Imperfect Attendance:
Toward a fairer measure of student absenteeism

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Foreword by
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Foreword/Executive Summary

By Amber M. Northern and Michael J. Petrilli

For many parents and teachers, the Covid experience has confirmed at least two pieces of common sense: It's hard for kids to learn if they're not in school, and those who are in school tend to learn more.[1] Yet in some communities, the crisis persists, thanks to one of the pandemic's most pernicious effects: the surge and apparent normalization of student absenteeism, especially in the many low-income communities that have been slammed by the virus.

Nationally, one in four students was chronically absent in 2020,[2] and it's not over: 59 percent of Detroit students are on pace to fit that category in 2021–22.[3] In many parts of America, enrollment data show tens of thousands of students to be simply missing, even after accounting for increases in charter, private, and home school enrollment.[4]

A focus during the post-Covid education recovery phase, then, should be making sure students return to school. Yet our systems for measuring their attendance—and holding schools accountable for getting kids back into classrooms—are woefully inadequate.

First, most jurisdictions rely exclusively on raw attendance rates and/or chronic-absenteeism rates, both of which are highly correlated with student demographics and other factors that schools generally cannot control.[5] Nevertheless, such metrics are ubiquitous in state accountability systems, with at least thirty states and the District of Columbia having adopted student absenteeism, chronic absenteeism, or variants thereof as a "measure of school quality" under the Every Student Succeeds Act.

Second, many states and districts do a poor job of measuring attendance because they can't (or choose not to) differentiate between full-day absences and partial-day ones (as in, when students show up for some classes but not for others). Prior research shows that partial-day absenteeism in secondary school is rampant, mostly unexcused, and explains more missed classes than full-day absenteeism.[6] Part-day absences increase with each middle school grade and then rise dramatically at the transition to high school.

In short, the most widely adopted "fifth indicator" under ESSA has been framed in ways that are hopelessly broad and unfair. But why? After all, collecting detailed attendance data ought to be straightforward in the era of smart phones and live tweets. And nothing prevents states from designing more sophisticated attendance and absenteeism gauges, as they already do when it comes to test scores. Just as "value-added" calculations derived from test scores help parents and policymakers understand schools' impact on students' achievement, so too might a measure of schools' "attendance value-added" complement raw attendance or chronic-absenteeism rates by highlighting schools' actual impact on attendance—after taking students' preexisting characteristics into account. Such an approach is also fairer, as it doesn't reward or penalize schools based on the particular students they serve. But what's more important, in our view, is that if "attendance value-added" were baked into accountability systems, it might encourage more schools to embrace changes that actually boost attendance.

For instance, some schools form task forces to closely monitor attendance to catch problems early, such that three absences might raise a warning flag that triggers a parent phone call. They make home visits if parents can't be reached by email or phone. They refer students with frequent absences to the school counselor or social worker for case management and counseling, as needed. They establish homeroom periods in high school, where students remain with the same teacher all four years so that they form relationships, making it easier for the educator to monitor and discuss attendance with the child and family.

We wanted to know whether these types of efforts might be isolated and reliably measured such that schools get credit (or don't) for making them. To that end, this study examines the following:

1. **Whether conventional measures of student absenteeism reflect high school students' individual characteristics rather than high schools' effects on attendance.**

2. **Whether high schools vary in their "attendance value-added."**

3. **Whether test-based value-added and attendance value-added are correlated and how well each predicts long-run outcomes, such as postsecondary enrollments.**

4. **Whether attendance value-added correlates to students' perceptions of key facets of high school culture and climate, such as safety.**

To tackle these questions, we reached out to Jing Liu, assistant professor of education at the University of Maryland and the author of numerous studies on the causes and effects of student absenteeism. He leveraged sixteen years of administrative data (2002–03 to 2017–18) from a large and demographically diverse district in California whose attendance information included data on partial-day absences. It's worth your time to read this (fairly short) study and Jing's policy implications, but for those in a rush, here are the four key findings:

1. *Conventional student absenteeism measures tell us almost nothing about a high school's impact on students' attendance.*

2. *Like test-based value-added, attendance value-added varies widely between schools and is highly stable over time.*

3. *There is suggestive evidence that attendance value-added and test-based value-added capture different dimensions of school quality.*

4. *Attendance value-added is positively correlated with students' perceptions of school climate—in particular, with the belief that school is safe and behavioral expectations are clear.*

There's much to unpack here, but to us, four takeaways merit attention.

First, more information is better.

The message from this study isn't that schools need to stop reporting raw attendance rates and chronic absenteeism. Instead, we think a both/and rather than either/or approach is the right choice. In fact, we'd go so far as to suggest that, just as some states have two grades for schools based on test scores (one for achievement and one for growth), we should consider having two measures of attendance (chronic absenteeism and "value-added" measures, once they're vetted). [7]

In general, status measures and growth measures are apples and oranges, so it doesn't make sense to average or aggregate them. The simplicity and usefulness of a single, summative grade is lost if it doesn't serve any one purpose well.

For instance, if the purpose is to decide whether to renew a school's charter for the next five years, that decision should rest on growth-based test-score measures. But if the purpose is to understand whether students are ready for college and career, status-based measures are best. Each tell us something different. So it is with chronic-absenteeism rates and attendance value-added.

Second, better attendance measures have real-world implications for educators.

One of the reasons for measuring a school's impact on attendance is to be able to hold school staff accountable for what's under their control. Plus, we want to encourage behavior that will make it likelier that students will come to school so they can learn more. "Value-added" measures are the best way to do that. They help us gauge how well teachers and school leaders cultivate better attendance because they adjust for what teachers and principals can't influence, such as students' demographics, baseline achievement, and prior absences and suspensions. Without making these adjustments, a chronic-absenteeism rating (based on raw attendance) might make a high-poverty school look bad, even if it's actually high performing. Simply put, attendance value-added differentiates between high-poverty schools that deserve to be lauded and those that demand intervention.

Likewise, we need to worry about demotivating the teachers and principals who choose to work in high-poverty schools and may be getting unfairly penalized when, in reality, they are making progress in improving student attendance, even if the "status" measures remain unsatisfactory.

All that said, this study is the first to explore the feasibility of attendance value-added, and we need other researchers to test the measure empirically—with larger samples and in other states—before it's ready for prime time. What's more, though the study undoubtedly demonstrates the promise of attendance value-added, it also underscores the strength and utility of *test-based* value-added measures—and why we'd be foolish to move away from them.

Third, better attendance measures could help students and families make better decisions.

On average, attending a high school with high attendance value-added increases a student's attendance by twenty-eight class periods (or roughly four school days) per year. And there is suggestive evidence that high schools that do an above-average job of boosting attendance also boost postsecondary enrollment—even if the school's test-based value-added is middling.

That is to say, just as there are high-test-value-added, low-achievement schools that help students succeed, there are high-attendance-value-added, low-raw-attendance schools that do, too.

Many low-income parents face a choice between two schools with similar achievement and attendance patterns but with value-added scores that vary widely. Helping them to understand and act upon those distinctions is essential. We want parents to choose schools that are "beating the odds," and value-added measures are one good way to identify these schools.

Finally, school safety matters when it comes to student attendance.

With wonky empirical studies such as this one, practitioners understandably ask, "What do these study findings imply for my work in real schools and classrooms?"

Although we hesitate to rely too heavily on correlational evidence, we'd point to some intriguing student-survey data. They consistently show that the strongest links to attendance value-added pertain to students' sense of safety at school and their perception that the rules and behavioral expectations are clear.

In other words, staff who earnestly want to improve attendance rates should be mindful that safe schools and *coming to school* go hand in hand.

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To repeat, one in four American students was chronically absent in 2020, up from the previous rate of one out of six in 2017–18.[8] Thankfully, buildings reopened last year as educators learned to navigate the pandemic. But it's past time to get *all* our kids back in school.

Cultivating a positive school culture—one that prioritizes student engagement, safety, and high expectations—has been and always will be a key piece of the attendance puzzle. But so is developing a novel way to isolate and measure a school's impact on attendance so that the efforts (or lack thereof) of those who work there can be made visible.

That's important because better measures can inform strategies to deter those absences in the first place.

Introduction

It's no secret that kids who aren't in school don't learn as much. Everyday experience and systematic research suggest that student absenteeism negatively impacts both short-run academic achievement and long-run outcomes such as high school graduation and college enrollment.[9] "Chronic absenteeism," commonly defined as missing at least 10 percent of a school year (or about eighteen days), is widely accepted as a leading indicator of academic peril. At least thirty states and the District of Columbia have adopted student absenteeism, chronic absenteeism, or variants thereof as a "measure of school quality" under the Every Student Succeeds Act.

> **The need to understand how and why schools affect student attendance has never been greater.**

Yet, despite the central role that student absenteeism plays in educational effectiveness and policy, little is known about the extent to which schools actually influence students' attendance (or the likely academic benefits of enrolling in a school that succeeds on this front). Recent studies have found that individual teachers can have a significant effect on student attendance.[10] But it's likely that schools also impact attendance through mechanisms such as creating a culture of attendance, connecting with parents, and ensuring students' physical safety, despite the fact that some principal determinants of a schools' attendance rate—such as students' home lives, access to transportation, and physical health—are largely beyond the control of educators.

As American education slowly emerges from yet another Covid-induced wave of school closures and quarantines, the need to understand how and why schools affect student attendance has never been greater. Accordingly, this study breaks new ground by using a value-added framework to examine high schools' contributions to attendance after accounting for individual students' prior attendance rates and other observable characteristics. In other words, it seeks to gauge schools' "attendance value-added."

With test-based value-added as a reference point, the study also evaluates the validity of this new indicator of school quality by quantifying its stability, impacts on short-term and long-term outcomes, and links to students' perceptions of school climate.

Specifically, the study answers the following research questions:

1. *To what extent do conventional measures of student absenteeism reflect high school students' individual characteristics as opposed to high schools' effects on attendance?*

2. *To what extent do high schools vary in their "attendance value-added"? And how much does a typical high school's attendance value-added vary over time?*

3. *How strongly correlated are test-based and attendance value-added? And how well do each of these measures predict long-run outcomes such as postsecondary enrollment?*

4. *How strongly does attendance value-added correlate to students' perceptions of various dimensions of high school culture and climate (e.g., safety)?*

Background

Like its test scores, a school's raw attendance rate often reflects the challenges its students face outside of school rather what happens within it. For example, a number of studies have found that minority, low-income, and low-achieving students accrue more absences than their White, high-income, and high-achieving peers.[11] Thus, if the goal is to hold schools accountable for what's under their control—and shine a light on those that succeed in promoting attendance—it is critical to account for students' demographics and educational histories.

One previous study evaluated school performance by using absenteeism (along with many other non-test-score student outcomes) using a value-added framework;[12] however, it focused on full-day absenteeism, meaning that it failed to capture partial-day absenteeism (e.g., coming to school on time but skipping sixth period), which other research suggests accounts for at least half of lost instructional time at the secondary level.[13] Failing to account for these additional absences could lead to biased estimates of schools' impacts, especially when partial-day absenteeism is more prevalent in some schools than others. Hence the present study's focus on the total number of *classes* that a student misses rather than the total number of *days* that he or she is absent (or his or her chronic-absenteeism status).

Test-based value-added, which is a well-established measure of school quality, is a useful benchmark for "attendance value-added" insofar as it helps us understand whether the latter provides similarly useful information. And linking both measures to students' long-run outcomes can help unpack the complex mechanisms through which schools contribute to student success.

Data and Sample

This study uses sixteen years of administrative data (2002–03 to 2017–18) from a large and demographically diverse urban school district in California that serves approximately 60,000 students each year.[14] This dataset is unique in that it contains student attendance records for each class, allowing for a highly precise measure of student absenteeism.[15] It also includes detailed information on students' gender, race/ethnicity, special-education status, English-language-learner status, discipline histories, math and English language arts (ELA) test scores, grade point average (GPA), and residential addresses (which enable the derivation of neighborhood characteristics)—plus several long-term outcomes, including measures of college enrollment (collected from the National Student Clearinghouse).

Three years of student self-reported school culture and climate survey data (for 2015–16 to 2017–18) are used to examine the associations between attendance value-added and various dimensions of school climate. The survey contains four main constructs, including "climate of support for academic learning," "sense of belonging," "knowledge and fairness of discipline rules and norms," and "sense of safety"; however, for the purposes of this analysis, the two subconstructs that comprise the "knowledge and fairness of discipline rules and norms" constructs ("Rule Clarity" and "Respectful and Fair") are analyzed separately (for a detailed description of the survey items, see Appendix C).

> **This dataset is unique… allowing for a highly precise measure of student absenteeism.**

The analytic sample includes 58,125 ninth-grade students[16] who attended a total of twenty regular high schools between 2002–03 and 2017–18.[17] Of the students in this group, 50 percent were Asian, 23 percent were Hispanic, 11 percent were Black, and 9 percent were White. On average, students missed seventy-nine class periods annually or roughly eleven school days (for more descriptive statistics, see Table B1).

Methodology

A high school's attendance value-added is constructed based on the total number of class periods that its school's ninth graders missed in a given school year. To isolate a high school's contribution to ninth-grade attendance in a given school year, the model controls for a rich set of student demographics and prior outcomes, including gender, age, race/ethnicity, English-language-learner status, special-education status, neighborhood conditions, prior achievement, prior suspensions, and prior absences, as well as time-varying school-level covariates that correspond to the individual-level covariates. To avoid mechanical endogeneity in the long-run analysis, we use "leave-year-out" estimates which give additional weight to value-added attendance in more recent years for a given school, and a weighting method to account for the "drift" of school effects (meaning they might fluctuate over time).

We estimate test-based value-added scores using essentially the same methodology. To make attendance- and test-based value-added scores commensurable, both variables were standardized, and attendance value-added was reverse coded (for more technical details, see [Appendix A](#)).

Findings

Finding 1: Conventional student-absenteeism measures tell us almost nothing about a high school's impact on students' attendance.

On average, high schools that serve large proportions of low-income students have much higher absenteeism and chronic-absenteeism rates than those that serve more affluent students (Figure 1). And a similar pattern also emerges for other demographic characteristics, such as the percentage of students who are White, Black, or Hispanic (see Appendix B, Table B2).
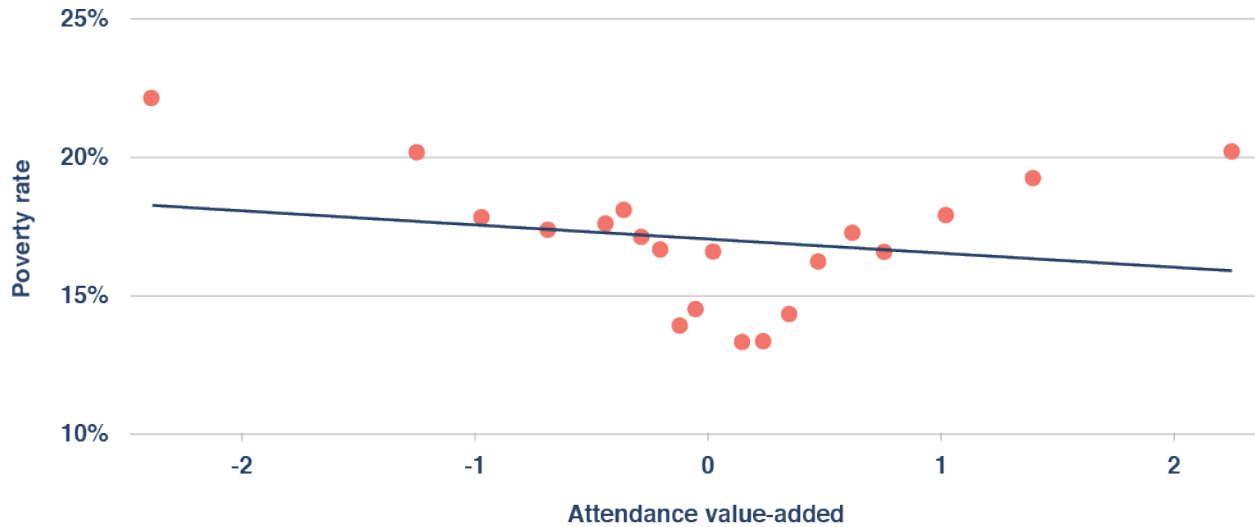
Figure 1. On average, high-poverty schools have much higher rates of absenteeism.
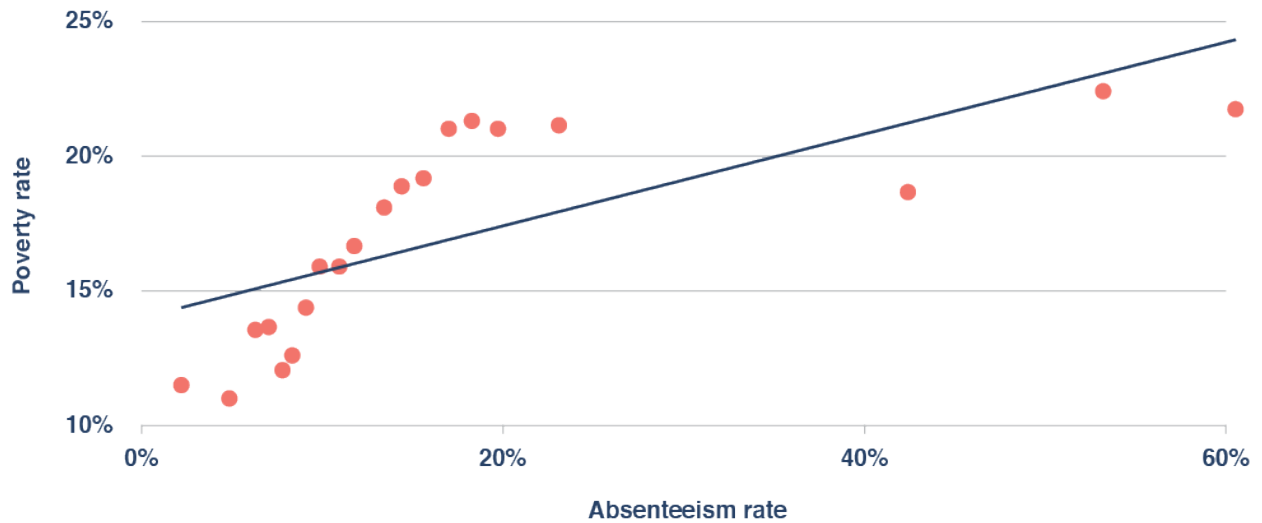
Note: Absenteeism rate is the percentage of all class periods that a high school's ninth-grade students were absent in a given school year. A high school's poverty rate is the average of its ninth-grade students' neighborhood poverty rate. r= 0.381, p= 0.000

In contrast, because "attendance value-added" takes students' demographic characteristics and attendance histories into account, it isn't significantly correlated with a school's poverty rate (Figure 2), nor is it significantly correlated with most other demographic characteristics of high schools (see Appendix B, Table B2).

Figure 2. There is no significant relationship between a school's poverty rate and its attendance value-added.

Note: Attendance value-added is standardized to be mean zero and unit variance. A high school's poverty rate is the average of its ninth-grade students' neighborhood poverty rate. r= -0.102, p= 0.127

Finally, the correlation between a school's attendance value-added and its overall absenteeism rate is quite small, as is the correlation between a school's attendance value-added and its chronic-absenteeism rate (Figure 3A-B).

Figure 3A-B. Conventional absenteeism measures tell us almost nothing about a school's effects on attendance.
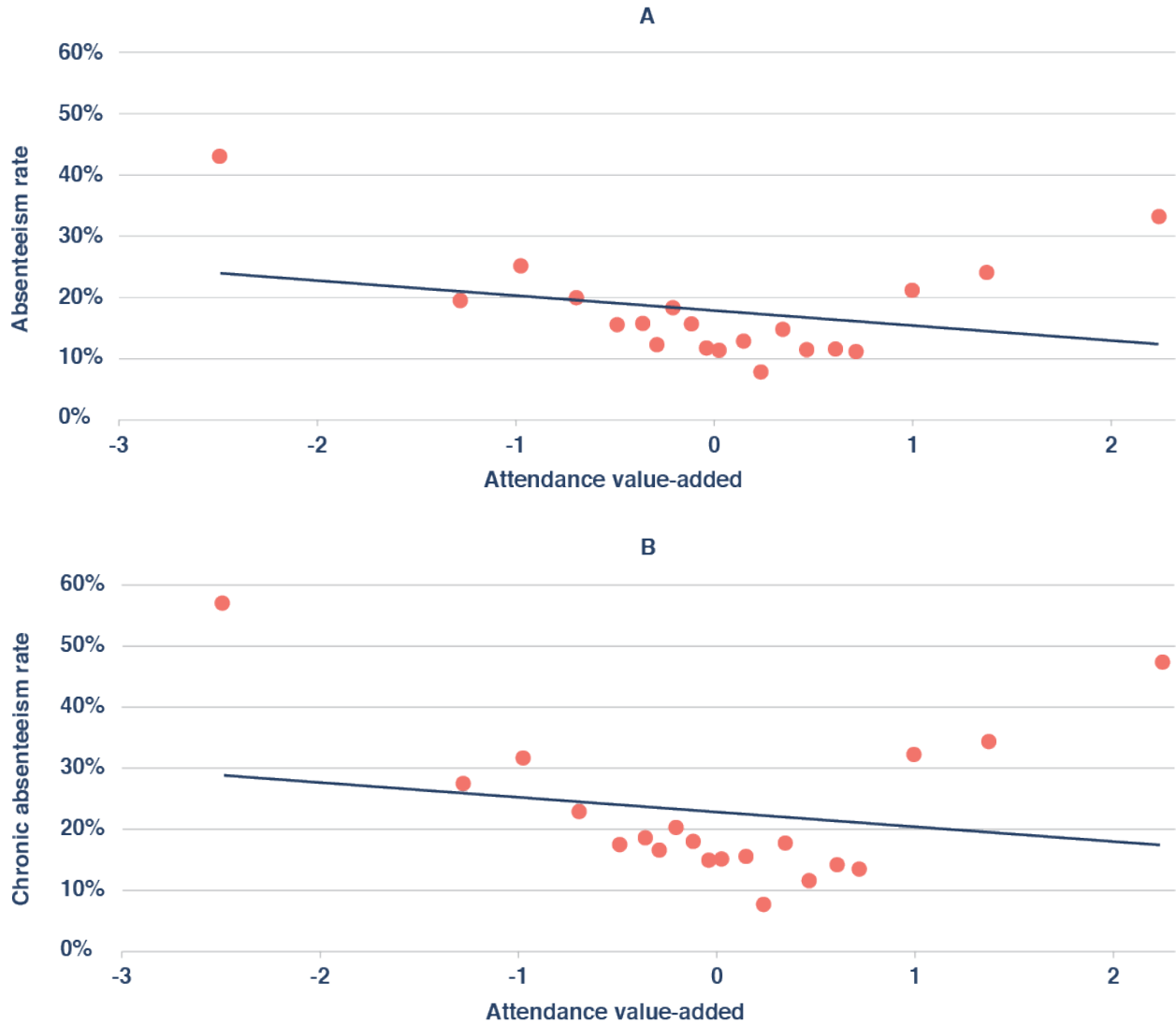
*Note: Absenteeism rate is the percentage of all class periods that a high school's ninth-grade students were absent in a given school year. Chronic-absenteeism rate is the percentage of ninth-grade students who missed at least eighteen days of school in a given school year. Attendance value-added is standardized to be mean zero and unit variance. Figure 3A: r= -0.087, p= 0.175. Figure 3B: r= -0.106, p= 0.098*

In other words, conventional absenteeism measures tell policymakers almost nothing about a high school's effect on attendance. So if the goal is to hold schools accountable for things that are under their control, these measures are both uninformative and unfair to high-poverty schools—just like raw proficiency rates and other test-based measures that fail to capture a school's value-added.

Finding 2: Like test-based value-added, attendance value-added varies widely between schools and is highly stable over time.

On average, attending a high school with high attendance value-added increases a student's attendance by twenty-eight class periods (or roughly four school days) per year (Figure 4). Relative to the variation in attendance and achievement that is observed at the student level, the magnitude of this effect is somewhat larger than the magnitude of an above-average school's effect on its students' ELA and math test scores.

Figure 4. Attending a high school with high attendance value-added significantly reduces the average student's absenteeism rate.
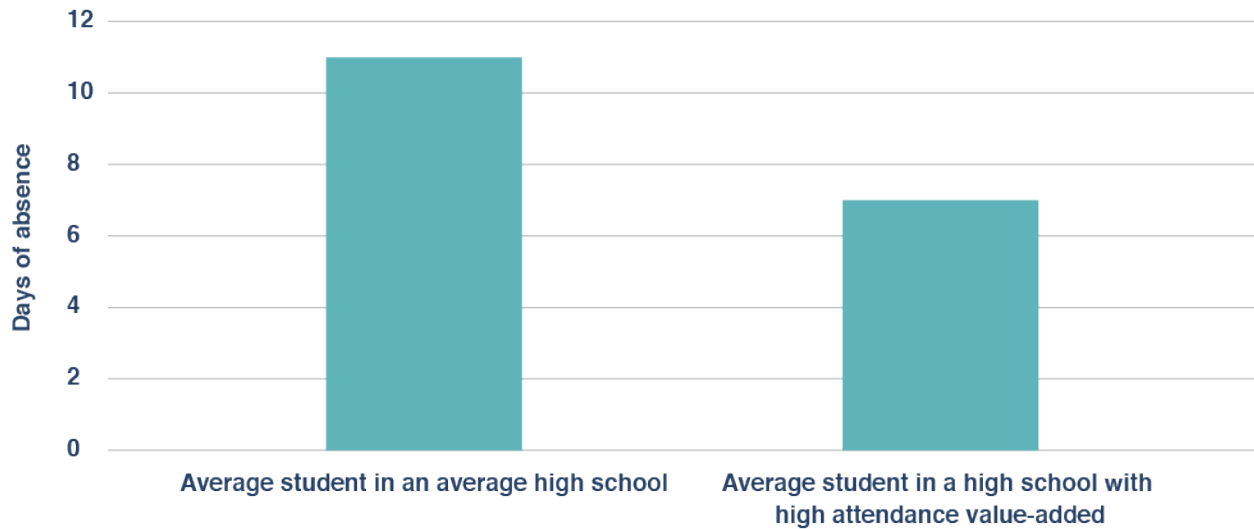
Note: "Days of absence" is calculated by dividing the number of class periods that the average ninth-grade student missed in the average school year by seven (i.e., the number of periods in the average school day).

Similarly, the average correlation between a school's attendance value-added in one year and its attendance value-added in the following year is 0.878, while the year-to-year correlation for test-based value-added is 0.774. In other words, attendance value-added is actually more stable than test-based value-added (Figure 5A-B).

Figure 5A-B. Attendance value-added exhibits even greater year-to-year stability than test-based value-added.
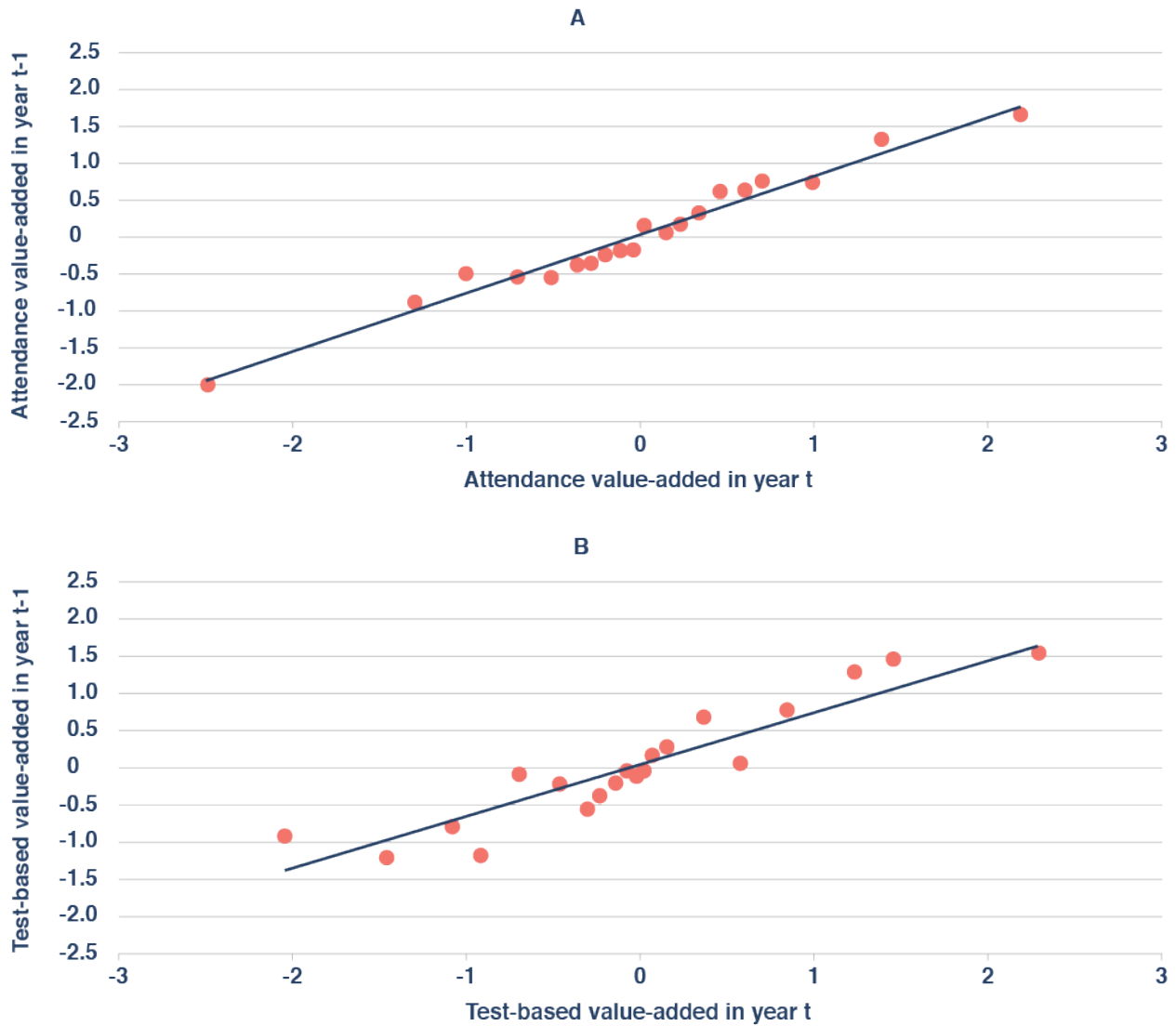
A

B

Note: Both attendance value-added and test-based value-added are standardized to be mean zero and unit variance. Figure 5A: r= 0.878, p= 0.000. Figure 5B: r= 0.774, p= 0.000

Finding 3: There is suggestive evidence that attendance value-added and test-based value-added capture different dimensions of school quality.

Perhaps surprisingly, attendance value-added is weakly correlated with test-based value-added at the school level (Figure 6). Moreover, each of these measures is only predictive over its own domain: that is, attendance value-added offers 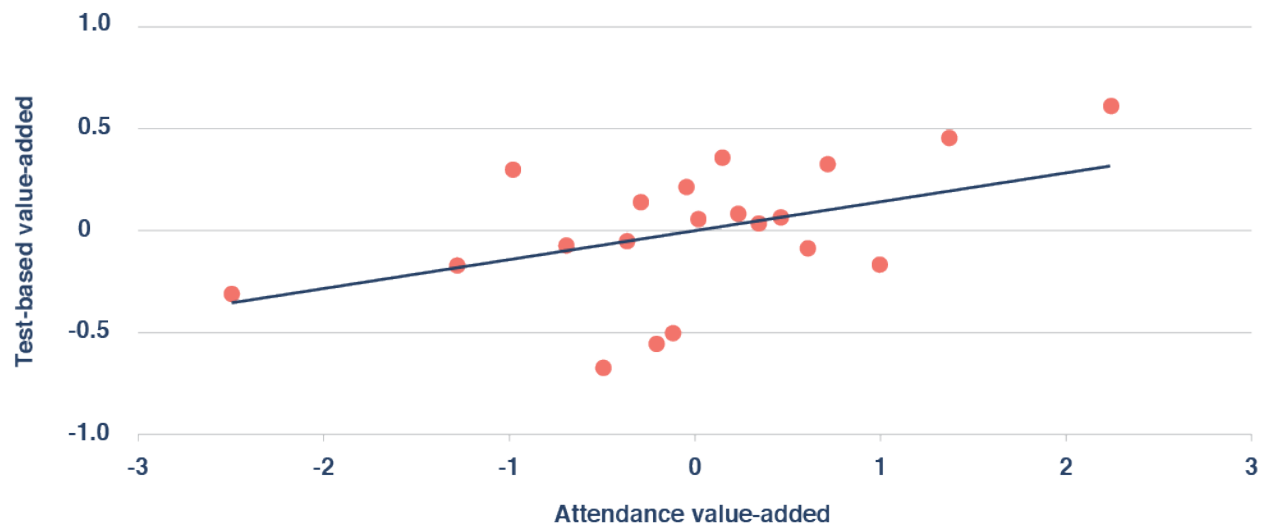no additional information about a school's impact on student achievement conditional on test-based value-added, and test-based value-added offers no additional information about a school's impact on attendance conditional on attendance value-added (see Appendix B, Table B4).

Figure 6. Attendance value-added is weakly correlated with test-based value-added.

Note: Both attendance value-added and test-based value-added are standardized to be mean zero and unit variance. r= 0.142, p= 0.026

In addition to this disconnect, there is also suggestive evidence that high schools with above-average attendance value-added boost postsecondary enrollment—even if their test-based value-added is average (Figure 7). For example, there is suggestive evidence that attending a high school with high attendance value-added increases a ninth grader's probability of attending a four-year college by 1.7 percentage points (for context, attending a high school with high test-based value-added but average attendance value-added boosts four-year college attendance by 2.2 percentage points).

Figure 7. Evidence suggests that attending a high school with high attendance value-added boosts postsecondary enrollment.
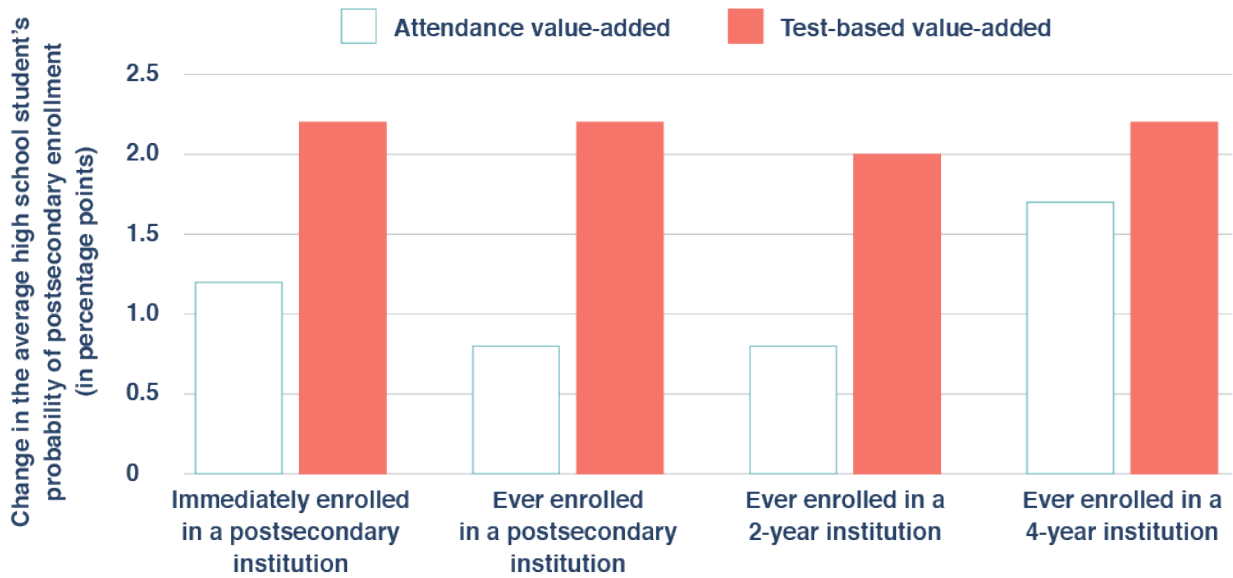
Note: Coefficients come from models that include both attendance value-added and test-based value-added. Both value-added scores are standardized to be mean zero and unit variance. Solid bars show correlations that are significant at the 95 percent confidence level. Empty bars show correlations that are not significant at conventional levels. For technical details, please see Appendix B, Table B5.

Collectively, these results *suggest* that attendance value-added captures some dimensions of school quality that are not captured by test-based value-added; however, additional research (with larger samples) is needed to clarify this point and to establish more conclusively that attendance value-added significantly predicts long-term outcomes.

Finding 4: Attendance value-added is positively correlated with students' perceptions of school climate—and, in particular, with the belief that school is safe and behavioral expectations are clear.

Of the five aspects of school climate that are included in the district's school-climate survey, attendance value-added is most strongly correlated with the sense of safety that students feel at school and the clarity of rules and expectations related to student behavior—though it's also significantly correlated with students' sense of belonging, their perceptions of academic support, and their belief that student-adult relationships are respectful. In contrast, neither test-based value-added nor a school's raw absenteeism rate (i.e., the total number of classes missed by the average student) is significantly correlated with any of the five constructs reported by students (Figure 8).

Figure 8. Unlike test-based value-added and raw attendance, attendance value-added is significantly correlated with several dimensions of school climate.
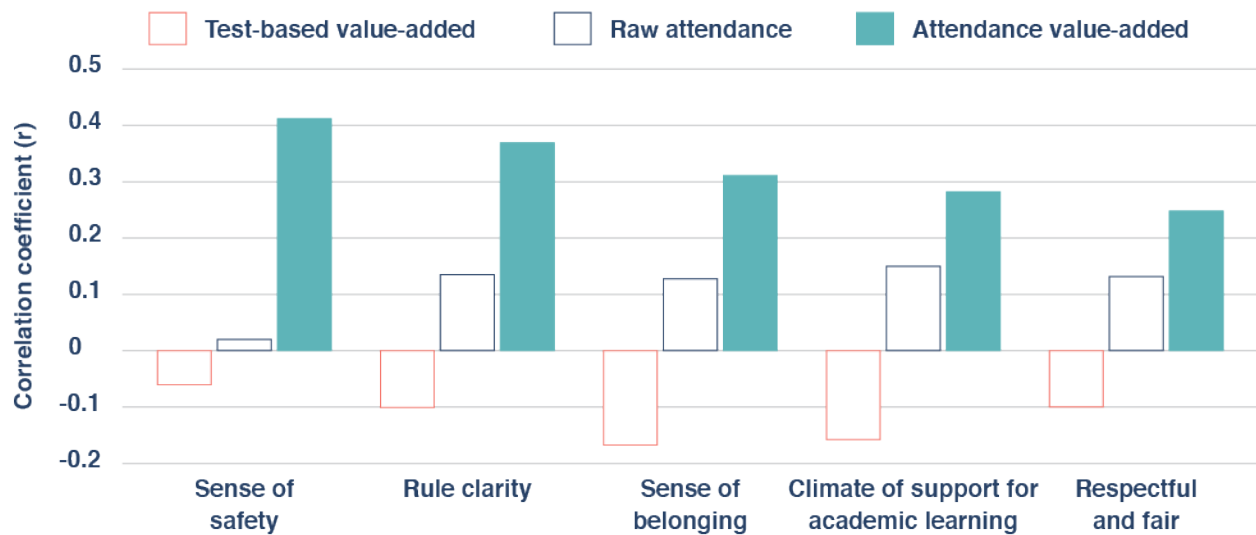
Note: Solid bars show correlations that are significant at the 95 percent confidence level. Empty bars show correlations that are not significant at conventional levels.

At a more granular level, attendance value-added has meaningful correlations with several individual survey items touching on various aspects of school climate, including the perception that "teachers give students a chance to take part in classroom discussions" and that "the teachers at this school treat students fairly"; however, the single item that correlates most strongly to attendance value-added is, again, students' feelings of safety (Figure 9).

Figure 9. Attendance value-added is significantly correlated with a diverse collection of individual survey items.

Note: Solid bars show correlations that are significant at the 95 percent confidence level. Striped bars show correlations that are significant at the 90 percent confidence level. Empty bars show correlations that are not significant at conventional levels.

*All item responses map to a Likert scale that ranges from strongly disagree to strongly agree, except for the first item, which has a Likert scale that ranges from very unsafe to very safe.

Implications

1. Using raw student-absenteeism measures in accountability systems likely imparts credit or penalty to schools that don't deserve it.

As the findings make clear, some schools do a better job of getting students to come to class regularly. Yet many of these schools are overlooked by states' existing accountability systems—even as others are rewarded for habits and circumstances that students developed before their arrival. To be clear, there are good reasons to report schools' raw attendance and chronic-absenteeism rates, which are transparent, parent-friendly, and crucial to understanding the depth of the problem. But if the goal is to hold schools or educators accountable for things they can control or help parents understand if their child's attendance is likely to improve, then raw attendance rates are unfair and uninformative (and the same is also true of *any* non-test-based indicator that fails to account for the things *students* bring to school).

2. States and districts with the requisite resources should explore "attendance value-added" measures to better understand schools' and teachers' effects on attendance.

Per the findings, there is suggestive evidence that students see long-term benefits from attending high schools with high attendance value-added, even if their raw attendance rates, test scores, and test-based value-added are average. Broadly speaking, this evidence is consistent with an emerging literature that suggests that effective schools contribute to students' success through the cultivation of noncognitive and/or socioemotional as well as academic skills.[18] Accordingly, states and other jurisdictions should consider developing their own measures of attendance value-added. That will, of course, entail the collection of precise and detailed attendance data while minimizing the potential for gaming and misreporting.

3. Schools and districts that are seeking to boost their attendance rates in the wake of the pandemic should remember that many students prioritize safety and order.

It is notable that the strongest correlates of "attendance value-added" at the high school level are students' feelings of safety and order—or, more specifically, their sense that rules and behavioral expectations are clear—consistent with prior research on school climate[19] (for example, 7 percent of Black teens report avoiding school activities or classes because of "fear of attack or harm").[20] Meanwhile, surveys of educators suggest that student absences have doubled as a result of remote learning and have remained elevated, along with various forms of misbehavior—even as students have returned to in-person instruction.[21] As they continue to do so, policymakers and educators must continue to focus on reengaging students, ensuring that school is a safe place, and combating the sadly rejuvenated scourge of chronic absenteeism. Left unaddressed, its implications for American youth and society are troubling indeed.

Appendix A: Empirical methods

Estimating school value-added to attendance

To isolate a school's contribution to student attendance, I need to compare ninth graders' yearly total absences in the focal school to similar students attending other schools. Following Jackson et al. (2020), I model total missed class periods for student i in school j in year t as a function of both student characteristics Z_{ijt}, including basic demographics, prior achievement, prior suspensions, prior absences, neighborhood conditions, and other personal traits such as special-education status (for detailed descriptive statistics on these variables, see Table B1). I also control for school-level student characteristics by getting averages of all the student traits mentioned above. The model is written as follows:

$$abs_{ijt} = \beta Z_{ijt} + v_{ijt} \qquad (1)$$

where $v_{ijt} = \theta_{jt}^{VA} + \varepsilon_{ijt}$. θ_j^{VA} would be the value-added of school j's contribution to student attendance in year t. If using $\hat{v}_{ijt}$ to indicate individual-level residuals after accounting for the aforementioned rich set of student characteristics, school's contribution to student attendance can be estimated as

$$\hat{\theta}_{jt}^{VA} = \sum_{i \in it}^{jt} \left(\hat{v}_{ijt} \right)/N_{jt} \qquad (2)$$

where N_{jt} indicates total ninth graders in school j in year t. $\hat{\theta}_{jt}^{VA}$ would be an unbiased estimate of school value-added to attendance in year t if it does not correlate with any unobserved student characteristics that affect student absenteeism.

Estimating school value-added to achievement

I use the same model as above to estimate school value-added to achievement. As I can observe both math and ELA test scores for students, I combine both into one measure to simplify the analysis. I first standardize test scores in each subject to have mean of zero and a standard deviation of one. Then I compute the average of math and ELA scores for each student as a composite measure for achievement. I also conduct the analysis using math and ELA test scores separately, and the results are consistent with this composite-score approach.

Leave-year-out estimates

For the analysis of how value-added scores predict student short- and long-run outcomes, I follow Chetty et al. (2014) and Jackson (2020) by using "leave-year-out" estimates to avoid mechanical endogeneity and a weighting method to account for the "drift" of school effects. Specifically, when forecasting the value-added score for school j in year t, I predict this value by using value-added scores for the same school in other years but giving more weight to adjacent years than years that are further away from year t.

Appendix B: Additional tables

Table B1. Descriptive statistics

	Student level		School-year level	
School years 2003–18	Mean	SD	Mean	SD
Black	0.106		0.169	(0.12)
Hispanic	0.229		0.321	(0.18)
Asian	0.495		0.345	(0.21)
White	0.086		0.081	(0.10)
Other race/ethnicity	0.083		0.084	(0.04)
Female	0.482		0.472	(0.08)
Special education	0.105		0.135	(0.07)
Gifted	0.259		0.174	(0.16)
Median HH income	70301.501	(26260.66)	66788.031	(8633.60)
% of 25+ with BA+	39.284	(18.24)	37.145	(7.29)
Math test score (standardized)	0.084	(1.01)	−0.324	(0.54)
ELA test score (standardized)	0.068	(1.00)	−0.317	(0.64)
Days suspended	0.179	(1.05)	0.337	(0.41)
Total missed class meetings	78.650	(116.67)	111.805	(73.26)
Full-day absences	7.128	(14.10)	13.593	(12.67)
Chronic-absenteeism rate	0.106		0.227	(0.23)
Observations	58125		244	
School years 2003–12				
Graduate from high school	0.744		0.587	(0.25)
Ever enrolled in college	0.656		0.498	(0.24)
Ever enrolled in four-year college	0.472		0.328	(0.22)
Ever enrolled in two-year college	0.444		0.351	(0.15)
Observations	42480		171	

Note: Data are from all ninth graders attending the district during 2002–03 to 2017–18 (excluding school year 2013–14 due to data-quality issues). Chronic absenteeism is defined as missing at least 10 percent of full school days.

Table B2. Correlations between school characteristics and three measures of school absenteeism

	VA to attendance		Average missed classes		Average missed days		Chronic-absenteeism rate	
	rho	p	rho	p	rho	p	rho	p
Share of Black students	−0.031	0.630	0.614	0.000	0.610	0.000	0.670	0.000
Share of Hispanic students	0.119	0.065	0.338	0.000	0.405	0.000	0.417	0.000
Share of Asian students	−0.085	0.188	−0.451	0.000	−0.571	0.000	−0.589	0.000
Share of White students	0.008	0.906	−0.360	0.000	−0.199	0.002	−0.258	0.000
Avg suspension	−0.054	0.408	0.476	0.000	0.390	0.000	0.379	0.000
Avg math test scores	−0.030	0.646	−0.580	0.000	−0.626	0.000	−0.650	0.000
Avg ELA test scores	−0.010	0.876	−0.526	0.000	−0.528	0.000	−0.567	0.000
Avg neighborhood income	0.092	0.173	−0.578	0.000	−0.499	0.000	−0.544	0.000
Avg neighborhood poverty rate	0.037	0.588	−0.381	0.000	−0.260	0.000	−0.297	0.000
Avg neighborhood BA degrees	−0.102	0.128	0.649	0.000	0.576	0.000	0.624	0.000

Note: This table shows correlations of school-level measures on student demographics, prior test scores, and prior suspensions and three alternative measures on school absenteeism. The "average missed classes" item accounts for all class meetings missed by students. The "average missed days" item accounts for full school days students missed and does not include class meetings missed on days when student attend some classes. Chronic absenteeism is defined as missing at least eighteen full school days.

Table B3. Correlations of three measures of school absenteeism

	VA to attendance	Average missed classes	Average missed days	Chronic-absenteeism rate
VA to attendance	1.000			
Average missed classes	−0.386	1.000		
	(0.000)			
Average missed days	−0.087	0.791	1.000	
	(0.175)	(0.000)		
Chronic-absenteeism rate	−0.106	0.807	0.970	1.000
	(0.098)	(0.000)	(0.000)	

Note: This table shows Pearson correlations at the school-year level. Standard errors are in parentheses. The chronic-absenteeism rate is the percentage of students in a given school year who missed at least 10 percent of total school days. The "average missed classes" item accounts for all class meetings missed by students. The "average missed days" item accounts for full school days students missed and does not include class meetings missed on days when student attend some classes. Chronic absenteeism is defined as missing at least eighteen full school days.

Table B4. Effects of VA to attendance and VA to achievement on short-run student outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
	Total missed class meetings			Test scores		
VA to attendance	−0.227**		−0.229**	0.032		0.005
	(0.013)		(0.014)	(0.020)		(0.017)
	[0.000]		[0.000]	[0.181]		[0.780]
VA to achievement		−0.038+	0.003		0.057**	0.056**
		(0.021)	(0.009)		(0.014)	(0.016)
		[0.134]	[0.773]		[0.007]	[0.060]
Observations	39690	39690	39690	36601	36601	36601
R2	0.454	0.438	0.454	0.705	0.707	0.707

Note: Standard errors clustered at school level are in parentheses. Will bootstrap p values are in brackets. Each column comes from a separate regression. VA to attendance and VA to achievement are standardized "leave-year-out" estimates that account for drift. All models use controls that are identical to the model used in estimating VA scores, including student demographics, neighborhood characteristics, lagged test scores, lagged absences, lagged suspensions, and school-level covariates on all these measures.
*** p < 0.01; ** p < 0.05; and *p < 0.1.

Table B5. Attendance value-added, test-based value-added, and long-run outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
	Immediately enrolled			Ever enrolled		
VA to attendance	0.022*		0.012	0.017+		0.007
	(0.010)		(0.008)	(0.009)		(0.007)
	[0.073]		[0.212]	[0.126]		[0.360]
VA to achievement		0.024**	0.022**		0.024**	0.022**
		(0.004)	(0.004)		(0.004)	(0.004)
		[0.006]	[0.008]		[0.005]	[0.007]
Observations	36420	36420	36420	36420	36420	36420
r2	0.321	0.322	0.322	0.313	0.315	0.315
	Ever enrolled in two-year college			Ever enrolled in four-year college		
VA to attendance	0.016+		0.007	0.028*		0.018
	(0.009)		(0.008)	(0.012)		(0.011)
	[0.179]		[0.423]	[0.077]		[0.198]
VA to achievement		0.021**	0.020**		0.025**	0.022**
		(0.007)	(0.007)		(0.004)	(0.004)
		[0.006]	[0.039]		[0.000]	[0.001]
Observations	36,420	36,420	36,420	36,420	36,420	36,420
r2	0.090	0.091	0.091	0.385	0.386	0.386

Note: Standard errors clustered at school level are in parentheses. Will bootstrap p values are in brackets. Each column comes from a separate regression. VA to attendance and VA to achievement are standardized "leave-year-out" estimates that account for drift. All models use controls that are identical to the model used in estimating VA scores, including student demographics, neighborhood characteristics, lagged test scores, lagged absences, lagged suspensions, and school-level covariates on all these measures.
*** p< 0.01, ** p<0.05, and *p<0.1.*

Table B6. Correlations between school-climate survey constructs and/or items and attendance value-added, test-score value-added, and average missed classes

Construct level						
	(1)		(2)		(3)	
	Attendance VA		Test-score VA		Avg missed classes	
Construct	rho	p	rho	p	rho	p
Sense of safety	0.412	0.002	−0.061	0.660	0.020	0.883
Rule clarity	0.369	0.024	−0.101	0.551	0.135	0.426
Sense of belonging—school connectedness	0.311	0.021	−0.168	0.220	0.128	0.350
Climate of support for academic learning	0.282	0.091	−0.158	0.352	0.150	0.376
Respectful and fair	0.248	0.068	−0.100	0.469	0.132	0.335
Individual item level						
	(1)		(2)		(3)	
	Attendance VA		Test-score VA		Avg missed classes	
Item	rho	p	rho	p	rho	p
How safe do you feel when you are at school?	0.412	0.002	−0.061	0.660	0.020	0.883
Teachers give students a chance to take part in classroom discussions or activities.	0.372	0.005	−0.135	0.325	0.239	0.079
The teachers at this school treat students fairly.	0.339	0.011	−0.132	0.338	0.135	0.326
I am happy to be at this school.	0.276	0.042	−0.145	0.290	0.319	0.018
My teachers work hard to help me with my schoolwork when I need it.	0.276	0.041	−0.103	0.456	−0.041	0.766
Students know what the rules are.	0.267	0.049	−0.145	0.291	0.445	0.001
I feel close to people at this school.	0.266	0.049	−0.080	0.563	−0.245	0.072
All students are treated fairly when they break school rules.	0.260	0.055	−0.150	0.274	0.207	0.129
The school rules are fair.	0.259	0.056	−0.026	0.852	−0.060	0.665
Rules in this school are made clear to students.	0.256	0.059	−0.123	0.373	0.434	0.001
Adults at school encourage me to work hard so I can be successful in college or at the job I choose.	0.229	0.093	−0.188	0.169	0.378	0.004
This school is a supportive and inviting place for students to learn.	0.193	0.158	−0.158	0.249	0.286	0.034
I feel safe in my school.	0.180	0.189	−0.140	0.306	0.435	0.001
I feel like I am part of this school.	0.169	0.216	−0.206	0.132	0.211	0.122
Adults at this school treat all students with respect.	0.121	0.378	−0.137	0.317	0.185	0.177
This school promotes academic success for all students.	0.116	0.495	−0.206	0.222	0.041	0.812
Teachers go out of their way to help students.	0.108	0.433	−0.088	0.523	0.277	0.040

All item responses map to a Likert scale that ranges from strongly disagree to strongly agree except for the first item under "Individual item level," which has a Likert scale that ranges from very unsafe to very safe.

Appendix C: School-climate survey

Construct and definition	Student items
Climate of support for academic learning Students and teachers feel that there is a climate conducive to learning and that teachers use supportive practices, such as encouragement and constructive feedback; varied opportunities to demonstrate knowledge and skills; support for risk-taking and independent thinking; atmosphere conducive to dialog and questioning; academic challenge; and individual attention to support differentiated learning.	*How strongly do you agree or disagree with the following statements about your school?* *[Strongly Disagree, Disagree, Neither Disagree nor Agree, Agree, Strongly Agree]* • Adults at school encourage me to work hard so I can be successful in college or at the job I choose. • My teachers work hard to help me with my schoolwork when I need it. • Teachers give students a chance to take part in classroom discussions or activities. • Teachers go out of their way to help students.
Sense of belonging—school connectedness A positive sense of being accepted, valued, and included, by others (teacher and peers) in all school settings. Students and parents report feeling welcome at the school.	*How strongly do you agree or disagree with the following statements?* *[Strongly Disagree, Disagree, Neither Disagree nor Agree, Agree, Strongly Agree]* • I feel close to people at this school. • I am happy to be at this school. • I feel like I am part of this school. • The teachers at this school treat students fairly.
Knowledge and fairness of discipline, rules, and norms Clearly communicated rules and expectations about student and adult behavior, especially regarding physical violence, verbal abuse or harassment, and teasing, and clear and consistent enforcement and norms for adult intervention.	*How strongly do you agree or disagree with the following statements?* *[Strongly Disagree, Disagree, Neither Disagree nor Agree, Agree, Strongly Agree]* *Five-item scale (rule clarity)* • This school clearly informs students what would happen if they broke school rules. • Rules in this school are made clear to students. • Students know how they are expected to act. • Students know what the rules are.

	Four-item scale (respectful and fair)
	• Adults at this school treat all students with respect.
	• Students treat teachers with respect.
	• The school rules are fair.
	• All students are treated fairly when they break school rules.

Sense of safety
 	
Students and adults report feeling safe from verbal abuse, teasing, or exclusion by others in the school.
	• *How safe do you feel when you are at school?*
	[Very Safe, Safe, Neither Safe nor Unsafe, Unsafe, Very Unsafe]
	
	During the past 12 months, how many times on school property have you …
	[0 Times, 1 Time, 2 or 3 Times, 4 or More Times]
	Six-item scale (bullying)
	    • Been pushed, shoved, slapped, hit, or kicked by someone who wasn't just kidding around?
	    • Had mean rumors or lies spread about you?
	    • Had sexual jokes, comments, or gestures made to you?
	    • Been made fun of because of your looks or the way you talk?

Endnotes

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[14] At the suggestion of district leaders, we exclude data from 2013–14, when the district's transition to a new attendance-tracking system caused some data-quality issues.

[15] Before the school year 2013–14, teachers used a paper scantron to mark a student as absent, tardy, or present in each class; however, starting in 2014–15, the district transitioned to an electronic system called Synergy in which teachers use an electronic tablet to track each student's class-attendance information in real time. Conversations with several district leaders suggest that data quality in the transition year (2014–15) was low due to the rolling out of the new system. Accordingly, that school year is omitted when estimating school value-added to attendance.

[16] To ensure that each school in the sample has enough observations for both cross-sectional and longitudinal analysis, schools that have fewer than five years of data, and school years that have fewer than ten students are dropped.

[17] Because they serve a very different population of students, the special-education schools in the district are not included in the analysis.

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