 9 absences	0.20	0.10	2.02	0.04*
Socioeconomic status → Grade 8 math → Grade 9 course failures	0.03	0.01	2.24	0.03*

(continued)

Table D2. Standardized model results for Academic Mindsets, Behaviors, and Supports path model, 2015/16 *(continued)*

Path	Estimate	Standard error	Estimate/ standard error	*p*-value
Hispanic				
Hispanic → Grade 8 math → Grade 9 grade point average	−0.05	0.01	−3.68	0.00**
Hispanic → Class participation → Grade 9 absences	−0.21	0.11	−1.98	0.04*
Hispanic → Grade 8 math → Grade 9 absences	0.39	0.14	2.68	0.01*
Hispanic → Grade 8 math → Grade 9 course failures	0.06	0.02	3.22	0.00**
American Indian				
American Indian → Academic perseverance → Grade 9 grade point average	−0.04	0.01	−3.28	0.00**
American Indian → Academic monitoring → Grade 9 grade point average	−0.02	0.01	−2.34	0.02*
American Indian → Academic perseverance → Grade 9 course failures	0.06	0.02	2.90	0.00**

* Significant at $p < .05$; ** significant at $p < .01$.

Note: Fit statistics: comparative fit index = 9.5; standardized root mean square residual = 0.031. Statistical significance is in comparison to White students.

Source: Authors' compilation using data from the Beginning High School Survey, 2015, and district data, 2015/16

Table D3. Standardized model results for Transition to High School path model, 2015/16

Path	Estimate	Standard error	Estimate/ standard error	p-value
Direct effects				
Grade 9 transition on…				
Male	−1.79	0.34	−5.33	0.00**
English learner	2.30	0.62	3.73	0.00**
Socioeconomic status	1.17	0.38	3.10	0.00**
Hispanic	−1.78	0.44	−4.06	0.00**
American Indian	−0.23	0.53	−0.45	0.66
Grade 8 math	−0.06	0.02	−3.29	0.00**
Peer fit on…				
Male	−2.01	0.37	−5.36	0.00**
English learner	1.87	0.69	2.71	0.01*
Socioeconomic status	0.76	0.42	1.81	0.07
Hispanic	−0.89	0.49	−1.81	0.07
American Indian	−1.05	0.59	−1.79	0.07
Grade 8 math	−0.05	0.02	−2.55	0.01*
School safety on…				
Male	−2.26	0.36	−6.29	0.00**
English learner	0.47	0.65	0.73	0.47
Socioeconomic status	0.73	0.41	1.78	0.08
Hispanic	−1.20	0.47	−2.53	0.01*
American Indian	−1.64	0.56	−2.91	0.00**
Grade 8 math	−0.04	0.02	−1.90	0.06
Sense of belonging on…				
Male	0.67	0.35	1.93	0.05
English learner	−0.64	0.63	−1.01	0.31
Socioeconomic status	−0.68	0.39	−1.73	0.08
Hispanic	0.60	0.46	1.32	0.19
American Indian	−0.42	0.55	−0.77	0.43
Grade 8 math	0.04	0.02	2.25	0.03*
Grade 8 math on…				
Male	−0.82	0.44	−1.86	0.06
English learner	−4.49	0.83	−5.42	0.00**
Socioeconomic status	−1.25	0.50	−2.49	0.01*
Hispanic	−2.23	0.59	−3.80	0.00**
American Indian	0.26	0.69	0.37	0.71
Grade 9 grade point average on…				
Male	−0.20	0.03	−6.14	0.00*
English learner	−0.27	0.07	−4.11	0.00**
Socioeconomic status	−0.22	0.04	−5.93	0.00**
Hispanic	−0.01	0.04	−0.17	0.86
American Indian	−0.56	0.05	−10.97	0.00**
Grade 8 math	0.02	0.00	11.79	0.00**
Grade 9 Transition	−0.01	0.00	−3.38	0.00**

(continued)

Table D3. Standardized model results for Transition to High School path model, 2015/16 *(continued)*

Path	Estimate	Standard error	Estimate/ standard error	*p*-value
Peer fit	0.00	0.00	0.92	0.36
School safety	−0.01	0.00	−2.64	0.01**
Sense of belonging	0.01	0.00	6.26	0.00**
Grade 9 absences on…				
Male	−0.94	0.81	−1.15	0.25
English learner	−2.07	1.46	−1.41	0.16
Socioeconomic status	6.02	0.94	6.38	0.00**
Hispanic	0.55	1.06	0.52	0.60
American Indian	−3.06	1.27	−2.42	0.02*
Grade 8 math	−0.17	0.05	−3.81	0.00**
Grade 9 transition	−0.03	0.06	−0.43	0.67
Peer fit	−0.05	0.06	−0.81	0.42
School safety	0.04	0.05	0.76	0.46
Sense of belonging	−0.17	0.05	−3.11	0.00**
Grade 9 course failures on…				
Male	0.45	0.08	5.44	0.00**
English learner	0.52	0.18	2.99	0.00**
Socioeconomic status	0.31	0.09	3.35	0.00**
Hispanic	−0.07	0.11	−0.60	0.5
American Indian	0.86	0.13	6.77	0.00**
Grade 8 math	−0.03	0.01	−6.06	0.00**
Grade 9 transition	0.01	0.01	1.66	0.10
Peer fit	−0.01	0.01	−1.30	0.19
School safety	0.01	0.01	1.10	0.27
Sense of belonging	−0.04	0.01	−7.22	0.00**
Indirect effects				
Male				
Male → Grade 9 transition → Grade 9 grade point average	0.01	0.01	2.86	0.00**
Male → School safety → Grade 9 grade point average	0.01	0.01	2.44	0.02*
English learner				
English learner → Grade 8 math → Grade 9 grade point average	−0.10	0.02	−4.95	0.00**
English learner → Grade 9 transition → Grade 9 grade point average	−0.02	0.01	−2.52	0.01*
English learner → Grade 8 math → Grade 9 absences	0.78	0.25	3.08	0.00**
English learner → Grade 8 math → Grade 9 course failures	0.12	0.03	4.03	0.00**
Socioeconomic status				
Socioeconomic status → Grade 8 math → Grade 9 grade point average	−0.03	0.01	−2.43	0.02

(continued)

Table D3. Standardized model results for Transition to High School path model, 2015/16 *(continued)*

Path	Estimate	Standard error	Estimate/ standard error	*p*-value
Socioeconomic status → Grade 9 transition → Grade 9 grade point average	−0.01	0.00	−2.28	0.02
Socioeconomic status → Grade 8 math → Grade 9 absences	0.22	0.11	2.08	0.04*
Socioeconomic status → Grade 8 math → Grade 9 course failures	0.04	0.02	2.30	0.02*
Hispanic				
Hispanic → Grade 8 math → Grade 9 grade point average	−0.05	0.01	−3.63	0.00**
Hispanic → Grade 9 transition → Grade 9 grade point average	0.01	0.01	2.60	0.01**
Hispanic → Grade 8 math → Grade 9 absences	0.39	0.14	2.71	0.01**
Hispanic → Grade 8 math → Grade 9 course failures	0.06	0.02	3.23	0.00**

* Significant at *p* < .05; ** significant at *p* < .01.

Note: Fit statistics: comparative fit index = 0.90; standardized root mean square residual = 0.037. Statistical significance is in comparison to White students.

Source: Authors' compilation using data from the Beginning High School Survey, 2015, and district data, 2015/16.

Table D4. Standardized model results for School Environment path model, 2015/16

Path	Estimate	Standard error	Estimate/ standard error	p-value
Direct effects				
Future orientation on…				
Male	−0.55	0.37	−1.50	0.13
English learner	0.38	0.68	0.56	0.58
Socioeconomic status	0.27	0.42	0.66	0.51
Grade 8 math	−0.01	0.02	−0.61	0.55
Hispanic	1.19	0.48	2.45	0.01*
American Indian	3.00	0.58	5.20	0.00**
Preparation for the future on…				
Male	−0.17	0.36	−0.47	0.64
English learner	1.43	0.67	2.13	0.03*
Socioeconomic status	0.28	0.41	0.67	0.50
Grade 8 math	0.03	0.02	1.33	0.18
Hispanic	0.80	0.48	1.68	0.09
American Indian	3.60	0.57	6.30	0.00**
School discipline on…				
Male	0.05	0.34	0.15	0.88
English learner	0.91	0.62	1.46	0.15
Socioeconomic status	0.19	0.39	0.50	0.62
Grade 8 math	0.01	0.02	0.53	0.60
Hispanic	0.25	0.45	0.57	0.57
American Indian	1.07	0.53	2.01	0.04*
Student respect on…				
Male	0.75	0.34	2.16	0.03*
English learner	0.80	0.63	1.27	0.21
Socioeconomic status	0.26	0.39	0.67	0.50
Grade 8 math	0.05	0.02	2.57	0.01*
Hispanic	1.36	0.45	3.01	0.00**
American Indian	2.33	0.54	4.22	0.00**
Teacher support on…				
Male	−0.23	0.37	−0.62	0.54
English learner	1.74	0.68	2.57	0.01*
Socioeconomic status	−0.38	0.42	−0.92	0.36
Grade 8 math	0.07	0.02	3.15	0.00**
Hispanic	−0.07	0.48	−0.14	0.89
American Indian	0.39	0.58	0.67	0.50
Grade 8 math on…				
Male	−0.80	0.44	−1.83	0.07
English learner	−4.45	0.83	−5.38	0.00**
Socioeconomic status	−1.28	0.50	−2.53	0.01*
Hispanic	−2.26	0.59	−3.84	0.00**
American Indian	0.21	0.68	0.31	0.76

(continued)

Table D4. Standardized model results for School Environment path model, 2015/16
(continued)

Path	Estimate	Standard error	Estimate/ standard error	p-value
Grade 9 grade point average on...				
Male	−0.17	0.03	0.36	0.00**
English learner	−0.32	0.07	−0.38	0.00**
Socioeconomic status	−0.24	0.04	−5.14	0.00**
Hispanic	0.01	0.04	−4.86	0.00**
American Indian	−0.58	0.05	−6.24	0.00**
Grade 8 math	0.02	0.00	12.00	0.00**
Preparation for the future	−0.01	0.00	−1.82	0.07
School discipline	−0.01	0.00	−1.72	0.09
Student respect	0.01	0.00	2.80	0.01*
Future orientation	0.01	0.00	4.44	0.00**
Teacher support	0.01	0.00	4.20	0.00**
Grade 9 absences on...				
Male	−1.03	0.80	−1.28	0.20
English learner	−1.82	1.45	−1.25	0.21
Socioeconomic status	6.20	0.94	6.60	0.00**
Hispanic	0.88	1.06	0.83	0.41
American Indian	−2.03	1.28	−1.59	0.11
Grade 8 math	−0.17	0.05	−3.80	0.00**
Preparation for the future	−0.08	0.07	−1.25	0.21
School discipline	0.06	0.07	0.91	0.36
Student respect	−0.11	0.06	−1.82	0.07
Future orientation	−0.17	0.05	−3.18	0.00**
Teacher support	−0.00	0.07	−0.06	0.95
Grade 9 course failures on...				
Male	0.39	0.08	4.79	0.00**
English learner	0.61	0.17	3.52	0.00**
Socioeconomic status	0.34	0.09	3.72	0.00**
Hispanic	−0.08	0.11	−0.70	0.49
American Indian	0.95	0.13	7.24	0.00**
Grade 8 math	−0.03	0.01	−6.36	0.00**
Preparation for the future	0.01	0.01	1.33	0.18
School discipline	−0.01	0.01	−1.02	0.31
Student respect	−0.00	0.01	−0.66	0.51
Future orientation	−0.03	0.01	−5.25	0.00**
Teacher support	−0.02	0.01	−2.68	0.01*
Indirect effects				
English learner				
English learner → Grade 8 math → Grade 9 grade point average	−0.10	0.02	−4.93	0.00**
English learner → Teacher support → Grade 9 grade point average	0.02	0.01	2.18	0.03*
English learner → Grade 8 math → Grade 9 absences	0.78	0.25	3.07	0.00**

Table D4. Standardized model results for School Environment path model, 2015/16
(continued)

Path	Estimate	Standard error	Estimate/ standard error	*p*-value
English learner → Grade 8 math → Grade 9 course failures	0.13	0.03	4.09	0.00**
Socioeconomic status				
Socioeconomic status → Grade 8 math → Grade 9 grade point average	−0.03	0.01	−2.48	0.01*
Socioeconomic status → Grade 8 math → Grade 9 absences	0.22	0.11	2.11	0.04*
Socioeconomic status → Grade 8 math → Grade 9 course failures	0.04	0.02	2.36	0.02*
Hispanic				
Hispanic → Grade 8 math → Grade 9 grade point average	−0.05	0.01	−3.66	0.00**
Hispanic → Student respect → Grade 9 grade point average	0.01	0.00	2.06	0.04*
Hispanic → Future orientation → Grade 9 grade point average	0.01	0.01	2.15	0.03*
Hispanic → Grade 8 math → Grade 9 absences	0.39	0.14	2.72	0.01**
Hispanic → Grade 8 math → Grade 9 course failures	0.01	0.20	3.30	0.00**
Hispanic → Future orientation → Grade 9 course failures	−0.03	0.02	−2.23	0.03*
American Indian				
American Indian → Student respect → Grade 9 grade point average	0.02	0.01	2.35	0.02*
American Indian → Future orientation → Grade 9 grade point average	0.03	0.01	3.39	0.00**
American Indian → Future orientation → Grade 9 absences	−0.51	0.19	−2.72	0.01**
American Indian → Future orientation → Grade 9 course failures	−0.09	0.02	−3.71	0.00**

* Significant at *p* < .05; ** significant at *p* < .01.

Note: Fit statistics: comparative fit index = 0.938; standardized root mean square residual = 0.035. Statistical significance is in comparison to White students.

Source: Authors' compilation using data from the Beginning High School Survey, 2015, and district data, 2015/16.

Notes

1. Members include representatives of the New Mexico Public Education Department, the Bureau of Indian Education, New Mexico Highlands University, New Mexico State University, the University of New Mexico, Regional Education Cooperatives, and the New Mexico Association for Bilingual Education, among others.
2. Members include representatives of the New Mexico Public Education Department, the Bureau of Indian Education, New Mexico Highlands University, New Mexico State University, the University of New Mexico, Regional Education Cooperatives, and the New Mexico Association for Bilingual Education, among others.
3. In New Mexico, 61 percent of students enrolled in public schools in the 2014/15 school year were Hispanic and 10 percent of students were American Indian (U.S. Department of Education, n.d.).
4. Economists generally refer to these factors as noncognitive because they are not measured by commonly administered cognitive tests, such as IQ tests or academic examinations (Farrington, Roderick, Allensworth & Nagaoka, 2012); psychologists and sociologists often refer to these factors as social-emotional factors.
5. The English version of the survey was translated into Spanish by a professional translator. Students were given the opportunity to complete either version. However, fewer than 10 students opted to complete the Spanish version of the survey.
6. IRT-based reliability estimates are equivalent to traditional test reliability estimates, such as Kuder-Richardson Formula 20 or Cronbach's alpha.
7. To avoid multicollinearity issues, only grade 8 math achievement (students' scale scores on the New Mexico grade 8 state math assessment) was included in the model. Math scale scores were selected over reading scale scores because of higher correlations among math scale scores and the grade 9 outcome measures.

References

Allensworth, E., & Easton, J. (2005). *The on-track indicator as a predictor of high school graduation.* Chicago, IL: Consortium on Chicago School Research.

Bryk, A., Sebring, P., Allensworth, E., Luppescu, S., & Easton, J. (2010). *Organizing schools for improvement: Lessons from Chicago.* Chicago, IL: University of Chicago Press.

Casillas, A., Allen, J., Kuo, Y.-L., Pappas, S., Hanson, M. A., & Robbins, S. B. (2011). *Development and validation of ENGAGE Grades 6–9.* Iowa City, IA: ACT Research Reports, ACT, Inc.

Christle, C., Jolivette, K., & Nelson, M. (2007). School characteristics related to high school dropout rates. *Remedial and Special Education, 28*(6), 325–339.

Consortium on Chicago School Research. (2009). *Survey of Chicago Public Schools.* Chicago, IL: Author.

Consortium on Chicago School Research. (2012). *CPS My Voice, My School student survey.* Chicago, IL: Author.

Duckworth, A. & Quinn, P. (2009). Development and validation of the Short Grit Scale (Grit-S). *Journal of Personality Assessment, 91*(2), 166–174.

Dweck, C. S., Walton, G. M., & Cohen, G. L. (2011). *Academic tenacity: Mindsets and skills that promote long-term learning.* White paper prepared for the Bill & Melinda Gates Foundation, Seattle, WA.

Edwards, V. (2006). Diplomas count: An essential guide to graduation policy and rates. *Education Week, 25*(41), 1–42. Retrieved on March 30, 2017, from http://www.edweek.org/ew/toc/2006/06/22/index.html?intc=ml.

Farrington, C., Roderick, M., Allensworth, E., & Nagaoka, J. (2012). *Teaching adolescents to become learners: The role of noncognitive factors in shaping school performance.* Chicago, IL: Consortium on Chicago School Research.

Heckman, J. (2008). Schools, skills, and synapses. *Economic Inquiry, 43*(3), 289–324.

Heckman, J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics, 24*(3), 411–482.

Midgley, C., Maehr, M., Hruda, L, Anderman, E., Anderman, L., Freeman, K., et al. (2000). *Patterns of Adaptive Learning Scales (PALS),* version 12. Ann Arbor, MI: University of Michigan.

National Center for Education Statistics. (n.d.). *ED School Climate Surveys: Student Survey.* Washington, DC: U.S. Department of Education, National Center for

Education Statistics. Retrieved June 28, 2017, from https://nces.ed.gov/surveys/edscls/pdf/EDSCLS_Student_Questionnaire_English.pdf.

Neild, R., & Balfanz, R. (2006). An extreme degree of difficulty: The educational demographics of the urban neighborhood high school. *Journal of Education for Students Placed at Risk, 11*(2), 123–141.

New Mexico Public Education Department. (2017). Graduation webfiles cohort 2016-Year-4 (data file). Retrieved June 28, 2017, from http://ped.state.nm.us/ped/Graduation_data.html.

Organisation for Economic Co-operation and Development. (2009). *Programme for International Student Assessment, Student Questionnaire.* Paris: Organisation for Economic Co-operation and Development.

Shechtman, N., DeBarger, A., Dornsife, C., Rosier, S., & Yarnell, L. (2013). *Promoting grit, tenacity, and perseverance: Critical factors for success in the 21st century.* Washington, DC: Office of Educational Technology, U.S. Department of Education.

Suh, S., & Suh, J. (2007). Predictors of categorical at-risk high school dropouts. *Journal of Counseling and Development, 85*(2), 196–203.

U.S. Department of Education. (n.d.). New Mexico State Snapshot (online data and graph). Washington, DC: Author. Retrieved April 26, 2017, from https://eddataexpress.ed.gov/state-report.cfm/state/NM/.

Voight, A., Austin, G., & Hanson, T. (2013). *A climate for academic success: How school climate distinguishes schools that are beating the odds.* San Francisco, CA: WestEd.

Wigfield, A., & Eccles, J. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12*(1), 265–310.

Wigfield, A., & Eccles, J. S. (2002). The development of competence beliefs and values from childhood through adolescence. In A. Wigfield & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 92–120). San Diego, CA: Academic Press.

The Regional Educational Laboratory Program produces 7 types of reports

Making Connections
Studies of correlational relationships

Making an Impact
Studies of cause and effect

What's Happening
Descriptions of policies, programs, implementation status, or data trends

What's Known
Summaries of previous research

Stated Briefly
Summaries of research findings for specific audiences

Applied Research Methods
Research methods for educational settings

Tools
Help for planning, gathering, analyzing, or reporting data or research