

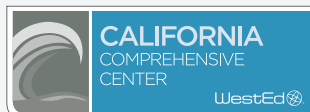


A Climate for Academic Success

Full
Report

→ How School Climate Distinguishes Schools That Are Beating the Achievement Odds

Adam Voight | Gregory Austin | Thomas Hanson



A Climate for Academic Success

How School Climate Distinguishes Schools That Are Beating the Achievement Odds (Full Report)

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Executive Summary

The goal of this study is to determine what makes successful schools different from other schools. Rather than define success in absolute terms—such as the percentage of students who are proficient on a standardized test—this study’s definition is based on whether or not a school is performing *better than predicted* given the characteristics of the students it serves. Using data from over 1,700 California public middle and high schools, 40 schools were identified that consistently performed better than predicted on standardized tests of math and English language arts achievement. These schools were labeled “beating-the-odds” (BTO) schools.

A previous study using this definition of success found that personnel resources—such as the education, experience, and roles of staff—did not help distinguish successful from unsuccessful schools. The current study looks at the relationship between school climate and success, as measured by the California Healthy Kids Survey. The measure includes such dimensions of the school environment as safety, academic supports, social relationships, and school connectedness. A positive school climate has been associated with higher academic achievement and healthy behavioral outcomes for students.

The results of this study show that BTO schools had substantially more positive levels of school climate than other schools. BTO schools had climate scores at the 82nd percentile, on average, whereas other schools were at the 49th percentile, on average. Differences in school climate were twice as large between BTO schools and 20 schools that were consistently performing worse than expected (“chronically underperforming”).

These differences were attenuated, but remained large and significant, even after adjusting for schools’ student characteristics and personnel resources. In other words, school climate distinguished BTO schools from non-BTO schools that served the same types of students and had the same types of staff. Furthermore, school climate was more strongly associated with the likelihood of beating the odds than student demographics or personnel resources.

This study adds to the growing body of evidence suggesting that school climate is an important factor for school success. The study builds on the school effectiveness and school climate literature by examining not only if there is an association between climate and achievement—as previous research has done—but by examining if school climate helps understand how a subset of schools is consistently able to beat the odds and perform better than its peers.

School climate is a malleable factor that schools or districts are able to manipulate. Expansion of programs designed to improve school climate could result in increased success for a broader number of schools. School climate may be part of the solution to helping schools beat the odds.

Chapter 1. Introduction and Overview

Introduction

Amid a national education narrative fraught with themes of dropout factories and failing schools, the search for successful public schools and turnaround strategies has been in earnest. Education scholars and policymakers invoke the term “pockets of excellence” in discussing public schools that stand out above their peers. These schools are seen as ideals for public schooling, and other schools can learn from their successes.

In 2007, the American Institutes for Research (Pérez et al., 2007) published *Successful California Schools in the Context of Educational Adequacy* (“2007 SCS report,” hereafter). The report compared academically successful and unsuccessful California schools—based on whether they did better or worse than would be predicted on standardized tests—and sought to understand how personnel resources might explain the difference between the two. The 2007 SCS report concluded that, in regard to using personnel resources to distinguish successful from unsuccessful schools, “traditional resource measures do not seem to be what are making the difference” (p. 89).

What, then, *is* making the difference for successful schools? This report, *A Climate for Academic Success*, approaches this question by using a “successful-schools” methodology similar to that of the 2007 SCS report, but it examines an alternative set of explanatory factors. This study explores differences in school climate as well as personnel resources. The specific questions addressed in this report are:

- What are the reported differences in school climate by students in academically successful versus unsuccessful schools?
- What are the relative associations between the likelihood of school success, on the one hand, and school climate and personnel resources, on the other?
- What are the practical implications of these findings for improving the academic performance of schools?

Successful Schools

What defines a successful school? A school’s performance depends heavily on its student body. The Coleman Report (Coleman et al., 1966) famously drew the connection between students’ socioeconomic status (SES) and academic achievement. This relationship, as well as the relationships between other student characteristics (e.g., race, English learner status) and achievement, has been reaffirmed many times since (see Duncan & Murnane, 2011 for a collection of recent work on inequality in education). For this reason, it is problematic to use an absolute performance measure to diagnose success. Schools that perform well typically enroll students with higher incomes and fewer special needs.

To illustrate this point, consider California’s measure of school success—the Academic Performance Index (API). According to the state accountability system, a school must attain an API of 800 or higher to be deemed successful. Exhibit 1.1 shows the 1,331 public middle and

high schools in California that meet this criterion and the 5,349 that do not. It also shows the percentage of students in those schools who are eligible for the free and reduced-price meals program (FRPM), a proxy for poverty, and those who are English learners.

Exhibit 1.1. Demographics of California public middle and high schools, by API

	School level	N	% Free and Reduced-Price Meals	% English Learners
School at or above 800 API	Middle	837	24.4	8.2
	High	494	18.7	5.2
	Total	1,331	22.3	7.1
Schools below 800 API	Middle	1,865	66.4	25.2
	High	3,484	52.0	18.0
	Total	5,349	57.0	20.5

Note: Statistics were derived from the study sample described in Chapter 3 of this report.

Schools that meet the API threshold for success have less than half the proportion of students in poverty, on average, compared to schools with APIs below 800 (22.3 percent versus 57.0 percent). Furthermore, schools with APIs below 800 have three times as many English learners, on average.

One must keep the relationship between student demographics and achievement in mind when linking any other school characteristics with success. For example, there is a demonstrable connection between a school’s climate and its API (O’Malley & Hanson, 2012), but it is likely that the SES of the school’s students underlies both of these factors (see Gottfredson, Gottfredson, Payne, & Gottfredson, 2005, for evidence of the connection between student SES and school climate). It is plausible that high SES students—and their wider access to resources—are the true engine of both higher achievement and better climate in schools. Failure to account for SES confounds the relationship between achievement and school characteristics like climate.

To account for this potential confound, the study employed the definition of success used in the 2007 SCS report that takes student demographics into account. Rather than absolute performance on a measure like the API, success is defined by a school’s performance relative to how it would be *predicted* to perform based on its student population. Comparing a school’s actual and predicted performance indicates which schools are performing better than predicted and which are performing worse than predicted. The successful schools described in this report are not those that have the highest test scores in the state; rather, they are “*beating the odds*” (BTO) schools that outperform other schools with similar types of students. The unsuccessful schools are labeled “chronically underperforming” (CU). A detailed description of the methodology used to develop this criterion is provided in Chapter 3.

School Climate

School climate has become increasingly popular in discussions of school success. School climate is a broad term used to describe the school environment, and while it has no consensus definition, reviews of the topic have identified several recurring themes: (a) order, safety, and discipline; (b) academic supports; (c) personal and social relationships; (d) school facilities; and (e) school connectedness (Austin, O’Malley, & Izu, 2011; Cohen, McCabe, Michelli, & Pickeral,

2009; Zullig, Koopman, Patton, & Ubbes, 2010). There is evidence to suggest that these factors have an important role in turning around unsuccessful schools (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010), and a positive school climate has been associated with higher academic achievement and healthy behavioral outcomes for students (Brand, Felner, Shim, Seitsinger, & Dumas, 2003; Patton et al., 2006).

This study benefits from the availability of widespread data on school climate in California. Between 2003 and 2011, California districts that received funding through the Safe and Drug-Free Schools and Communities Act, Title IV, Part A of the No Child Left Behind Act of 2001 or the state Tobacco Use Prevention Education program were required to administer the California Healthy Kids Survey (CHKS), which is largely focused on measuring school climate. Approximately two thirds of all public middle and high schools in the state administered the CHKS. These data are used to create a global school climate score for each school in which the CHKS was administered, as well as subscale scores that measure specific dimensions of school climate.

Organization of the Report

Chapter 2 of this report examines the existing research literature on school climate and its relationship with school success. A body of evidence links positive school climate with improved student academic outcomes; however, no studies use a successful-schools approach.

Chapter 3 describes the data used in the study, the method of identifying successful and unsuccessful schools, and the method for analyzing the relationships between school climate and school success.

Chapter 4 presents the results of the analyses, demonstrating a strong and significant positive association between school climate and school success. The analyses also suggest that school climate has a stronger relative association with school success than a school's personnel resources.

Chapter 5 includes concluding remarks on the study and implications for future research and practice in light of the findings.

Chapter 2. What We Know About School Climate and School Success

Introduction

This chapter contains three sections that review areas of previous research relevant to the present study.

- **Section 2-A** provides a brief overview of the successful-schools approach.
- **Section 2-B** examines literature on school effectiveness to identify a set of school characteristics associated with success.
- **Section 2-C** summarizes studies that have explored the connection between school climate, student achievement, and school success. These reviews lay the foundation for the analysis of successful schools in the context of school climate.

Section 2-A. Successful-Schools Approach

The successful-schools approach has traditionally been used by education finance scholars to determine appropriate expenditure levels. Once success is defined, the next step is to determine how much successful schools are spending, with this spending figure becoming a sort of norm or expectation for the resources required to make schools successful. The 2007 SCS report summarizes and critiques a body of research literature that employs the approach, reaching two relevant conclusions.

First, previous studies using the successful-schools approach define success in absolute terms (e.g., a certain percentage of students above a certain proficiency level) or in terms of growth rates (e.g., “adequate yearly progress”). Whatever the successful schools are spending is then considered “adequate” funding for all schools. This approach’s simplicity has appeal for researchers and policymakers alike: “Here’s what successful schools are spending,” the logic goes. “Let’s make sure all schools have that level of resources.”

Second, the 2007 SCS report concludes that using absolute criteria to define success is overly simplistic and ignores the impact of student characteristics on schools’ resource needs. When using an absolute selection criterion, the successful schools will typically be those with largely affluent student populations. Schools that serve students who are predominantly low income and special needs likely need more resources on a per-student basis. If these types of schools are systematically excluded from being identified as successful, the results of any analysis linking resources and success will be biased.

The present study takes advantage of the elegance of the successful-schools approach, while avoiding the pitfalls pointed out in the 2007 SCS report. It does this by defining success in terms

that take schools' student populations into account. It also adds a new twist to research in the successful-schools mold, treating school climate, rather than resources, as the concept of focus.

Section 2-B. Selected Literature on Elements of School Effectiveness

While the successful-schools approach represents a specific method for determining what makes schools effective, a rich body of research in this area uses alternative approaches. In large part, the attempt to identify elements of effective schools grew from the findings of the Coleman Report (1966) that stressed student demographics as the most salient predictor of academic success. The social forces that render students of particular backgrounds less successful in school are difficult for educators to address. Therefore, researchers focused on what schools could do in spite of those forces.

Purkey and Smith (1983), in an oft-cited review of early school-effectiveness research, identified "school culture" as the most important factor in a school's ability to facilitate student achievement. According to the authors, school culture is both a structure and a process. Structural factors that promote positive school culture include:

- Administrative leadership
- District support
- Staff stability and development
- Parental involvement
- A strong curriculum with maximized learning time
- Recognition of academic success

Process factors include:

- Staff collegiality
- Sense of community
- High expectations for students
- Order and discipline

Recent research on school effectiveness has yielded similar results. In a review of over 300 studies commissioned by the U.S. Department of Education (Vishner, Emanuel, & Teitelbaum, 1999), the predictors of effectiveness were high expectations, parent involvement, staff development, and more intimate learning environments, along with initiatives to connect learning with students' interests and career plans. Factors identified by Marzano (2003), in a later review, overlapped heavily with those already mentioned.

These findings have been further corroborated by a comprehensive empirical study of Chicago Public Schools by Bryk and colleagues (2010). In it, they used longitudinal data from a large sample of Chicago schools during a period of decentralization that created a laboratory for reform initiatives. A framework of essential supports for school improvement emerged from this work that included:

- School leadership
- Parent-community ties
- Professional capacity
- Student-centered learning climate
- Instructional guidance

These five supports were interrelated, and the presence of all five greatly increased the likelihood of school success.

In the 2007 SCS report, interviews were conducted with school principals at successful schools to determine, in an inductive manner, what they were doing differently compared to less successful schools. The results suggested three mediating factors:

- High-quality staff
- A standards-based curriculum
- Coherent instruction

These factors were, in turn, influenced by seven other factors:

- Staff development
- Principal control over hiring
- Staff collegiality and cooperation
- Assessment data for student achievement
- Student services
- Parent involvement
- High expectations

The commonalities across these reviews and studies regarding the qualities of effective schools are abundant. For decades, research on effective schools has boiled down to a handful of factors: leadership, relationships, and teaching and learning, to put it most generally. Purkey and Smith (1983), some 30 years ago, referred to these factors collectively as school culture or school climate, and these terms have regained prominence in education only in the last several years. Alternatively, some of the identified factors relate to personnel resources, such as teacher and administrator experience and the presence and number of student services professionals in a building. Personnel resources were the factor of interest in the 2007 SCS report. The focus here turns to school climate, defined in a way more consistent with Purkey and Smith's process factors noted earlier.

Section 2-C. Selected Literature on School Climate and Student Achievement

School climate has gained in popularity for various reasons, not the least of which include its ability to organize disparate characteristics of schools under one theoretical umbrella and its amenability to intervention. The term has become something of a catchall for targets of school improvement, though several reviews have distilled its dimensions into a manageable framework

that includes (a) order, safety, and discipline; (b) academic outcomes; (c) personal and social relationships; (d) school facilities; and (e) school connectedness (Austin et al., 2011, Cohen et al., 2009; Zullig et al., 2010).

A positive school climate has been associated with higher academic achievement and healthy behavioral outcomes for students. Brand and colleagues (2003) found multiple dimensions of school climate to be significantly associated with student academic, behavioral, and socioemotional well-being in a large, nationally representative sample of middle school students. The association between climate and achievement has been confirmed in data from California public middle and high schools (Hanson, Austin, & Zheng, 2011). Patton and colleagues (2006) conducted one of the few documented randomized trials involving school climate, showing that an intervention designed to enhance school connectedness and student engagement had the effect of lowering student health-risk behaviors and substance use.

Due, in part, to its perceived malleability and, in part, to the alternative it presents to accountability-type reforms, school climate has been the focus of several recent federal initiatives for school reform, including the Safe and Supportive Schools program (Learning First Alliance, 2001).¹

Contributions of the Present Study

The present study builds on the school effectiveness and school climate literature by bringing the successful-schools approach to bear on the association between climate and performance. This study generated a definition of success that takes student demographics into account, per the recommendations of the 2007 SCS report.

The study then examines differences in school climate between successful and unsuccessful schools. This represents a novel approach to school-climate research that is not only able to detect an association between climate and achievement—as previous research has done—but to examine whether school climate helps to explain how a subset of schools is consistently able to beat the odds.

A final original contribution of this study is its comparison of the relative associations of school climate versus personnel resources with the likelihood of school success. Controlling for personnel resources makes the estimated effects of climate on performance more robust, and comparing the relative effects of climate and resources offers a point of reference that is often lacking in school-climate research.

¹ California is one of eleven states that received federal Safe and Supportive Schools grants to improve the learning conditions and other school climate factors in low-performing high schools. For more information and to access a wide range of resources to assist in school climate improvement, visit the project website: www.californiaS3.wested.org.

Chapter 3. Data and Methodologies

Introduction

This chapter describes the data sources and research methodologies used to conduct the study.

- **Section 3-A** addresses the process of identifying BTO and CU middle and high schools in California.
- **Section 3-B** describes the process of building a statewide, school-level database of school climate, personnel resources, and demographics used in the study analyses.
- **Section 3-C** describes the multivariate regression approach to assessing differences in school climate between BTO, CU, and other schools.
- **Section 3-D** describes the logistic regression approach to assessing the relative association with BTO status of school climate, personnel resources, and other school characteristics.

Section 3-A. Identification of Beating-the-Odds and Chronically Underperforming Schools

Data Sources

To define school success, this study drew on data from the sources described below, which are available for all public middle and high schools in California. The sample was limited to schools that administered the CHKS (the measure of school climate) during the 2008-09 and 2009-10 school years. During this period, the CHKS was administered in a representative sample of 1,715 public middle and high schools, roughly two thirds of the state total. Only traditional middle and high schools were included in the study; the single charter school that met the above criteria was excluded from the analyses.

Student and Demographic Characteristics

Several databases were combined to create a profile of public middle and high schools in California from 2007-08 to 2010-11. Information regarding schools' racial composition, proportion of English learners and students with disabilities, and students receiving FRPM was drawn from the California Basic Educational Data System (CBEDS) API database.

Outcome Measures

Academic performance indicators were accessed through the California Standardized Testing and Reporting (STAR) program. The academic outcomes of interest were middle school English language arts (ELA) and math scores on the California Standards Tests (CST) from 2007-08 to 2010-11 and high school ELA CST and math scores in grade 10 on the California High School Exit Examination (CAHSEE) from 2008-09 to 2010-11. CAHSEE math scores were used in lieu

of CST math scores in high school because CST scores are course-specific (e.g., algebra, geometry) and thus are not readily comparable. The CST and CAHSEE are major components of a school's API. For each school, an overall student average for each of these test scores was calculated, as well as an average for each of the following subgroups: African American and Hispanic students, English learners, and students receiving FRPM.

Methodology for Selection

Our approach to classifying schools as BTO or CU parallels that of the 2007 SCS report. Due to instability in schools' average test scores from year to year, BTO/CU classification was based on multiple years of data. Specifically, four years of student demographic data and test scores for middle schools and three years for high schools were used. CST and CAHSEE scores were standardized by grade level to allow for cross-grade-level comparability and were then weighted by the relative number of students tested in each grade to create a school-level average academic performance measure. This process was repeated for each of the aforementioned subgroups, as well.

BTO and CU schools were identified based on the difference between their actual academic performance and their predicted performance in consideration of their demographic makeup. A series of linear regression models were estimated to determine this predicted academic performance score:

$$Y^{tp}_{iy} = \beta^{tp}_0 + \beta^{tp}_1 X^{tp}_{iy} + \varepsilon^{tp}_{iy}$$

where Y is the academic performance outcome variable in subject t , for student group/subgroup p , in school i in year y . X is a vector of school-level student demographic characteristics that includes the proportion of students who (a) receive FRPM, (b) are English learners, (c) have disabilities, (d) are Hispanic, (e) are African American, and (f) are Asian. Each school's fitted value (\hat{Y}^{tp}_{iy}), predicted by these regression models, was subtracted from its actual academic performance, resulting in a difference score, or a residual, ε^{tp}_{iy} . This residual reflects how well a school is performing versus how well it is predicted to perform based on its student body. A negative residual indicates that a school is performing worse than predicted for that subject, student group/subgroup, and year; a positive residual indicates that a school is performing better than expected.

Beating-the-Odds Schools

To be classified as BTO, a school had to meet several criteria, summarized in Exhibit 3.A.1. First, a school's residual had to be 0.25 standard-deviation units² above the mean residual to be considered "overperforming" (for each subject, student group, and year). For schools that performed roughly as predicted (i.e., have a residual near zero), there was little difference in performance between those that performed worse than predicted versus better than predicted, and a 0.25 standard-deviation criterion better distinguished the overperforming versus

²In the 2007 SCS report, the cut-point used as part of the BTO-selection criteria was 0.75 standard-deviation units above the mean. Due to the smaller sample of schools in the present study, this standard on inclusion resulted in only 13 schools being identified as BTO. Thus, this criterion was relaxed in order to classify a greater number of schools as BTO.

underperforming schools. For example, one school’s residual could be just below zero and another school’s residual could be just above zero. While these two schools would be performing nearly identically, without this criterion the former’s performance would be considered underperforming and the latter’s overperforming.

Exhibit 3.A.1. Criteria for selecting beating-the-odds schools

<p><i>Middle schools</i> For all students:</p> <ul style="list-style-type: none">▪ CST ELA and math residuals for all students are more than 0.25 standard deviations above the mean residual for students in all middle schools in California for four consecutive years. <p>For subgroups: FRPM, English learner, Hispanic, and African American students:</p> <ul style="list-style-type: none">▪ CST ELA and math residuals for these subgroups of students are more than 0.25 standard deviations above the mean residual for each subgroup of students for four consecutive years.▪ CST ELA and math residuals can be missing. The school may not have that subpopulation of students (or an insufficient number of students to be considered accountable for that subgroup) and still may be part of the pool of schools that are beating the odds. <p><i>High schools</i> For all students:</p> <ul style="list-style-type: none">▪ CST ELA residual and CAHSEE math residual are more than 0.25 standard deviations above the mean residual for students in all high schools in California for three consecutive years. <p>For subgroups: FRPM, English learner, Hispanic, and African American students:</p> <ul style="list-style-type: none">▪ CST ELA residuals and CAHSEE math residuals for each subgroup are more than 0.25 standard deviations above the mean residual for each subgroup for three consecutive years.▪ CST ELA residuals and CAHSEE math residuals can be missing. The school may not have that subpopulation of students (or an insufficient number of students to be considered accountable for that subgroup) and still may be part of the pool of schools that are beating the odds.

Second, schools had to be considered overperforming in both ELA and math, overall and across four subgroups: FRPM, English learner, Hispanic, and African American. The subgroup requirement was designed to ensure that a school’s residual was not inflated or deflated by certain subgroups of students in the school. If a single subgroup was not overperforming, the school was not considered BTO. If a school did not serve a sufficient number of a certain subgroup of students to be considered accountable for that subgroup, then this subgroup’s performance was not factored into BTO selection.

Third, as mentioned above, because test scores are relatively unstable from year to year, a school must have been overperforming—for each subject and student group—for three or four consecutive years (for high and middle schools, respectively).³ A school could witness a one-year aberration in test scores (for all its students or for a subgroup of students) that is not reflective of its usual performance. To reduce error associated with this random variability, Exhibit 3.A.2 shows the number of public middle and high schools that met these criteria each year. Out of the total 1,715 schools, this selection process resulted in 40 schools (2.3 percent)

³ BTO selection was based on four years of data—2007-08 through 2010-11. School climate data from the CHKS were collected in either 2008-09 or 2009-10, depending on when the school administered the survey. Thus, only two of the four years of achievement data correspond directly with CHKS data. The goal of using additional years of achievement data was simply to make the BTO selection process more robust, and this decision does not reflect any assumptions about causality between BTO status and school climate.

being classified as BTO, 17 of which were middle schools and 23 were high schools.⁴ The 40 BTO schools consistently performed much better than predicted for all subgroups of students.

Exhibit 3.A.2. Number of overperforming schools each year, 2007-08 to 2010-11

	2007-08	2008-09	2009-10	2010-11	All years
Middle schools	88	104	106	112	17
High schools	N/A	78	81	70	23
Total	88	182	187	182	40

Exhibit 3.A.2 also illustrates the instability of test score results from year to year. A school that was overperforming one year was unlikely to sustain that performance for three or four consecutive years. For example, only 17 of the 106 middle schools (16 percent) that were overperforming during the 2009-10 school year met the four-year criteria for BTO.

Chronically Underperforming Schools

The selection process for CU schools mirrored that used for identifying BTO schools, except that the residual cut-point was at least 0.25 standard-deviation units *below* the mean for each subject, student group, and year. Twenty schools (1.2 percent) were identified as CU using these criteria: 13 middle schools and 7 high schools. These 20 schools consistently performed worse than predicted for all students.

Selected Schools

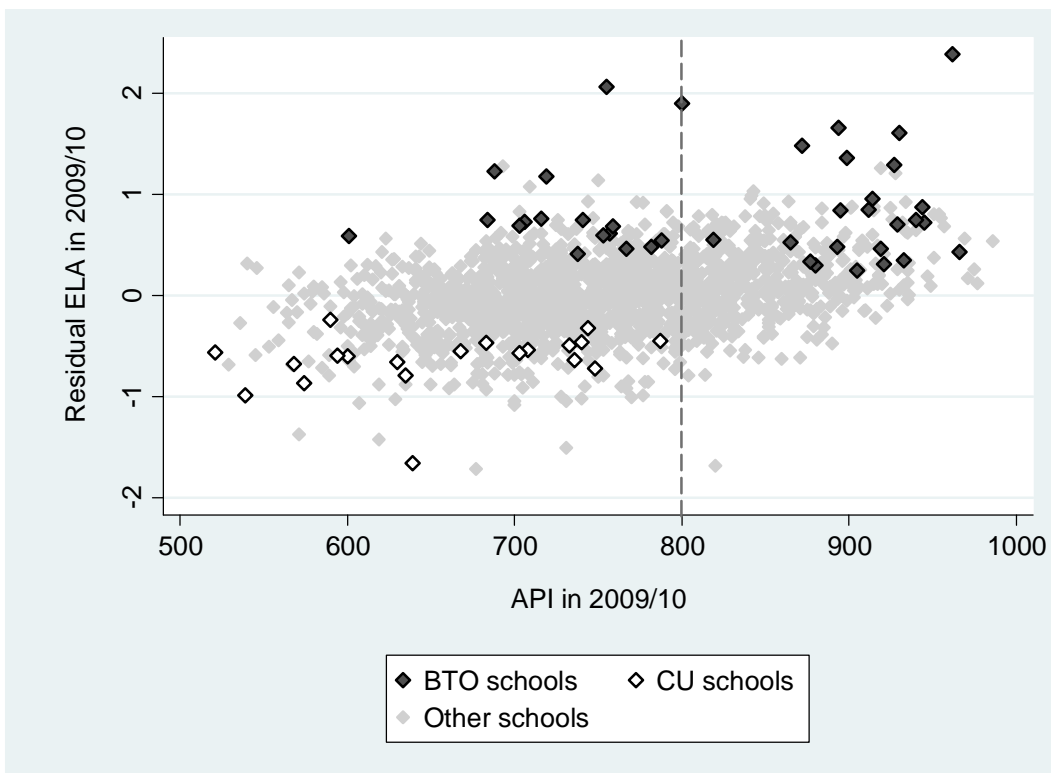
In any given year, BTO schools performed better than predicted on tests of achievement (i.e., they had high residual scores), and CU schools performed worse than predicted on tests of achievement (i.e., they had low residual scores). Exhibit 3.A.3 shows this distribution of residuals for all 1,715 schools, using 2009-10 CST ELA scores as an example. BTO schools are represented by black diamonds, CU schools by white diamonds, and other schools by light gray diamonds. The horizontal axis indicates a school’s API in 2009-10. The API is a single number, ranging from 200 to 1000, that reflects a school’s performance level based on the results of statewide testing. As noted in Chapter 1, a school must attain an API of 800 or higher to be deemed successful according to the state accountability system. This threshold is indicated with a dotted line.

The exhibit shows that the majority of BTO and CU schools were not outliers in terms of their 2009-10 CST ELA performance. Some schools that were not considered BTO have higher residuals than BTO schools due to the single-year presentation of CST ELA residuals, but these schools did not meet the multiyear criteria for BTO classification. Furthermore, this exhibit shows that in 2009-10 most BTO schools had APIs above 800 and no CU schools had APIs above 800. This distribution is somewhat expected, as a school must be relatively high-performing for three or four consecutive years to be considered BTO. If a school has a very low API, it is unlikely to be BTO, even if its predicted performance—based on student demographics—is low. However, it is notable that nearly half of BTO schools had APIs below 800, the state threshold for success, in 2009-10. This situation reiterates that it is possible for a

⁴ The study sample was limited to schools that had administered the CHKS in 2008-09 or 2009-10 (representing about two thirds of all California public middle and high schools). Among all public middle and high schools in the state, there were 108 that met the BTO criteria.

school to perform much better than predicted but still not perform well according to the absolute state standard.

Exhibit 3.A.3. Distribution of ELA residuals across API for BTO, CU, and other schools



The names of the 40 BTO schools are provided in Appendix A. Eight of the 40 (20 percent) are classified as magnet schools⁵ by the National Center for Educational Statistics (Keaton, 2012), whereas only five percent of other sample schools are magnet schools. For some of the following analyses, parallel analyses were conducted with magnet schools excluded. There were no substantive differences in results when magnet schools were left out.

To this point, a group of schools has been identified that consistently outperformed (i.e., BTO schools) and underperformed (i.e., CU schools) predictions. This result leads naturally to the question, “What distinguishes schools that beat the odds from those that do not?” The analyses that follow provide insight into this question.

Section 3-B. The School Climate Database

The factor of interest in explaining why some schools outperformed and underperformed predictions is school climate. Assessing the relationship between BTO and CU status and school

⁵ The California Department of Education defines a magnet school as a public school that focuses on a special area of study that is designed to attract students from across the district. The state does not provide special funding for these programs. More information is available at <http://www.cde.ca.gov/sp/eo/mt>.

Exhibit 3.B.1. Data sources and variables used in analyses

Data Source/Variable Name	#	Variable Description
CBEDS – 2008-09 & 2009-10		
<i>Academic Performance Index (API)</i>		
FRPM	1	Percentage of students who are eligible for the free and reduced-price meals program
African American	2	Percent Black or African American students
Hispanic	3	Percent Hispanic or Latino/a students
EL	4	Percent English learners
Enrollment	5	Number of students enrolled on the first day of testing
<i>Professional Assignment Information Form (PAIF)</i>		
Teacher education	6	Teachers' highest education level
Teacher experience	7	Teachers' total years of public and/or private educational service
Teacher tenure	8	Indicates that a teacher has tenure
Teacher credentials	9	Indicates that a teacher is fully credentialed
Administrator experience	10	Administrators' total years of experience in education
Student support staff	11	Indicates an employee of the district in a position requiring a standard designated services credential, a health or development credential, or a librarian credential and who performs direct services to pupils (e.g., counselors, guidance and welfare personnel, librarians, psychologists)
CHKS – 2008-09 & 2009-10		
School Climate Index	12	Composite score of "supports and engagement" and "low violence, victimization, and substance use" domain scores
Supports and engagement domain score	13	Composite score of four "supports and engagement" subdomains below
High expectations and caring relationships	14	Construct of six survey items that measure students' perceptions of the degree to which school staff have high expectations for student performance and have caring relationships with students
Meaningful participation	15	Construct of three survey items that measure students' perceptions of the degree to which their school provides opportunities for them to participate in activities and decision-making
Perceived school safety	16	Construct of two survey items that measure the degree to which students report feeling safe at their school
School connectedness	17	Construct of four survey items that measure the degree to which students report feeling connected and respected at their school
Low violence, victimization, and substance use domain score	18	Composite score of four "low violence, victimization, and substance use" subdomains below
Low violence perpetration	19	Construct of seven survey items that measure the frequency of student perpetration of violence, vandalism, and other crimes on school property
Low violence victimization	20	Construct of six survey items that measure the frequency of student victimization of physical and emotional violence on school property
Low harassment and bullying	21	Construct of five survey items that measure the frequency of student victimization of specific difference-based bullying and harassment on school property
Low substance use at school	22	Construct of four survey items that measure the frequency of students' use of various substances on school property
Low truancy incidents	23	Percentage of students who missed more than 30 minutes of instruction without an excuse at least three times during the school year

climate required the construction of a database that included binary variables representing the BTO and CU classifications described in the previous section, school climate indicators derived from the CHKS, personnel resources data from the CBEDS Professional Assignment Information Form (PAIF), and school demographic data from the CBEDS API database.

California Healthy Kids Survey

A single administration of the CHKS was required of California public schools during the 2008-09 to 2009-10 period as a condition of Safe and Drug-Free School and Communities (Title IV) funding or the state Tobacco Use Prevention Education (TUPE) program. Approximately two-thirds of all traditional public middle and high schools in the state had students complete the survey. In one large district, only a small sample of the entire population of schools completed the survey. Other schools did not administer the survey due to not receiving Title IV or TUPE funding, being exempt from this requirement under the Rural Education Achievement Program, or for unknown reasons.

The CHKS core module is a 115-item student survey that is primarily designed to measure school climate. In completing the CHKS, students indicate how safe, supportive, and engaging they perceive their school to be; how often they perpetrate or are victims of violence; and how often they use substances. A factor analytic study of the CHKS identified eight latent constructs, or subdomains (Hanson, 2012):

- High expectations and caring relationships
- Meaningful participation
- Perceived school safety
- School connectedness
- Low violence perpetration
- Low violence victimization
- Low harassment and bullying
- Low substance use at school

These constructs load onto two more general constructs, or domains: (a) supports and engagement (constructs 1-4); and (b) low violence, victimization, and substance use (constructs 5-8). These two domains (90 percent) combine with a reverse-coded truancy indicator from schools' administrative records (10 percent) to calculate an overall school climate rating, or School Climate Index (SCI), which is rescaled to range from 100 to 500, with a mean of 300 and a standard deviation of 50. All of the school climate domains (e.g., support and engagement) and subdomains (e.g., high expectations and caring relationships) are scaled in a similar fashion. In previous research, a school's SCI was found to be associated with its API (O'Malley & Hanson, 2012).

California Basic Educational Data System

Some schools administered the CHKS during the 2008-09 school year and some during the 2009-10 school year, and school demographic data from the CBEDS API dataset for the corresponding year were linked to each school. This linkage resulted in a combined data file wherein all CHKS schools had same-year information regarding the percentages of students who were (1) receiving FRPM; (2) African American; (3) Hispanic; and (4) English learners; as well as (5) the number of students enrolled.

To operationalize personnel resources—a factor found to be significantly associated with BTO status in the 2007 SCS report—staff characteristics from the PAIF were aggregated to the school level and merged with the CHKS/demographic database, again on a same-year basis (i.e., either 2008-09 or 2009-10). Personnel resources included, for example, staff experience and education and the proportion of staff in student support services roles. The full set of personnel-resources variables is presented in Exhibit 4.A.2 in the following chapter. Only those personnel-resources variables found to be significantly associated with BTO or CU status in the 2007 SCS report (at the $p < .05$ level) were retained for analyses, along with administrator experience, for which there was a large difference in averages between BTO schools and other schools in the present data.

As a next step, personnel-resources variables that were determined to be highly correlated ($r > 0.60$) were removed to avoid problems of multicollinearity in subsequent regression models. In the case that two variables were identified as being collinear, the variable with the stronger correlation with the SCI was retained. For example, the school-level variables for the average years of teacher experience in education and the average years of teacher experience in the district were highly correlated ($r = 0.90$) and thus likely to lead to unreliable estimates if both were included as model variables. However, since the former variable had a stronger correlation with the SCI ($r = 0.23$ versus $r = 0.20$), it was retained, and the latter variable was dropped. The retained school-level personnel-resources variables were (1) average teacher education, (2) average teacher experience, (3) proportion of teachers with tenure, (4) proportion of teachers with full credentials, (5) average administrator experience, and (6) the proportion of overall staff who are in student support services roles.

This merged dataset was combined with the BTO and CU indicators described in the previous section, resulting in a comprehensive database of school climate, performance, demographics, and personnel resources. Descriptive statistics for these variables and the omitted personnel-resources variables are provided in the next chapter.

Section 3-C. Methodology for Assessing School Climate Differences in BTO and CU Schools

This section describes the methodology used to assess the differences in school climate between BTO schools, CU schools, and other California public middle and high schools. The comprehensive dataset described in the preceding section was used for these analyses.

Twelve multivariate regression models were estimated, one for each of 12 school climate outcomes, using the general equation:

$$CLIMATE_s = \beta_0 + \beta_1 BTO_s + \beta_2 CU_s + \beta_3 STU_s + \beta_4 STF_s + \varepsilon_s$$

where the outcome *CLIMATE* for school *s* represents a different outcome in each of the 12 models: the SCI (in Model 1); the domain score for support and engagement (in Model 2) or violence, victimization, and substance use (in Model 3); one of the eight subdomain scores (in Models 4 through 11, respectively); or the low truancy index (in Model 12). *BTO_s* and *CU_s* are binary variables indicating whether school *s* fits the respective performance criteria (0 = no, 1 = yes). *STU_s* is a vector that includes the five student-demographic variables, and *STF_s* is a vector for the six personnel-resources variables. β_0 is a constant intercept term, and β_1 , β_2 , β_3 , and β_4 are parameters to be estimated. ε_s is a stochastic error term representing the variance in the outcome that is not explained by the predictor variables.

The predictor variables of interest to this analysis are the *BTO_s* and *CU_s* binary variables. The coefficients for these two variables, β_1 , and β_2 , detect whether there are significant differences in school climate between BTO, CU, and other schools.

The predictor variables representing student demographics and personnel resources acted as controls. The 2007 SCS report established a relationship between personnel resources and BTO and CU classification. Personnel resources may likewise be associated with school climate, as schools with better climate tend to have higher rates of teacher retention (Ingersoll, 2001). Not controlling for personnel resources in such an analysis could result in the detection of a spurious relationship between climate and BTO and CU classification. Further, while the BTO and CU selection process took student demographics into account—indeed the residuals used as part of the selection criteria were derived in part from achievement scores predicted by student demographics—as shown in Section 4-A, BTO and CU schools are disproportionately distributed across certain demographic spectrums. Student demographics are associated with BTO and CU statuses. There is also empirical evidence that students with different demographic backgrounds have different perceptions of school climate (Koth, Bradshaw, & Leaf, 2008).

As with any cross-sectional survey research design, there are variables not included in this model that may be correlated with the outcome and predictors variables, such as parent involvement or intrinsic student motivation. However, the inclusion of both student demographics and school personnel resources as covariates represents a more conservative and unbiased estimate of the association between school climate and academic performance than most previous research on the topic.

Section 3-D. Methodology for Assessing Associations Between School Characteristics and BTO Classification

In addition to multivariate regression analyses to assess differences in school climate among BTO, CU, and other public middle and high schools, a logistic regression model was estimated that compares the relative associations of school climate and personnel resources, on the one

hand, and the likelihood of a school being classified as BTO, on the other. The comprehensive dataset described in the Section 3-B was used for this analysis.

The equation used to estimate the logistic regression was:

$$\ln \left(\frac{\Pr(BTO_s)}{1 - \Pr(BTO_s)} \right) = \beta_0 + \beta_1 SCI_s + \beta_2 LP_s + \beta_3 STU_s + \beta_4 STF_s + \varepsilon_s$$

where the outcome is the natural log of the odds (“log odds”) of a school being classified as BTO. Log-odds units have little intuitive value unto themselves, but they allow for the estimation of linear relationships between continuous predictor variables and binary outcome variables, such as the BTO variable (Long & Freese, 2006). After estimating the logistic regression model, the probability of a school being classified as BTO can be calculated for specified values of the predictor variables. These probabilities are much more intuitive than log-odds units.

Aside from the log-odds outcome, the logistic regression equation looks similar to the equation used to estimate the regression models in Section 3-C, except that the SCI has replaced BTO or CU status for school s as a predictor variable. The variables representing student-demographic and personnel-resources predictor variables remain the same, except that, instead of vectors, they represent a single index that is an average of a school’s standardized scores for all personnel-resources variables and student-demographic variables. In creating these two indices for personnel resources and student demographics, individual variables that were determined to be negatively associated with the likelihood of BTO classification were reverse-coded. Those variables were (a) the proportion of FRPM students and (b) enrollment, which both factored into the student-demographic index.

For ease of comparison, all of the continuous variables included in the model (i.e., all predictor variables) were standardized so that their means equal 0 and their standard deviations equal 1. This standardization allows the coefficients of all the predictor variables to be measured against one another to determine the relative strength of their association with the likelihood of being a BTO school. The next chapter presents the results of these analyses.

Chapter 4. School Climate Analysis Results

Introduction

This study's objective is to determine whether there is a relationship between a school's climate and its academic performance being better or worse than predicted based on its student body. The results suggest that this relationship exists.

This chapter is divided into three main sections that mirror those of Chapter 3.

- **Section 4-A** describes how BTO, CU, and other schools differ in terms of demographics, personnel resources, and school climate (refer to Chapter 3 for an explanation of how BTO and CU schools were selected).
- **Section 4-B** presents the results of a series of multivariate regression models that tested for differences in school climate between BTO, CU, and other schools and take into account schools' student demographics and personnel resources.
- **Section 4-C** presents the findings of the logistic regression model that juxtaposes the associations between school climate and personnel resources, on the one hand, and the likelihood of BTO status, on the other. Personnel resources are a competing explanation for how BTO schools differ from other schools, and these latter findings allow for a direct comparison between these alternatives.

Section 4-A. Description of Beating-the-Odds and Chronically Underperforming Schools

Do BTO and CU schools have different types of staff, students, and perceived climates compared to other public middle and high schools? The data suggest that they do. Despite the fact that the BTO and CU classification process took student demographics into account, BTO schools had, on average, fewer students who received FRPM, and CU schools had more FRPM students than other schools. Further, CU schools had a higher proportion of English learners, Hispanic students, and African American students compared with BTO and other schools. BTO schools were also smaller and CU school larger than other schools. In general, BTO schools had more personnel resources than other schools, and CU schools had fewer. Finally, BTO schools had markedly more positive school climate than other schools, while CU schools had more negative climates.

Student Demographics of BTO, CU, and Other Public Middle and High Schools

Exhibit 4.A.1 provides demographic characteristics, including enrollment, for BTO, CU, and other public middle and high schools in California that administered the CHKS between fall 2008 and spring 2010. As mentioned in the previous chapter, a school's student-demographic

information was included in the database in the same year that it administered the CHKS. Thus, for example, if a school administered the CHKS in spring 2009, its student demographics from the 2008-09 school year were represented in the database.

Exhibit 4.A.1. Demographic characteristics of school groups

Beating-the-Odds (BTO) Schools						
	Middle (N = 23)		High (N= 17)		Total (N = 40)	
	Average (%)	SD (%)	Average (%)	SD (%)	Average (%)	SD (%)
% FRPM	43.4	37.0	37.9	32.9	41.1	35.0
% English Learner	17.2	17.2	17.6	25.6	17.4	20.9
% Hispanic	45.6	34.9	38.6	33.5	42.6	34.1
% African American	6.7	9.7	4.7	5.7	5.9	8.2
Enrollment	750	240	860	606	796	431

Chronically Underperforming (CU) Schools						
	Middle (N = 13)		High (N= 7)		Total (N = 20)	
	Average (%)	SD (%)	Average (%)	SD (%)	Average (%)	SD (%)
% FRPM	62.5	20.6	45.2	17.1	56.5	20.8
% English Learner	26.5	16.6	18.0	12.0	23.6	15.4
% Hispanic	53.3	23.8	48.4	24.8	51.6	23.6
% African American	10.8	8.8	8.1	3.8	9.9	7.4
Enrollment	862	486	1887	898	1220	809

Other Public Schools						
	Middle (N = 912)		High (N= 732)		Total (N = 1,644)	
	Average (%)	SD (%)	Average (%)	SD (%)	Average (%)	SD (%)
% FRPM	50.4	27.0	41.1	24.4	46.3	26.3
% English Learner	19.4	14.9	14.8	11.6	17.3	13.7
% Hispanic	46.8	27.6	42.1	25.8	44.7	26.9
% African American	6.7	8.5	6.2	8.2	6.4	8.4
Enrollment	871	330	1395	653	1104	564

Notes: SD = Standard Deviation

Overall, the 40 BTO schools were similar to other schools in terms of student race, FRPM eligibility, and English learner status, though BTO schools at both levels had slightly lower poverty rates, as indicated by FRPM. The largest discrepancy was in average enrollment for BTO high schools versus other high schools, with a difference of about 500 students. BTO middle schools were smaller, as well, but by a less substantial margin.

As for the 20 CU schools, they had higher percentages of students in poverty and who were English learners, African American, and Hispanic compared to other public middle and high schools. CU high schools were also much larger than other schools in terms of enrollment.⁶

⁶ BTO and CU selection was based on performance residuals, or differences between a school's actual performance and expected performance given its percentage of students were who were FRPM, English learner, Hispanic, African American, and recipients of special education services. Thus, schools' residual performance scores in any given year should be uncorrelated with these student demographic variables in that year. However, due to the categorical nature of the BTO and CU variables with their cut-points for residual scores and to the multiyear and multiple-student-group nature of the BTO criteria, there are still differences in schools' student demographics among BTO, CU, and other schools. Enrollment was not included in the residual performance calculation, perhaps explaining its more dramatic fluctuation between school groups.

Personnel Resources of BTO, CU, and Other Public Middle and High Schools

In part to confirm the findings of the 2007 SCS report, school group differences in personnel resources were explored. As in the 2007 SCS report, personnel resources were separated into (a) “resource levels,” which indicate the number of staff per pupil and staff education and experience; and (b) “resource ratios,” which indicate the distribution of staff across assignment and the status and characteristics of teachers. These variables were drawn from the CBEDS PAIF and aggregated to the school level.⁷

Exhibit 4.A.2. Middle and high school personnel resources profile

Variable/ Resource Category	Variable Description	BTO schools	CU schools	Other public schools	
Resource Levels	Staff per pupil	Certificated staff per 100 pupils	6.01	5.56	5.78
		Teachers per 100 pupils	5.19	4.95	5.11
		Administrators per 100 pupils	0.37	0.33	0.34
		Student support staff per 100 pupils	0.45	0.28	0.34
	Education & experience	Teachers: average total years of education	17.5	17.2	17.4
		Teachers: average total years of experience in education	13.6	11.6	13.3
		Teachers: average total years of experience in district	11.2	9.4	10.7
		Administrators: average total years of education	18.3	18.1	18.2
		Administrators: average total years of experience in education	18.6	15.3	16.9
		Administrators: average total years of experience in district	14.1	10.7	11.5
Resource Ratios	Distribution of staff across assignments	Share of total staff who are teachers	86.5%	89.0%	88.5%
		Share of total staff who are administrators	6.1%	6.0%	5.8%
		Share of total staff who are pupil support staff	7.4%	5.0%	5.8%
	Teacher status & characteristics	Share of total teachers designated probationary or temporary	17.1%	23.9%	16.7%
		Share of total teachers with tenure	76.2%	62.8%	77.7%
		Share of total teachers with full credentials	95.9%	91.8%	94.9%

Note: As CBEDS only includes the discrete education attainment level of staff, this study followed the 2007 SCS report in creating a continuous education variable in the following way:

- Less than bachelor’s degree: 12 years of education
- Bachelor’s degree: 16 years of education
- Bachelor’s degree plus 30 or more semester hours: 17 years of education
- Master’s degree: 18 years of education
- Master’s degree plus 30 or more semester hours: 19 years of education
- Doctorate: 21 years of education

⁷ As mentioned in the previous chapter, only those personnel-resources variables that were found to be significantly associated with BTO and CU status ($p < .05$) in the 2007 SCS report were retained for subsequent analyses. Administrator experience, although not significantly different in BTO versus CU or other schools in the 2007 report, was retained due to the large descriptive difference found in the present database.

Exhibit 4.A.2 shows that, on average, CU schools had lower levels of personnel resources than BTO or other schools. CU schools had the lowest staff-to-student ratios, the lowest levels of education and experience among their staff, and the lowest percentage of teachers who were tenured and credentialed. BTO schools had similar resources levels compared to other schools, with the exception of more student support staff and more experienced administrators.

Apart from the student support staff differences between BTO and other schools, these descriptive differences paralleled those found in the 2007 SCS report very closely. That report found many of these differences to be statistically insignificant. In the present study, they were included in the models described below as controls to isolate differences in school climate among the school groups.

School Climate in BTO, CU, and Other Public Middle and High Schools

Exhibit 4.A.3 depicts the differences in school climate indicators across BTO, CU, and other public middle and high schools, organized by domain, as described in Chapter 3.

Exhibit 4.A.3. Middle and high school climate profile

Variable/ Climate Domain	Variable Description	BTO schools	CU schools	Other schools
Overall	School Climate Index	346	247	299
Supports & engagement	Overall supports and engagement	343	250	299
	High expectations and caring relationships	339	260	299
	Opportunities for meaningful participation	336	263	299
	Perceived school safety	346	246	299
	School connectedness	338	252	299
Low violence, victimization, & substance use	Overall low violence, victimization, and substance use	344	254	299
	Low physical violence perpetration	342	255	299
	Low physical and emotional violence victimization	341	266	299
	Low harassment and bullying	341	257	299
	Low substance use at school	342	255	299
Low truancy	Low truancy incidents	314	259	300

Note: All climate indices range from 100 to 500, with higher scores representing more positive school climates. The average score for each indicator is 300, with a standard deviation of 50.

The SCI and domain and subdomain scores all had means of 300 and standard deviations of 50 in the statewide sample. Thus, the mean scores for other public schools—which make up over 95 percent of the sample—were approximately 300 for all climate indicators. Within school groups, SCI, domain, and subdomain scores were consistent. Between groups, the differences were stark. BTO schools had much higher scores than other schools, almost a full standard deviation across all the indicators except low truancy. Expressed in percentiles, the difference in SCI between BTO and other schools was 33 percentiles (82nd and 49th, respectively). CU schools were approximately one standard deviation lower than other schools across all indicators. The difference in SCI between BTO and CU schools was two standard deviations, or 68 percentiles

(82nd versus 14th, respectively), and it was only slightly smaller for other indicators. These are dramatic differences by social science standards.

With magnet schools removed from the sample, the results were almost identical. The largest difference was that scores on overall violence, victimization, and substance use were five points lower for BTO schools once magnet schools were removed.

Section 4-B. Regression Analysis of School Climate Adjusting for Student Demographics and Personnel Resources

One explanation for this school climate gap among BTO, CU, and other schools might be that unmeasured factors underlie both school climate and performance. As shown in Exhibits 4.A.1 and 4.A.2, BTO schools had smaller enrollments and more teachers per student, fewer students in poverty, and more experienced teachers and administrators. These differences may explain both BTO status and school climate. In the following analyses, two sets of factors were taken into account in an effort to establish the climate-BTO connection more robustly: student demographics and personnel resources.

Exhibit 4.B.1. Regression results for school climate outcomes ($N = 1,657$)

Variable/ Climate Category	Variable Description	BTO		CU		R^2
		β	SE	β	SE	
Overall	School Climate Index	37.8 ^{***}	7.6	-33.6 ^{***}	8.0	0.44
Supports & engagement	Overall supports and engagement	37.3 ^{***}	7.5	-33.9 ^{***}	7.2	0.42
	High expectations and caring relationships	30.8 ^{***}	8.1	-26.0 ^{**}	9.7	0.28
	Opportunities for meaningful participation	26.9 ^{**}	8.9	-20.8 [*]	8.1	0.38
	Perceived school safety	36.2 ^{***}	7.1	-33.5 ^{***}	6.9	0.48
	School connectedness	29.6 ^{***}	7.0	-29.0 ^{***}	7.3	0.39
Low violence, victimization, & substance use	Overall low violence, victimization, and substance use	38.2 ^{***}	8.5	-28.9 ^{***}	8.0	0.34
	Low physical violence perpetration	36.7 ^{***}	8.5	-26.7 ^{***}	7.6	0.38
	Low physical and emotional violence victimization	37.6 ^{***}	9.1	-24.9 ^{**}	8.8	0.16
	Low harassment and bullying	37.0 ^{***}	8.0	-27.0 ^{**}	9.4	0.24
Low substance use at school	37.0 ^{***}	8.1	-25.9 ^{**}	8.6	0.40	
Low truancy	Low truancy incidents	12.3 [*]	6.2	-31.2 [*]	14.8	0.18

* = $p < .05$ ** = $p < .01$ *** = $p < .001$

Notes: All models included the following variables as controls: the proportion of students who are FRPM, African American, Hispanic, and English learners; enrollment; average teacher education and experience; the proportion of tenured and fully credentialed teachers; average administrator experience; and the proportion of total staff who are in student support services roles. β is the regression coefficient estimating the relationship of BTO/CU status and the indicated outcome, and SE is the standard error. R^2 is the proportion of overall variance in the outcome explained by all model variables. All models were estimated using robust standard errors to adjust for heteroskedasticity.

The results of the multivariate regression models of school climate on BTO and CU status, controlling for student demographics and personnel resources, are shown in Exhibit 4.B.1. The results largely confirmed the differences in school climate across BTO, CU, and other schools

that are shown in Exhibit 4.A.3. Across all school climate indicators, there was a statistically significant difference among BTO, CU, and other schools. In other words, student demographics and personnel resources being equal, BTO schools still had more positive climates and CU school less positive climates than other schools.

BTO schools were predicted to have an SCI 37.8 points higher than a regular school and 71.4 higher than a CU school, after taking into account student demographics and personnel resources. Considering that the standard deviation of the SCI is 50, this implies that BTO schools had levels of school climate that were 1.4 standard deviations above CU schools and 0.8 standard deviations above other schools with identical enrollments, student demographics, and staff resources. These are large differences by social science standards. For each of the two school climate domains—supports and engagement; and low violence, victimization, and substance use—the estimated differences by school group were almost identical.

The subdomains, too, were estimated to have roughly similar differences among BTO, CU, and other schools. BTO schools had the largest separation from other schools in terms of the low-physical-and-emotional-violence-victimization subdomain ($\beta = 37.6, p < .001$). The smallest separation was for opportunities for meaningful participation ($\beta = 26.9, p < .01$), but even this difference is considered medium to large (Cohen, 1988). The largest and smallest differences for CU schools versus other schools were in the perceived-school-safety ($\beta = -33.5, p < .01$) and opportunities-for-meaningful-participation ($\beta = -20.8, p < .05$) subdomains, respectively.

With magnet schools removed from the sample, the substantive interpretation of the results was the same. The coefficients for BTO classification were attenuated in each of the models, but they were all still significant at the $p < .01$ level and all still larger than $\beta = .20$.

School Climate Differences by API Level

Do these differences in climate hold, however, for BTO and CU schools at different levels of academic performance? For example, looking only at schools with lower APIs, do BTO and CU schools have different school climates than other schools?

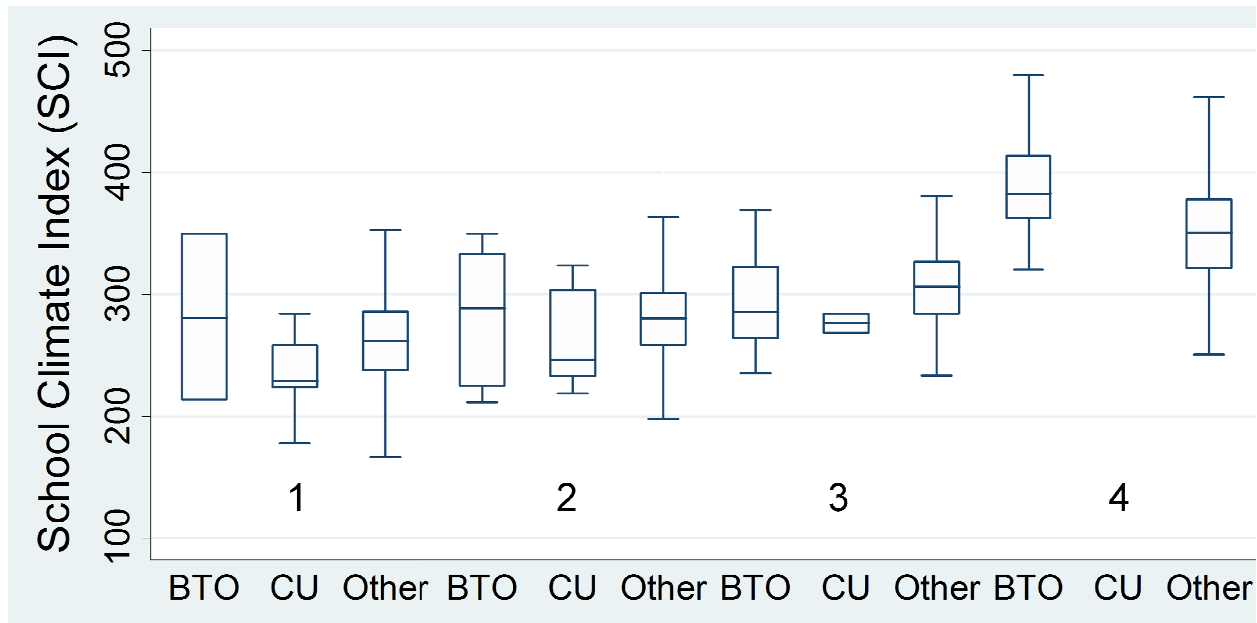
There were too few BTO and CU schools to estimate separate regression models by API quartiles, but Exhibit 4.B.2 gives a descriptive glance at school-group climate differences by 2008 or 2009 API (as with other CBEDS data, schools' APIs from the school year corresponding with their CHKS administration were used). The first quartile of API, for example, represents schools with the lowest academic performance; the fourth quartile represents schools with the highest. The exhibit shows that the differences in school climate between BTO and other schools were upheld in schools in the first, second, and fourth quartiles of API. That is to say, BTO schools had more positive school climates than other schools among both high- and low-performing schools.⁸

There were no CU schools in the fourth API quartile, as one might suspect, given that chronically low-performing schools are unlikely to turn out high-performance scores in any

⁸ For schools in the third API quartile, the BTO schools actually had lower average SCIs than other schools.

given year. However, CU schools had more negative climates than other schools in the bottom three quartiles.

Exhibit 4.B.2. Box plot of average SCI, by school group and 2008-2009 API quartile



Note: 1 = 1st quartile of school based on API (i.e., lowest performing quartile); 2 = 2nd quartile; 3 = 3rd quartile; 4 = 4th quartile (i.e., highest performing quartile).

The results of the regression analyses and the description of school-group climate differences stratified by API have several implications. First, there were significant medium-to-large differences in school climate among BTO, CU, and other schools. BTO schools had more positive climates than other schools, and CU schools had more negative climates. School climate helps to answer the question, “What is different about BTO and CU schools?” A nuanced look at these relationships in schools at different API levels suggested that school climate may help differentiate BTO, CU, and other schools across levels of academic performance. This latter finding should be interpreted with caution, however, as there were very few BTO schools in certain API quartiles (and no CU schools in the highest quartile), rendering the depicted climate differences in some quartiles more susceptible to random error.

Section 4-C. Relative Associations of School Characteristics and Likelihood of Beating the Odds

The previous set of regression analyses estimated the differences in school climate by school group, controlling for student demographics and personnel resources. This section presents the results of a logistic regression analysis that took a slightly different look at the associations between each of these factors. Here, school climate, student demographics, and personnel resources were each treated as predictors of a school’s *likelihood* of beating the odds.

This analysis, the results of which are shown in Exhibit 4.C.1, juxtaposed the relative associations of climate, demographics, and resources with the likelihood of beating the odds. The

beta coefficients presented in the exhibit (β) are in “log-odds” units, which have little meaning in real-world terms. However, they do allow for a direct comparison of the strength of association between the model predictor variables and the likelihood of beating the odds. The results suggested that a school’s SCI had the strongest association with the likelihood of beating the odds ($\beta = 1.19, p < .001$). A school’s personnel resources ($\beta = 0.49, p < .01$) and student demographics ($\beta = 1.10, p < .001$) also had significant associations with the likelihood of beating the odds. It should be noted that the association between student demographics and BTO was driven almost entirely by enrollment, which was negatively related to the likelihood of BTO classification.

Exhibit 4.C.1 shows that the probability⁹ of being classified as BTO was only 1.1 percent in an average school (i.e., when all predictor variables were at their sample mean value). In other words, the probability of beating the odds was very low. However, the results suggested that, in an otherwise average school, SCI was associated with the following probabilities of BTO:

- An SCI one standard deviation above the mean was associated with a 3.5 percent probability of beating the odds.
- Two standard deviations above the mean equated to a 10.6 percent probability of beating the odds.
- A school with an SCI equal to the highest SCI value in the sample had a 44.5 percent probability of beating the odds.

While the likelihood of beating the odds was low for all public middle and high schools in California, an exceptional school climate was associated with an exponentially higher probability. The results suggested that a school with a climate two standard deviations higher than the average school was more than ten times likely to be BTO. This probability was even greater for schools with the best climates. With magnet schools removed from the sample, the results were almost identical.

Exhibit 4.C.1. Logistic regression results for BTO outcome ($N = 1,704$)

	β^\dagger	SE	BTO probability at mean [‡]	BTO probability at +1SD [‡]	BTO probability at +2SD [‡]	BTO probability at max [‡]
School Climate Index [§]	1.19 ***	0.19	1.1% when all predictors are at mean value	3.5%	10.6%	44.5%
Personnel resources	0.49 **	0.14		1.7%	2.8%	3.9%
Student demographics	1.10 ***	0.18		3.2%	9.0%	32.4%

* $p < .05$ ** $p < .01$ *** $p < .001$

† Coefficients are in log-odds units.

‡ These values reflect the probability of a school being classified as a BTO school, given the indicated value of the predictor variable (e.g., plus one standard-deviation [SD]). These probabilities assume all other predictor variables are at their sample mean value.

§ All predictor variables are standardized (i.e., $mean = 0, standard\ deviation = 1$).

Notes: β is the regression coefficient estimating the relationship of the indicated predictor and BTO likelihood, and SE is the standard error. +1SD and +2SD refer to “one standard deviation above the mean” and “two standard deviations above the mean,” respectively.

⁹ Because coefficients presented in log odds are difficult to interpret in meaningful terms, probabilities can be estimated from the results of logistic regression models that indicate the probability of the outcome being true (i.e., of a school being a BTO school), given specified values of the predictor variables.

The results suggested that school climate had more to do with BTO than personnel resources. The effect size for school climate was more than twice as large. Even in a school with the optimal level of personnel resources, the probability of beating the odds was still only 3.9 percent. For student demographics the association with BTO probability was not significantly different from that of school climate.¹⁰ Enrollment appeared to be the main driver of the association between student demographics and BTO, with smaller student bodies predicting a greater likelihood of BTO.

¹⁰ Based on a post-estimation Wald test ($\chi = 0.15$, n.s.).

Chapter 5. Conclusions

This study adds to the growing body of evidence that suggests that school climate is one of the factors that differentiates schools that succeed from those that do not. There were significant differences in school climate between successful and unsuccessful schools, even when taking into account schools' student characteristics and resources. Interpreted in successful-schools-approach terms, it could be said that the attributes of climate evidenced in these schools that are BTO represent a model for all schools. Helping foster similarly positive school climate should be part of efforts to improve the performance of public schools.

Furthermore, the study indicates that a school's climate may have *more* to do with its success than the resources at its disposal.¹¹ This result implies that things like high expectations for students, caring relationships between teachers and students, and feeling safe at school are more associated with success than teacher or administrator experience or student support services staff ratios. In two schools with identical staff in terms of roles, experiences, and education, the school with a better climate has a much greater probability of being successful, according to this study's findings.

These two sets of factors—school climate and personnel resources—are potentially related. The literature reviewed in Chapter 2 pointed to both resources (e.g., teacher experience) and climate (e.g., high expectations) as elements of effective schools. There may be a mediating relationship whereby more experienced and educated teachers and administrators have more capacity for creating an environment characterized by connectedness, caring, and safety, which in turn fosters success. The interconnections between these factors should be the subject of future research.

Lastly, enrollment appears to have an important role in school success. The results of this study imply that BTO schools have significantly smaller enrollments and that CU schools have significantly larger enrollments. As with personnel resources, future research could examine the interconnections (e.g., mediating or moderating relationships) between enrollment and school climate. What the present results do suggest, however, is that in two schools of the same size, school climate is still significantly associated with the likelihood of BTO.

The authors have been careful throughout this report in referring to the relationship between school climate and success as an “association” rather than an “effect.” It is tempting to assert causality in the relationship between these variables. However, the present analyses are cross-sectional and not experimental, and while they address some alternative explanations for why school climate and performance are related, many potential confounds are unaccounted for. It could be that a third, unmeasured variable explains both school climate and success. For

¹¹ In the successful-schools approach, if the findings of a successful-schools analysis yield insignificant differences in resource use between successful and unsuccessful schools, the implication is that all schools should be able to succeed with the resources that they have (see, for example, Augenblick & Myers, 2001). That is, all schools' spending levels are adequate for success. According to this logic, if successful schools are spending no more than unsuccessful schools, then spending alone is not the answer. Other factors must differentiate schools that succeed from those that do not. This study indicates school climate is one of these factors.

example, in schools where students' parents are highly involved, parent engagement may be the true engine behind academic success *and* a positive school climate.

The directionality of the relationship between climate and success is also in question. When a school consistently beats the odds in terms of academic performance, it may engender a positive school climate. Nonetheless, it is clear from the results of this study that BTO schools have significantly more positive school climates, adding to the large and growing body of research demonstrating that safe and supported students perform better in school.

Implications for Practice

Students' demographics are strong predictors of their academic success. While some educational initiatives have begun targeting the social forces that make poor, racial minority, and English learners less successful in school (see Ladd, 2012), educators can take more immediate measures to meet all students where they are and improve their learning.

The factors explored in this study—school climate, staffing, and school size—are all malleable factors, things that schools or districts can manipulate. Student characteristics—things like race, socioeconomic status, first language, and special needs—and the factors that put students of certain demographics at a disadvantage are infeasible for schools and districts alone to manipulate. The approach employed in this study helps direct the focus toward characteristics of schools that can be targeted and changed through intervention. School climate is a particularly promising area of focus.

Among the more commonly employed strategies for improving school climate are schoolwide prevention approaches that involve all staff in the installation of a behavior management system and student social and emotional learning approaches that rely on classroom social-skills instruction (Osher, Bear, Sprague, & Doyle, 2010). For example, some schools have implemented restorative justice programs as alternatives to traditional, punitive discipline codes. These programs focus on the relationship between the perpetrator of misbehavior and members of the school community, including potential victims and their families. Another example is transformative classroom management, which leverages students' motivation and engagement to increase adherence to classroom behavioral norms. Expansion of these types of programs and increased support through mechanisms like the U.S. Department of Education's Safe and Supportive Schools program could help improve climate in more schools.

This study suggests that a positive school climate is an asset for all schools, serving all types of students across demographic spectrums. This news is especially encouraging for schools whose students face socioeconomic barriers to academic success. These schools *must* beat the odds to achieve conventional levels of success. Fortunately, as this study shows, certain schools are beating the odds, and these "pockets of excellence" have a positive school climate in common.

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Appendix A. Beating-the-Odds Schools

The names of the 40 California public middle and high schools that were identified in this study as “beating the odds” are shown below.

School	District	% FRPM*
1. Abraham Lincoln Middle	Selma Unified	74
2. Anderson W. Clark Magnet High	Glendale Unified	44
3. Arizona Middle	Alvord Unified	66
4. Avenal High	Reef-Sunset Unified	99
5. Bonita Vista Senior High	Sweetwater Union High	19
6. Bud Carson Middle	Hawthorne	76
7. C. T. English Middle	Loma Prieta Joint Union Elementary	4
8. California Academy of Mathematics and Science	Long Beach Unified	37
9. Crescenta Valley High	Glendale Unified	9
10. Day Creek Intermediate	Etiwanda Elementary	10
11. Dr. T. J. Owens Gilroy Early College Academy	Gilroy Unified	30
12. Edison Computech	Fresno Unified	59
13. Foothill Technology High	Ventura Unified	18
14. General Grant Middle	Kings Canyon Joint Unified	100
15. Georgina P. Blach Junior High	Los Altos Elementary	1
16. Granite Ridge Intermediate	Clovis Unified	16
17. Hawthorne Middle	Hawthorne	74
18. Huntington Middle	San Marino Unified	1
19. Joaquin Moraga Intermediate	Moraga Elementary	1
20. Kearny International Business	San Diego Unified	75
21. Mendota High	Mendota Unified	95
22. National City Middle	Sweetwater Union High	79
23. Newton Middle	Hacienda la Puente Unified	51
24. Oak Park High	Oak Park Unified	2
25. Orinda Intermediate	Orinda Union Elementary	0
26. Palos Verdes High	Palos Verdes Peninsula Unified	2
27. Palos Verdes Intermediate	Palos Verdes Peninsula Unified	1
28. Piedmont High	Piedmont City Unified	0
29. Piedmont Middle	Piedmont City Unified	0
30. Prairie Vista Middle	Hawthorne	76
31. Richardson Prep Hi	San Bernardino City Unified	70
32. Roosevelt International Middle	San Diego Unified	77
33. San Diego International Studies	San Diego Unified	46
34. San Diego Science and Technology	San Diego Unified	74
35. Saratoga High	Los Gatos-Saratoga Joint Unified	0
36. Segerstrom High	Santa Ana Unified	58
37. Sierra Vista Middle	Hacienda la Puente Unified	82
38. Sparks Middle	Hacienda la Puente Unified	80
39. Stone Valley Middle	San Ramon Valley Unified	1
40. West Campus	Sacramento City Unified	37

* Percentage of students eligible for the free and reduced-price meals program

The sample for this study was limited to schools that administered the California Healthy Kids Survey during the 2008-09 and 2009-10 school years. During this period, the survey was administered in a representative sample of 1,715 public middle and high schools, roughly two thirds of the state total. Schools that did not administer the survey during this period were not eligible to be labeled as “beating the odds” in this study. Eight of the 40 (20 percent) are classified as magnet schools by the National Center for Education Statistics, whereas only five percent of other sample schools are magnet schools. Parallel analyses were conducted with magnet schools excluded, and there were no substantive differences in results.