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Charter Management Organizations 2017

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2017

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CREDO, the Center for Research on Education Outcomes at Stanford University, was established to improve empirical evidence about education reform and student performance at the primary and secondary levels. CREDO at Stanford University supports education organizations and policymakers in using reliable research and program evaluation to assess the performance of education initiatives. CREDO's valuable insight helps educators and policymakers strengthen their focus on the results from innovative programs, curricula, policies and accountability practices.

Acknowledgments

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Table of Contents

Table of Figures

Table of Tables

List of Acronyms & Definitions

Brick-and-Mortar schools	A public school which uses standard in-person learning as its primary means of curriculum delivery
CMOs	Charter School Management Organizations – To qualify as a CMO, an organization must oversee the operation of at least three charter schools. Further, the CMO must be the charter holder for all of the schools operated by the CMO.
CREDO	Center for Research on Education Outcomes
EOC	End-of-Course Exam
ELA	English Language Arts
ELLs	English Language Learners
FERPA	Family Education Records Privacy Act
Growth	The year-to-year change in academic performance relative to one's peers. Growth can be positive or negative.
NAEP	National Assessment of Educational Progress
Network	A network is defined as a single organization which oversees the operation of at least three charter schools.
Online charter	A public school operated under a charter as defined by the state which uses online learning as its primary means of curriculum delivery
Online School	A school which offers a full-time online curriculum to the majority of its students
TPS	Traditional Public School
VCR	Virtual Control Record
VOSs	Vender Operated Schools – To qualify as a VOS, an organization must oversee the operation of at least three schools. However, the VOS is not the holder of the charters for the schools to which they provide services. Rather the VOS is hired by the school's charter holder to provide services to the school. These services can range from merely providing administrative services to the full operation of the school. The schools operated by a VOS can be independent charter schools or may also belong to a CMO. While rare, VOSs are occasionally hired to operate traditional public schools. Data from TPS are not included in this study.

Charter Management Organizations 2017

1. Introduction

Purpose of Study

In 2013, the Center for Research on Education Outcomes (CREDO) released the Charter School Growth and Replication (CGAR) study (Woodworth and Raymond 2013). The study examined the lifecycle of charter school networks from founding of the flagship school to development and eventual expansion of the network. Volume II of the CGAR study focused on the performance of charter school networks, organizations which operate at least three charter schools. This report is an update to CGAR Volume II. We examine the performance of charter networks compared to traditional public schools (TPS) and independent charter schools. A chief focus of this study is the management arrangement of the school and the impact it has on the school's performance, as measured by student academic progress. Additional analyses explore the variation in performance across networks and performance by state.

Need for the Study

Within the limits of each state's charter school law, charter school operators have discretion to decide how their school is managed. Two-thirds of American charter schools exist as single independent nonprofit organizations. However, twenty percent of charter school operators have elected to operate multiple schools. The existence of large networks of charter schools has the potential to spread proven, effective practices across a larger portion of the community. However, proof of positive student impacts is not always a requirement for expanding from a single school to a charter network.

TYPES OF CHARTERS

This report identifies four groups of charter schools in the United States.

1. Charter Management Organizations (CMOs)
2. Vender Operated Schools (VOSs)
3. Hybrid charter schools
4. Independent charters

The side bars below will describe each type of charter school in greater detail.

Each state has different policies in place for if and how charter school operators are allowed to expand beyond single schools. This study undertakes an exploration into the student growth outcomes of the charter networks operating schools in 24 states, New York City,[1] and Washington, D.C.

Independent

Independent charter schools are standalone charter operations. The charter holding organization may run the school directly or they may contract with an organization which provides services to only one or two charter schools. The major distinction is that independent charter schools are not part of a larger organization. They are typically the "Mom and Pop" type of charter school. The majority (68 percent) of charter school students attend an independent charter school.

It is important at the outset to identify and define the types of organizations that are included in this study. The concept of a single independent non-profit school is straightforward. The schools are sometimes referred to as "singletons" or "Mom and Pop" charter schools to reflect their commitment to remaining a single school.

Charter Management Organizations (CMOs) is a term that covers organizations that hold the charter for multiple schools. There are a small number of operators that we include in the CMO group that often are labeled elsewhere as Education Management Organizations (EMOs) because they operate as for-profit entities. For our purposes, the deciding factors for inclusion as a CMO group are that the CMO holds the charters for their schools and have direct control of school operations.

CMO

Many researchers and policymakers use the term CMO, but the definition differs from report to report. Our definition of a CMO in this study differs from some other organizations' reports. **For this report, a CMO is an organization which operates at least three separate charter schools, and the CMO is the charter holder for each school.** In a CMO, the organization will control every aspect of the schools' operations, including curriculum, personnel policies, operating policies and finances. The critical feature is the direct control of operations. In this study, the designation of CMO can be applied to non-profit or for-profit operators. For example, Achievement First is a non-profit CMO while Constellation Schools is a for-profit CMO.

Vendor Operated Schools (VOSs) are a form of education service provider that supports multiple schools on a contracted basis. They do not hold the charters for the schools they serve and are engaged for a specific period. We use the term VOS to distinguish the management relationship between the service provider and the governing body of the charter school. Some VOSs are non-profit organizations, while the majority are profit seeking.

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[1] For purposes of this analysis, we treat New York City as a separate state from the rest of New York. This is because New York City has policies which differ from those of the rest of the state and the large number of charter students in New York City would hide differential results from the rest of New York State.

A final group of charter school networks, called "Hybrids", deserve a special designation by virtue of their unusual constellations of organizations.

It is also useful to be clear about the organizations that were excluded from the study. Organizations which contract with charter schools to provide only a small portion of operations, such as physical therapy or speech therapy, are not classified as CMO/VOS organizations. These types of contract services do not involve the management and operation of the school overall.

In addition to independent charter schools and charter networks, we will also examine the operations of super networks. Super networks are large charter networks which usually span across large physical areas and often include multiple states. These super networks usually consist of multiple regional-level organizations which operate as separate CMOs/VOSs but have an overarching national management organization. A network may also be classified as a super network if it operates multiple "brands" of charter schools. One of the best known super networks is the KIPP network of schools. Each KIPP regional cluster has operational policies which are tailored to the specific needs of students in that region. While the KIPP regional networks are managed somewhat independently from each other, they must still operate within the expectations of the central national organization.

VOS

A VOS is an organization which provides services under contract to at least three separate charter schools, but do not hold the charter for any school they serve. To qualify for inclusion in this category, VOS's provided services to no more than two schools from the same charter holder. (Those serving more than three schools from the same provider are included in "Hybrid".) A VOS may provide a wide range of services to its charter schools. In some cases, the VOS is responsible for the entire operation of the school. In others, the VOS may be responsible for only selected aspects of the school's operations such as back-office support, curriculum or staffing. Importantly, a VOS must answer to the school's charter holder in addition to authorizers and state governance. The school and the VOS can part ways and the school could still exist. With a CMO, if the CMO stops operating the school, the school ceases to exist. VOS can be for-profit or non-profit. Innovative Education Management is an example of a non-profit VOS. Global Educational Experience is a for-profit.

Hybrid

As the name suggests, hybrid charter schools have aspects of both a CMO and a VOS. One example of a Hybrid charter is the Chicago International Charter Schools (CICS). CICS holds the charters for its schools like a CMO, but the CICS organization contracts out the operation of the schools to multiple VOS organizations, thereby acting as a portfolio manager. In other cases, the contractual relationship between the CMO and VOS extends over many, if not all, of the CMOs schools and may have other strategic purposes. For Hybrid charter schools, the CMO or the VOS or both entities may be for-profit organizations. These types of charter schools are rare. Only 1 percent of all charter schools are Hybrid charter schools.

Questions to Be Addressed

The overarching question of this analysis is, "Do schools which are part of a larger management structure create student academic growth that is different from that seen in independent charter schools?" The outcome we examine is the one-year academic progress of students. The research variable of interest is the management approach represented by the various organizational configurations. We seek insight into the advantages of scale (multiple schools versus single school operation) and the benefits of direct or indirect control of school operations (CMOs versus VOSs). We also examine whether the profit status of either the CMO or the VOS affects the academic gains that students make.

By using more nuanced analyses, we can tease out much more detail about which students have better outcomes from different management structures. For some subpopulations, network benefits from economies of scale in services, personnel or facilities may lead to improved or weaker academic growth when compared to their peers. To this end, the report includes breakout analyses by student racial/ethnic subpopulations, English language learners, students in poverty and students receiving special education services.

Inclusion in a charter network may also affect schools differently based on the characteristics of the schools. In this study, we look at the academic growth of students attending new charter schools to determine if students attending new schools in a charter network have different growth from students in new charters which are not part of a network. We also include an analysis of full-time online charter schools in a network compared to brick-and-mortar schools and nonprofit vs. for-profit networks.

As in the earlier report, we again examine and report on the average student academic growth by network.

2. Methods and Data

Classifying Network Schools

For the 2013 CGAR study, CREDO created a database of charter schools showing which were affiliated with various charter networks. For this study, we have updated that database to include new schools and new networks which have opened in recent years. To identify network schools, CREDO uses a variety of data sources. Some state departments of education include information on their websites which identify schools having an affiliation to specific networks. Additionally, most of the networks have some level of web presence which lists the schools included in the network. CREDO also received lists of charter schools and networks from state charter organizations when available. Finally, many network organizations brand their schools with the network name. All of these factors allow CREDO to maintain a list of charter school and network organization affiliations.

This study contains data for 3.7 million student observations across 26 states. We identify 240 CMOs and 54 VOSs operating within the states included in the data set. The large size of the data set provides ample statistical power to detect even small effects at the national level. Readers should keep in mind, however, that these findings come from a wide variety of schools and settings. Overall national numbers should not be assumed to hold at every charter school. In fact, the variation in charter school performance is one of the major findings of this study. Additionally, every student should not be assumed to have the same experience as the average. A complete count of students by state and students by network will be included in the data appendix of this report.

For this analysis we use academic growth, which is defined as the change in relative student scores from one testing period to the next. This is generally from spring to next spring. Due to shifting testing patterns over the last several years, not all states tested every year. Table 1 shows the tested years used to compute each growth period. In cases where a state was missing a year for all students, we computed growth from the previously tested year. In no instances did this result in more than one skipped year. States missing test scores for some years have fewer growth periods included in the data set.

Table 1: States Included in Study by Year

State	Growth Years		
Arkansas	2012-13	2013-14	2014-15
Arizona	2012-13	2013-14	2014-15
California	2012-13		
Colorado	2012-13	2013-14	2014-15
DC	2012-13	2013-14	2014-15
Florida	2012-13	2013-14	2014-15
Illinois	2012-13	2013-14	2014-15
Louisiana	2012-13	2013-14	2014-15
Massachusetts	2012-13	2013-14	2014-15
Michigan	2012-13		2014-15
Minnesota	2012-13	2013-14	2014-15
Missouri	2012-13	2013-14	2014-15
North Carolina	2012-13	2013-14	2014-15
New Jersey	2012-13	2013-14	2014-15
New Mexico	2012-13	2013-14	2014-15
Nevada	2012-13	2013-14	
New York (state)	2012-13	2013-14	2014-15
New York City	2012-13	2013-14	2014-15
Ohio	2012-13	2013-14	2014-15
Oregon	2012-13	2013-14	2014-15
Pennsylvania	2012-13	2013-14	2014-15
Rhode Island	2012-13		2013-15
Tennessee	2012-13	2013-14	2014-15
Texas	2012-13	2013-14	2014-15
Utah	2012-13	2013-14	2014-15
Wisconsin	2012-13		2013-15

Consolidating Student Data from Multiple States

Because each state uses its own standards and tests to evaluate student academic achievement, it is necessary for CREDO to standardize the values to make them comparable. CREDO does this by creating a bell curve for each test – by subject, grade and year – where the average student score on the test becomes the central value and all other scores are distributed around it. The transformation places each student's performance in relation to all other equivalent tested students, making it ready for comparison with other students. By comparing each student's performance relative to the other students from one year to that same student's relative performance in the next year, CREDO can estimate if the student is growing academically at a rate which is faster, similar or slower than the rate of peers.

Even though average academic performance in state A may represent a difference in achievement from the average academic performance in state B, a change in academic performance (growth) of .05 standard deviations in state A and a .05 standard deviation change in performance in state B both represent the same level of improvement relative to their peers in the students' home state. This is one

of the reasons measurement of academic growth is superior to simple measures of academic achievement, the level of which can vary greatly from state to state.

Since the passage of the No Child Left Behind Act of 2001 (NCLB), states have been required to test students in grades 3-8 and once in high school. The NCLB requirements provide a consistent set of scores for the middle grades but result in less consistency for high school students. To estimate academic growth for high school students in states which do not have grade-level tests in the upper grades, we use data from end-of-course (EOC) exams. For states with a consistent sequence of EOC exams, this estimator works similarly to the grade-level exams. In states with only a single high school exam or a long gap between grade 8 and the EOC exam, we are not able to generate an estimate of academic growth in high school.

Table 2: Tested Grade by State

State	Grade											EOCs
Arkansas		3	4	5	6	7	8					Algebra 1, Geometry
Arizona		3	4	5	6	7	8		10			
California		3	4	5	6	7	8	9	10	11		Algebra 1, Algebra 2, Geometry, General Math, High School Math, Integrated Math 1, Integrated Math 2
Colorado		3	4	5	6	7	8	9	10	11		
DC		3	4	5	6	7	8		10			
Florida		3	4	5	6	7	8	9	10			
Illinois		3	4	5	6	7	8					
Louisiana		3	4	5	6	7	8					Algebra 1, Geometry, English 1, English 2
Massachusetts		3	4	5	6	7	8		10			
Michigan	2	3	4	5	6	7	8					
Minnesota		3	4	5	6	7	8		10			
Missouri		3	4	5	6	7	8					Algebra 1, Algebra 2, Geometry, English 1
North Carolina		3	4	5	6	7	8					Algebra 1, English 1, English 2
New Jersey		3	4	5	6	7	8	9				
New Mexico		3	4	5	6	7	8	9	10	11		
Nevada		3	4	5	6	7	8		10	11	12	

State	Grade											EOCs
New York (state)		3	4	5	6	7	8					Algebra 1, Algebra 2, Geometry, Regents
New York City		3	4	5	6	7	8					Algebra 1, Algebra 2, Geometry, Regents
Ohio		3	4	5	6	7	8		10			
Oregon		3	4	5	6	7	8			11		
Pennsylvania		3	4	5	6	7	8	9		11		Algebra 1
Rhode Island		3	4	5	6	7	8	9				
Tennessee		3	4	5	6	7	8					Algebra 1, Algebra 2, English 1, English 2, English 3
Texas		3	4	5	6	7	8					Algebra 1, English 1, English 2
Utah		3	4	5	6	7	8	9	10	11		Algebra 1, Algebra 2, Geometry, Math 1, Math 2, Pre-algebra
Wisconsin		3	4	5	6	7	8					

Selection of Comparison Observations

A fair analysis of the impact of charter school networks requires a comparison group which matches the demographic and academic profile of charter students to the fullest extent possible. As in previous CREDO studies, this study employed the virtual control record (VCR) method of analysis developed by CREDO. The VCR approach creates a "virtual twin" for each charter student who is represented in the data. In theory, this virtual twin would differ from the charter student only in that the charter student attended a charter school. The VCR matching protocol has been assessed against other possible study designs and judged to be reliable and valuable by peer reviewers (Fortson et al. 2012).

Using the VCR approach, a "virtual twin" was constructed for each charter student. The VCR method draws on the available records of the TPS that the students in a given charter school would have likely attended if they were not in that charter school. These schools are called feeder schools. From the feeder schools for each charter school, we match individual charter students to TPS students with identical traits and identical or very similar[2] prior test scores.

[2] Achievement scores were considered similar if they were within 0.1 standard deviations of the charter student's pre-charter achievement.

Factors included in the matching criteria were:

- Grade level
- Gender
- Race/ethnicity
- Free or reduced-price lunch eligibility
- English language learner status
- Special education status
- Prior test score on state achievement tests

Click here for an infographic about the Virtual Control Record method.

Figure 1 shows the matching process used by CREDO to create the virtual twins linked to each charter school student. In the first step, CREDO identifies all TPS students with students who transferred to a given charter school. These schools are referred to as "feeder schools" for that particular charter school.[3] Students attending a charter school are eliminated from the match pool for each charter student to ensure VCRs consist entirely of TPS students. The feeder school method provides a strong counterfactual as residential school assignment commonly used to place students in TPS has been shown to group demographically and socioeconomically similar students into schools. This practice increases the likelihood that students assigned to similar schools have similar backgrounds and knowledge of school choice programs and school choice options. Once a school is identified as a feeder school for a particular charter, all the students in that TPS become potential matches for students in that particular charter school. All of the student records from all of a charter's feeder schools were pooled – this became the source of records for creating the virtual twin match.[4]

The VCR matching method then eliminates any of the TPS students from the match pool whose demographic characteristics do not match exactly to the individual charter students. As part of the match process, we also drop from the TPS match pool any students who enrolled in a charter school in subsequent comparison years.

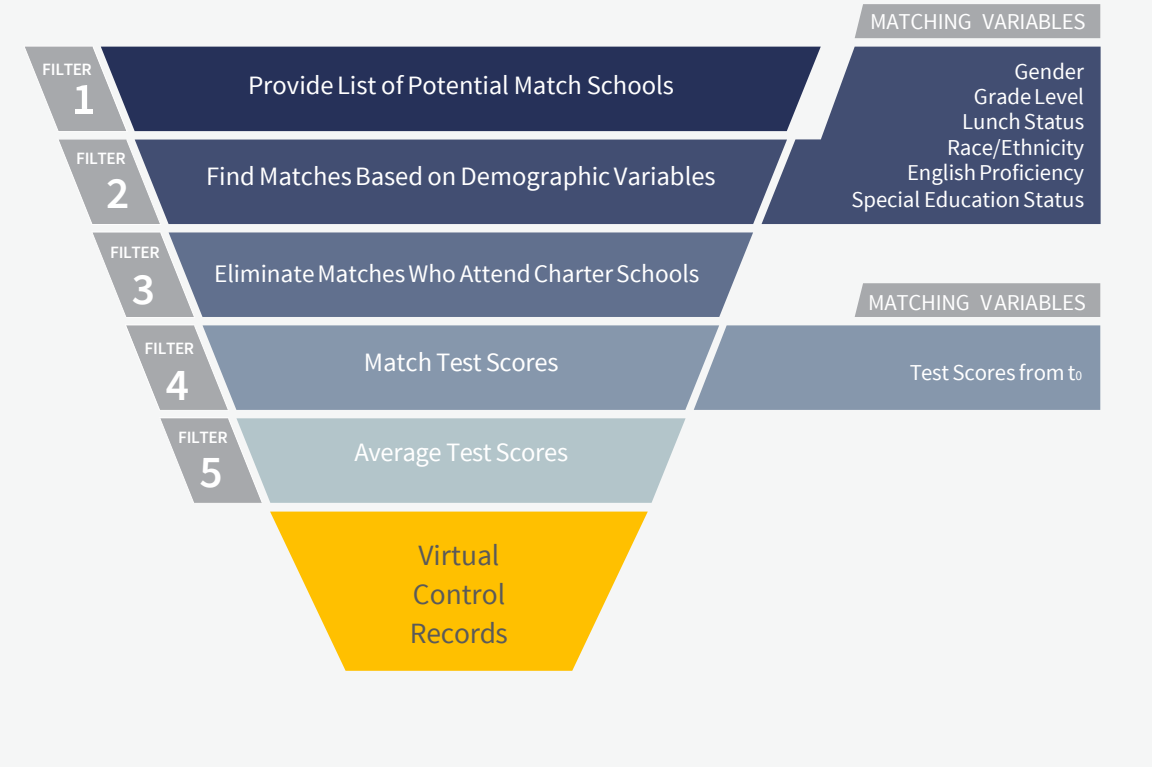
Using the records of TPS students at feeder schools in the year *before* the first year of growth, CREDO randomly selects up to seven TPS students with identical values on the matching variables in Figure 1, including identical or very similar prior test scores. Students with similar test scores were used only when there were not enough TPS students with exact test score matches. The values for the selected TPS

[3] For schools with extremely small feeder lists, we include schools with similar characteristics to the charter school which are not actually feeder schools. This method is primarily used to create VCRs for New Orleans charter students due to the lack of traditional public schools in New Orleans.

[4] Each charter school has its own independent feeder list, and thus a unique pool of potential VCR matches.

students are then averaged to create values for the virtual twin. As all other observable characteristics are identical, the only observable characteristic that differs between the charter student and the VCR is attendance in a charter school. The prior test score represents the impact on academic achievement of both the observable and unobservable student characteristics up to the time of the match, the year before the first growth measurement. Since we matched on observable characteristics and the prior test scores, we concluded that any differences in the post-test scores are primarily attributable to charter school attendance.

Figure 1: CREDO VCR Methodology



Basic Analytic Model

The primary question for this study is, "Do students enrolled in charter schools which are part of a larger network have different growth compared to students enrolled in independent charter schools?" To answer this central question, we need to address multiple lines of inquiry around enrollment in charter schools. To begin, we need to estimate how students who attend different types of charter schools perform compared to how we would have expected them to perform if they had attended traditional public schools. Then we estimate the differences in those differences to determine the value of attending a network charter school compared to an independent charter school.

The primary methodological challenge associated with any study of charter schools is selection bias. Even after controlling for student characteristics such as gender, poverty, race and ethnicity, the fact that

some students choose to enroll in charter schools and other students do not may indicate the existence of some unobserved difference between the two groups of students. The ideal solution to this problem is a randomized experiment that creates a control group that is identical to the treatment group before entering the charter school. Several charter school studies have used admissions lotteries in oversubscribed charter schools to conduct randomized experiments. The approach is not applicable to most charter schools as enrollments are not robust enough to generate a sufficient control group. Additionally, students who lose the lottery are not constrained to attend a TPS. They can and often do attend another charter school. This makes generalizing the results of a randomized control trial to the charter-to-TPS question more difficult.

In the absence of a randomized experiment, several recent studies have demonstrated that it is possible to successfully address selection bias by accounting for students' prior academic achievement levels before entering charter schools (Nichols-Barrer et al. 2016; Furgeson et al. 2012; Fortson et al. 2015). The three previous studies of the achievement effects of charter schools used variations on this approach. Unfortunately, however, it is not clear that the approach can succeed in eliminating all selection bias in the context of charter schools.

For this analysis we used the virtual control records (VCRs) method developed by CREDO (Davis and Raymond 2012), involving virtual controls that closely mirror the matched charter school students on known demographic attributes, eligibility or participation in special support programs (free or reduced-price lunch, English language learners or special education) and prior academic achievement. In order to determine the impact of attending a charter school on student academic growth (the change in academic achievement), we employed statistical models which compare charter students to their virtual twins. The virtual twins represent the expected performance of charter students had they not enrolled in charter schools. The VCR method has been shown to produce results similar to those obtained with randomized control trials and student fixed-effects approaches (Davis and Raymond 2012), such as those used in several published studies of charter-school impacts (for example, Bifulco and Ladd 2006; Booker et al. 2007; Zimmer et al. 2003, 2009).

Presentation of Results

In this report, we present the impacts of attending charter schools in terms of standard deviations. The base measures for these outcomes are referred to in statistics as z-scores. A z-score of 0 indicates the student's achievement is average for his or her grade. Positive values represent higher performance while negative values represent lower performance. Likewise, a positive effect size value means a student or group of students has improved relative to the students in the state taking the same exam. This remains true regardless of the absolute level of achievement for those students. As with the z-scores, a negative effect size means the students have on average lost ground compared to their peers.

It is important to remember that a school can have a positive effect size for its students (students are improving) but still have below-average achievement. Students with consistently positive effect sizes will

eventually close the achievement gap if given enough time; however, such growth might take longer to close a particular gap than students spend in school.

While it is fair to compare two effect sizes relationally (i.e., 0.08 is twice 0.04), this must be done with care as to the size of the lower value. It would be misleading to state one group grew twice as much as another if the values were extremely small such as 0.0001 and 0.0002.

Finally, it is important to consider if an effect size is significant or not. In statistical models, values which are not statistically significant should be considered as no different from zero. Two effect sizes, one equal to .001 and the other equal to .01, would both be treated as no effect if neither were statistically significant.

To assist the reader in interpreting the meaning of effect sizes, we include an estimate of the average number of days of learning required to achieve a particular effect size. This estimate is based on computations by Eric Hanushek and Margaret Raymond. Hanushek and Raymond created the estimate by examining average growth from fourth grade to eighth grade on the National Assessment of Educational Progress (NAEP). The previous translation used in CREDO reports relied on work from Hanushek, Woessmann and Peterson (2012) and estimated the growth rate at 720 days of learning per standard deviation. Incorporating the 2015 NAEP results in reading and math has led to a refinement of the days of learning translation. With the addition of the 2015 NAEP data and taking the average of separate growth estimates for reading and math, the new estimated growth rate is 570 days per standard deviation of growth. We wish to emphasize that the days of learning translation is only meant to be a loose approximation of the effect size to provide a sense of scale to aid the reader in interpreting the effect sizes. The effect sizes are the mathematically computed measures produced by the statistical models and should be the basis for policy decisions.

3. School and Student Demographics

In the 2014-15 school year, there were 101,879 public schools across the country. In Figure 2, the left pie chart indicates the portion of public schools which are TPS, 92 percent, and the portion which are charter, 8 percent. The pie chart on the right shows the percentage of schools from the 2014-15 school year in each charter sector. Of the 8 percent of charter schools in the country, 68 percent are independent charter schools. These schools are typically operated by nonprofit organizations. An additional 22 percent of charter schools are part of a CMO. Only 8 percent of schools are affiliated with a VOS. Finally, 1 percent of charter schools are associated with both a CMO and a VOS. Schools in the CMO, VOS, or HYBRID sectors can be nonprofit or for-profit depending on the network to which they belong.

Figure 2: Percent of All Public Schools in Each Sector, 2014-15 National Data

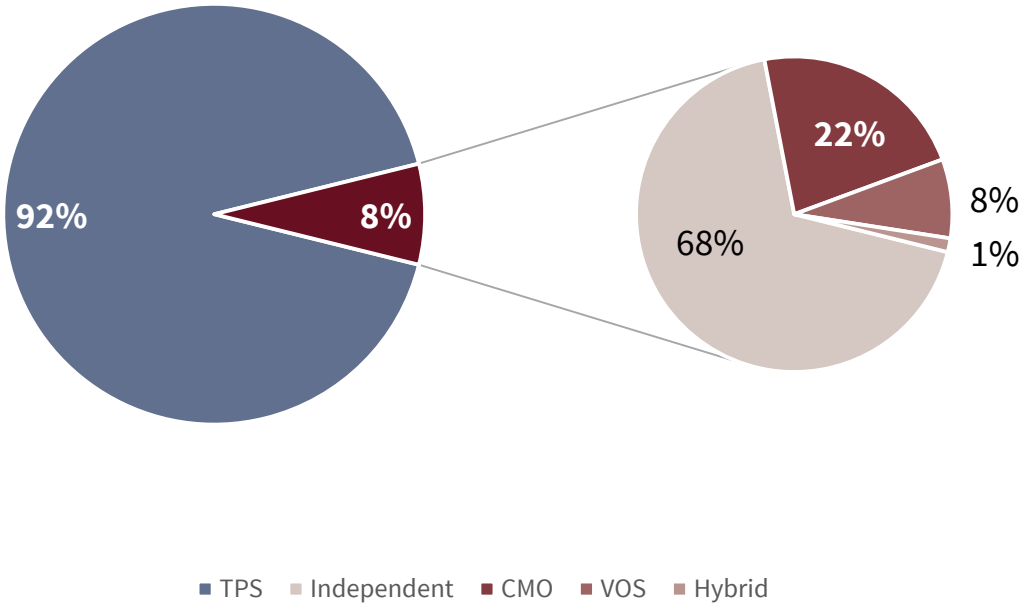
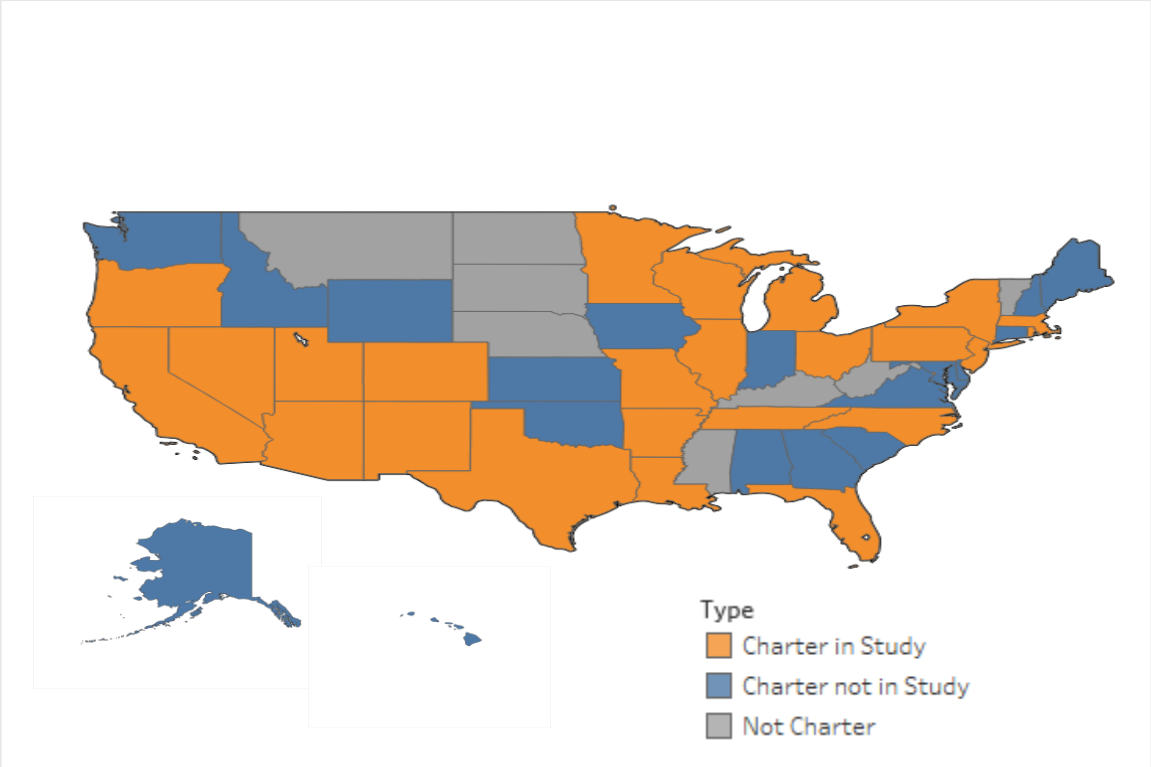


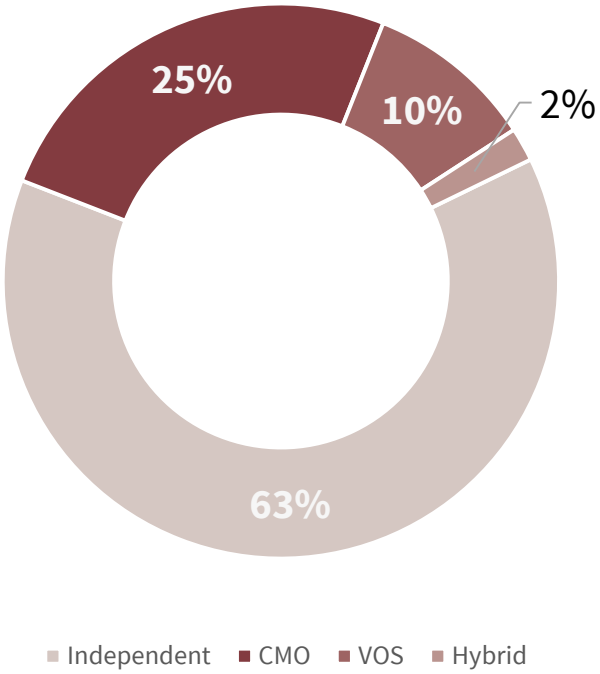
Figure 2 includes data for every public school in America. While CREDO has data agreements with the majority of states with charter schools, this study does not include every state. The map in Figure 3 shows the states included in this study in orange. States in blue had charter schools in the 2014-15 school year but are not included in the study. States in gray had no provisions to permit charter schools in the 2014-15 school year.

Figure 3: States Included in the Data Set by Charter Status



Because the data sample for this report does not include every state in the country, the composition of the sample is slightly different from the national population. Within the data sample for this report, the distribution of charter schools between the sectors remains similar to that of the national distribution. In Figure 4, 63 percent of charter schools in the sample are independent charter schools as compared to 68 percent nationally. The difference is split evenly among the CMO, VOS and Hybrid sectors.

Figure 4: Percentage of Schools by Charter Sector, Analytic Sample



A relationship exists between the charter sectors and school locale. Schools belonging to VOS networks are more likely to be located in a suburban setting. The majority of the Hybrid schools are located in suburban settings. While the majority of independent charters, CMOs and VOSs are located in urban settings, CMO network schools are far more likely to be located in an urban setting compared to the other sectors of charter schools. This likely has an impact on the characteristics of the students who attend schools in each sector. Figure 5 includes the percentage of charter schools in each locale by charter sector.

Figure 5: Percentage of Schools in Each Locale by Charter Sector, Analytic Sample

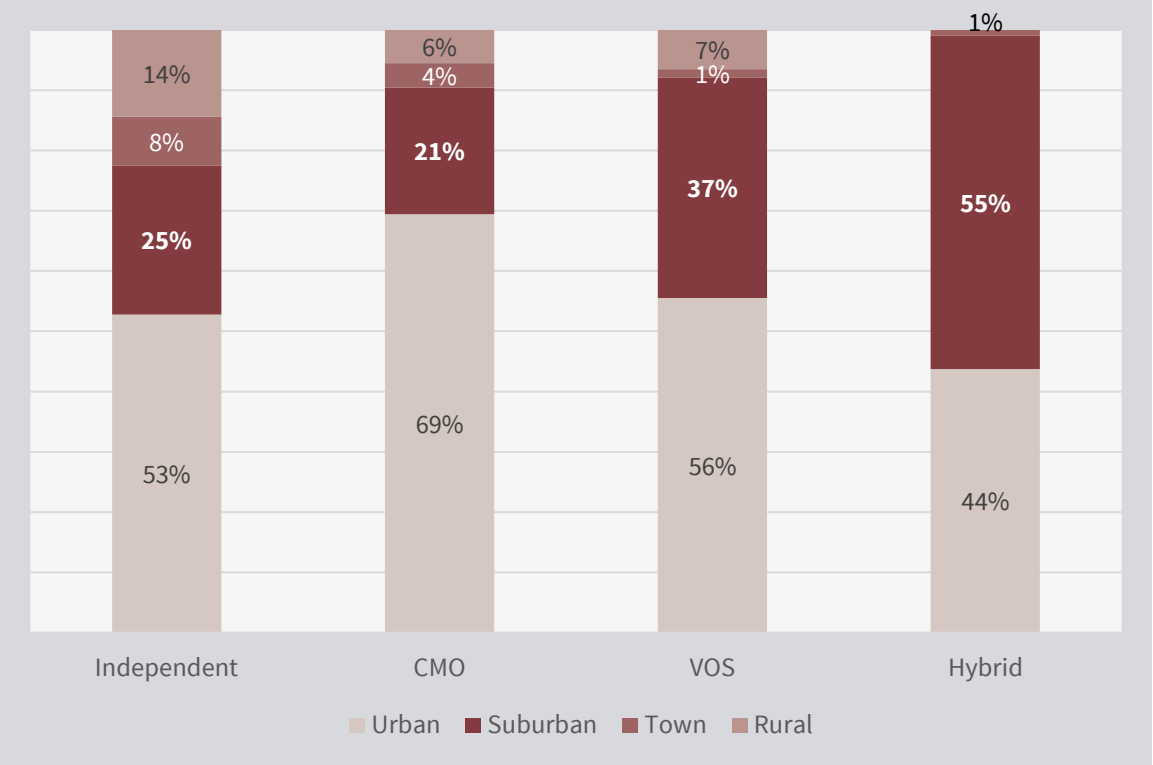


Table 3 shows the one-year characteristics of the student bodies in charter schools, the TPS feeder schools and all traditional public schools for the states included in the impact analysis. The major difference between the charter students and the students attending feeder schools is that the percentage of white students enrolled in the charter schools (34 percent) is lower than the percentage of white students attending both All TPS (48 percent) and feeder schools (39 percent). The difference in the percentage of white students is offset by an increase in the percentage of black students enrolled in charter schools. Across the dataset, 27 percent of students enrolled in charter schools are black, but black students make up only 13 percent of the sample's TPS population and 15 percent of the feeder schools population. Enrollment for other racial/ethnic groups is consistent between TPS and charter schools, except that charter schools serve a smaller percentage of Hispanic students (31 percent) compared to their feeder schools (36 percent).

Students from feeder schools and those enrolled in charter schools are more likely to be in poverty than the general TPS population. Charter schools serve a slightly smaller percentage of English language learners (10 percent) than the feeder schools (13 percent). Also, the percentage of students who require special education services is consistent across all three sectors, with 12 percent of TPS students and 10 percent of charter students receiving special education services.

Table 3: Student Population Demographics by Sector

	All TPS	TPS Feeder Schools	Charter Schools
Number of Schools	63,616	32,119	5,786
Percent Students in Poverty	50%	56%	55%
Percent English Language Learner Students	11%	13%	10%
Percent Special Education Students	12%	12%	10%
Percent White	48%	39%	34%
Percent Black	13%	15%	27%
Percent Hispanic	29%	36%	31%
Percent Asian/Pacific Islander	5%	6%	4%
Percent Native American	1%	1%	1%
Percent Multiracial	2%	2%	2%
Average Total Enrollment per School	555	693	411
Total Enrollment	34,429712	21,582524	2,180,342

The information in Table 3 represents the values for the entire potential data set. Of the 2.2 million students in charter schools, we successfully match 84 percent of students to be included in the analytic data set. Table 4 includes the same categories as Table 3 for the matched charter students broken out by charter sector. Not every charter school serves students in tested grades. Thus, the total number of charter schools in Table 4 is only 5,715 schools. One of the noticeable differences between independent charters and network charters is the higher percentage of students in poverty served by charters in the three network sectors. Additionally, charters associated with CMO organizations have much higher percentages of Hispanic students than do independent charters or TPS, but a lower percentage of English language learners. All three types of network charters serve a higher percentage of black students and a lower percentage of white students than independent charter schools.

Table 4: Student Population Demographics for Matched Data Set by Charter Sector[5]

	Independent Charters	CMO	VOS	Hybrid
Number of Schools	3,608	1,434	561	112
Percent Students in Poverty	53%	68%	58%	71%
Percent English Language Learner Students	6%	9%	4%	4%
Percent Special Education Students	7%	7%	7%	5%
Percent White	41%	23%	37%	10%
Percent Black	24%	31%	33%	33%
Percent Hispanic	29%	42%	25%	55%
Percent Asian/Pacific Islander	4%	3%	3%	1%
Percent Native American	0%	0%	0%	0%
Percent Multiracial	2%	1%	2%	1%
Average Total Enrollment per School	286	358	415	536
Total Enrollment	1,032,417	513,367	233,031	60,042

The majority of charter schools are operated by nonprofit organizations. However, in some states for-profit organizations are allowed to operate charter schools or provide services to charter schools as VOSs. One common question around for-profit charter school operations is whether charter schools operated by for-profit organizations have different growth from that of TPS and nonprofit charter schools. As part of this analysis, CREDO identified those charter networks which operate for-profit and we produce an estimate of the effect sizes of nonprofit charter schools and those which operate with a for-profit partner.[6]

The majority of students, 82 percent, attend a nonprofit charter school. The percentage of students attending a for-profit charter school is consistent across most student subpopulations. The only exceptions are for Asian students, multiracial students and ELL students (see Table 5). Only 13 percent of Asian students and 11 percent of ELL students attend a for-profit school. Twenty-five percent of multiracial students attend for-profit charter schools. This rate is higher than the other race/ethnic groups.

[5] Hybrid schools are listed as a separate sector and are not included in the CMO or VOS values.
[6] Independent charter schools are assumed to be nonprofit. While a small percentage of independent charter schools might be for-profit, the estimate provided is for corporate for-profit models.

Table 5: Percent of Students Attending Nonprofit and For-Profit Charter Schools

	Nonprofit	For-Profit
Black	82%	18%
Asian / Pacific Islander	87%	13%
Hispanic	83%	17%
Native American	83%	17%
White	80%	20%
Multiracial	75%	25%
Non-Poverty	81%	19%
In Poverty	82%	18%
Non-ELL	81%	19%
In ELL	89%	11%
Non-SPED	82%	18%
In SPED	80%	20%

4. Impact Analysis

For the impact analyses, we compare the growth of students in different charter school sectors to that of their VCRs. This type of analysis provides information about the year-to-year change in achievement relative to that of the rest of the students in the sample. On average, the effect sizes for students attending charter schools are positive but small. A positive effect size means students attending charter schools grew more than they would have been expected to grow in a TPS setting.

Growth by Charter Sector

The first set of analyses examines the academic growth of charter students from various sectors as compared to their matched VCRs. Note that assignment to charter sectors is based on the management structure of the charter network, not profit status. Figures 6 and 7 are agnostic to for-profit/non-profit status. Figure 22 includes a breakout of results by network profit status. Charter students attending an independent, non-network-affiliated charter school have similar growth to their VCRs as do students attending a charter school affiliated with a VOS. Students attending a charter school affiliated with a CMO tend to have stronger math growth equivalent to approximately 17 days of additional class time. The strongest effect in math is for students attending schools which are affiliated with both a CMO and a VOS. The effect for these students is equivalent to 51 days of additional class time.

Figure 6: Impact by Charter Sector Attendance on Average Student Academic Growth, Math

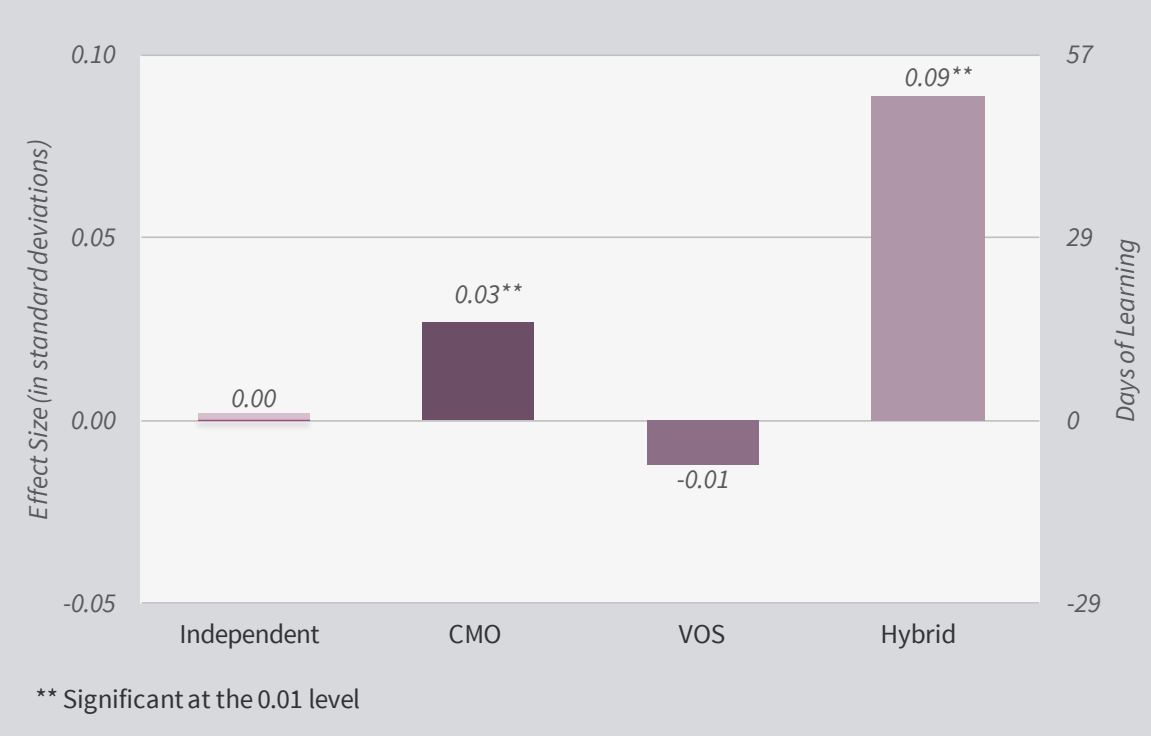
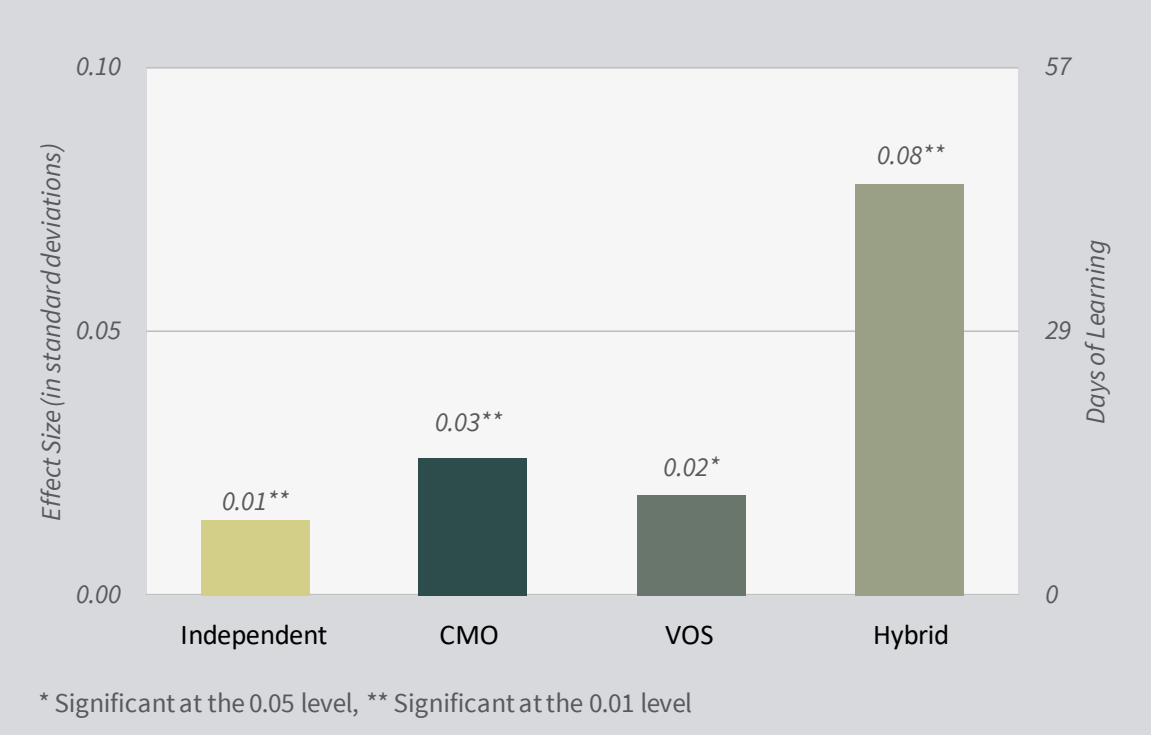


Figure 7 shows the results of the primary analysis for reading. Across all four sectors of charter schools the impact of attending a charter school is significant and positive in reading. As with math, the effects

are smallest for non-network and VOS schools and largest for schools affiliated with both a CMO and a VOS. Students attending a non-network-affiliated charter school are expected on average to experience the equivalent of an additional six days of growth per school year; VOS students 11 days; CMO students 17 days; and students attending Hybrid schools are gaining the equivalent of approximately 46 days of additional learning.

Figure 7: Impact by Charter Sector Attendance on Average Student Academic Growth, Reading

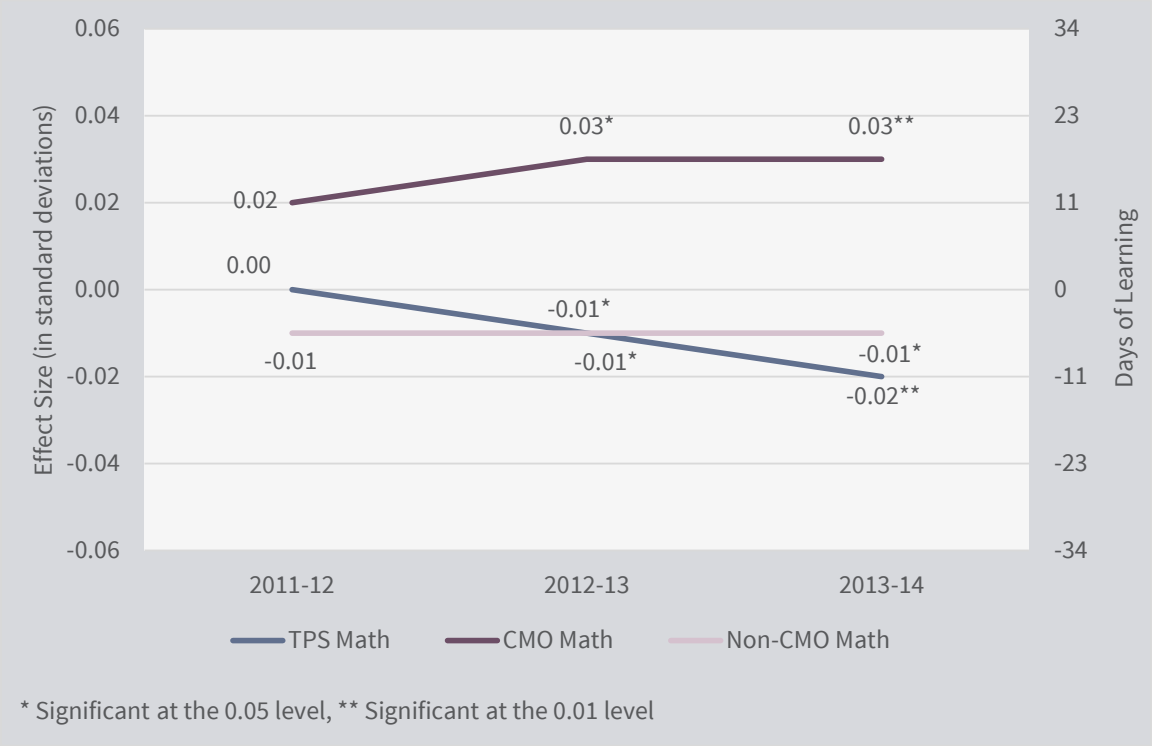


These results cover all students with a growth measure (i.e., at least two years of tested performance) in all the states in all the periods. They show that, overall, students attending charter schools have stronger growth than those attending TPS. The all-in figures, however, mask the story of the underlying data. In most common usages, the term "growth" indicates an increase; however, in statistical terms, growth can be positive, an increase in value, or negative, a decrease in value. To explore whether the positive charter effects are due to increases in growth for charter school students or decreases for TPS students, we need to examine the changes in growth over time. Figures 8 through 12 look at the by-year growth for the sectors. For this analysis, each graph includes three lines. One line represents all TPS students. The second line represents charter students from a given sector. The third line represents the growth of all

the remaining charter students. In all the by-year graphs, the values shown are relative to 2011-12 TPS growth which is set to 0.00.[7]

Figure 8 shows the by-year growth for CMO students in math. Charter students in non-CMO settings have steady growth across the years, whereas CMO charter students see a slight uptick in growth. The TPS students have declining math growth in 2012-13 and 2013-14 relative to TPS growth in 2011-12.

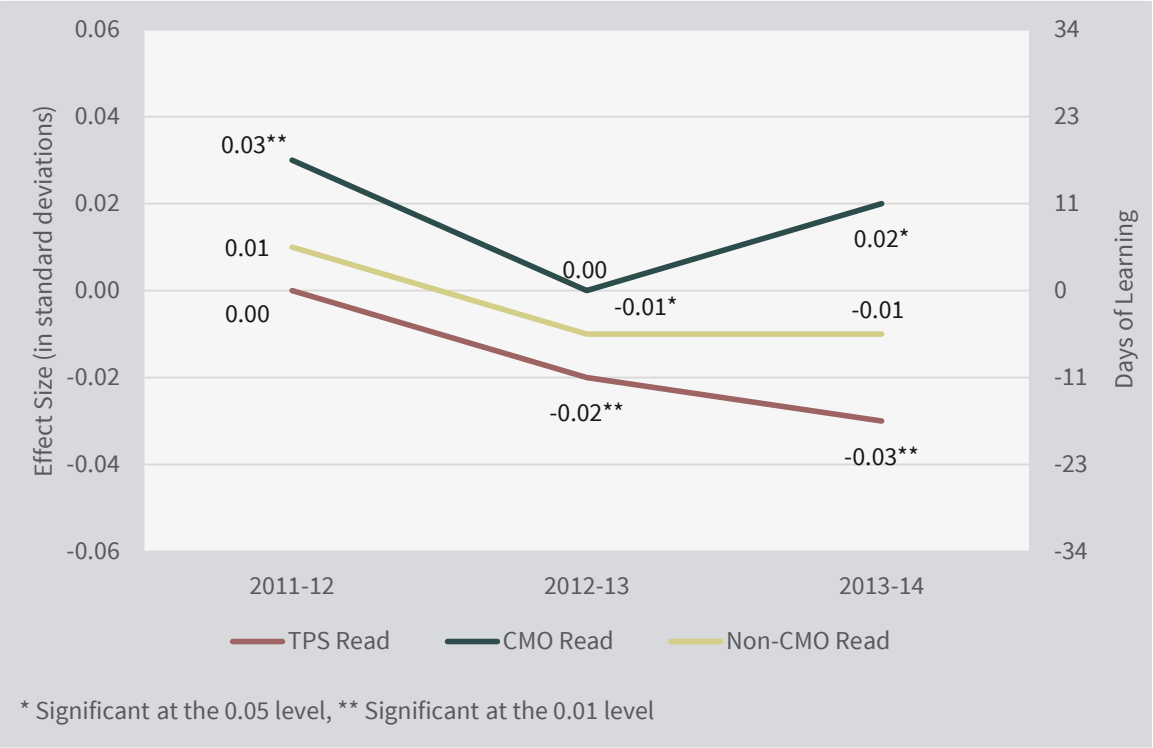
Figure 8: Impact of CMO Charter Attendance on Academic Growth by Year, Math



For reading, Figure 9 shows a small but steady decline in growth across all three groups. Even with their slight decline in growth, CMO students maintain stronger growth relative to non-CMO charter and TPS students in all three growth periods. These findings suggest that the positive charter effect for CMO charter students in reading is due in part to declining growth of TPS students.

[7] This means the asterisks for statistical significance indicate whether a value is significantly different from TPS growth in 2011-12. The asterisks do not indicate significance between charter and TPS pairs in a given year.

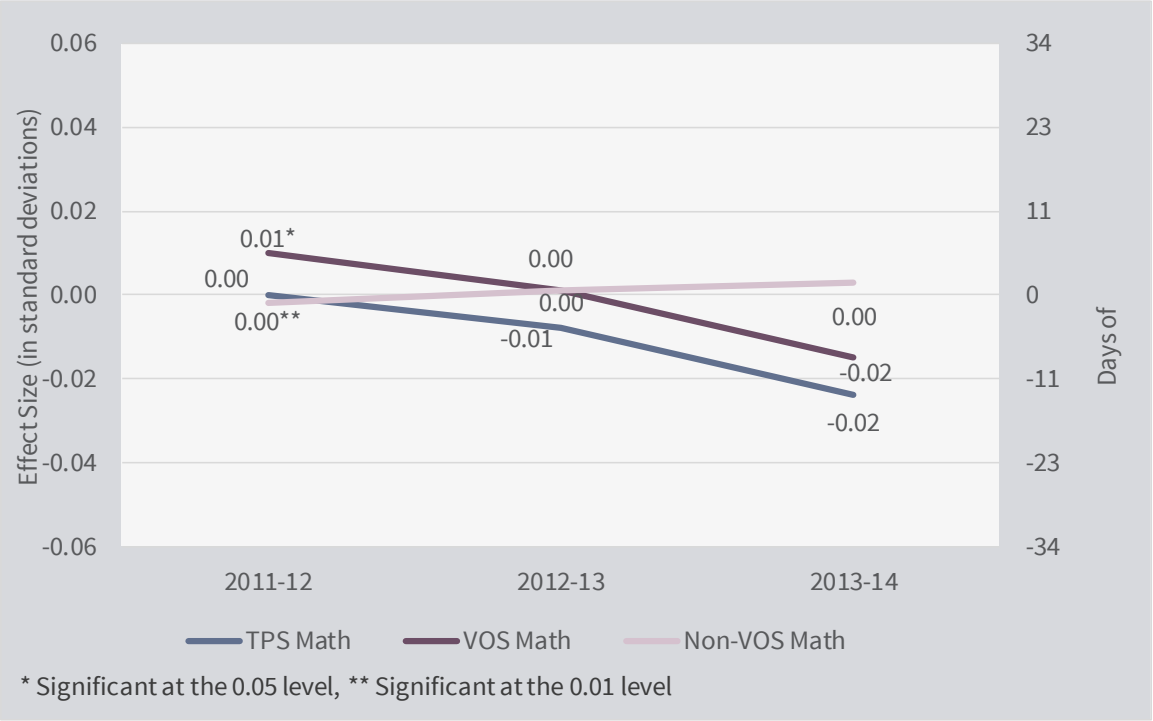
Figure 9: Impact of CMO Charter Attendance on Academic Growth by Year, Reading



Students attending VOS charter schools see a decline in math growth over the years (Figure 10). The decline in math growth for VOS students almost exactly mirrors the decline for TPS students. This aligns with the overall not-significant finding in math for VOS students (see Figure 6).

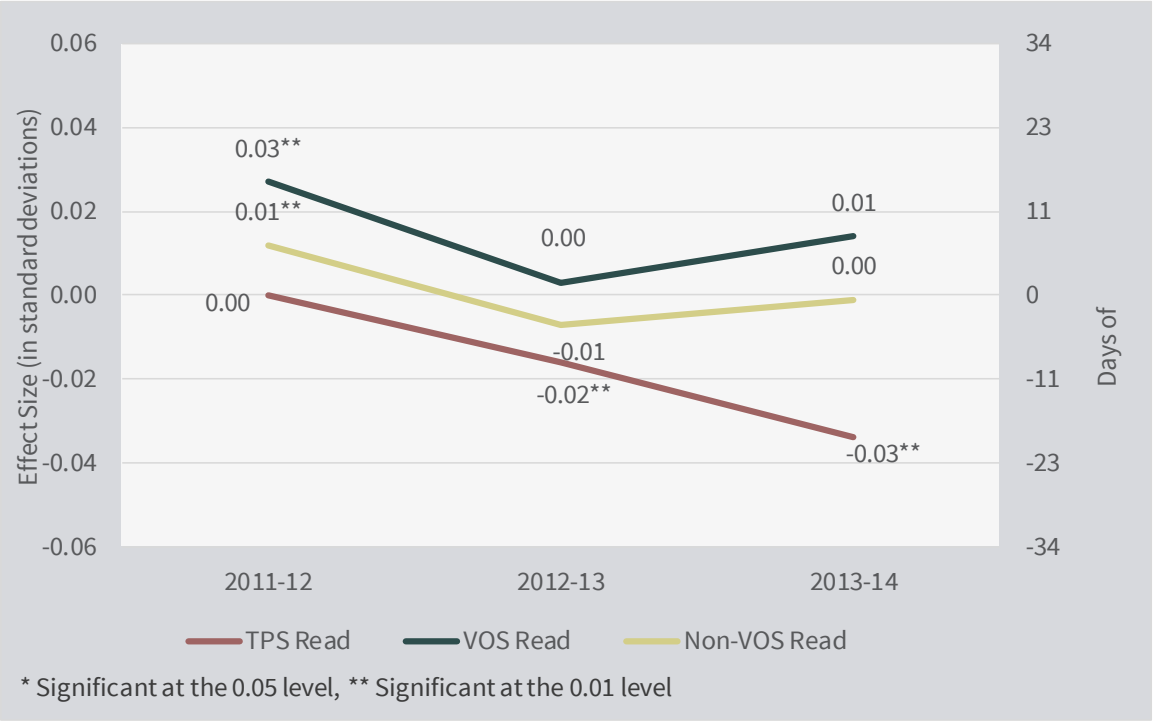
Reading growth patterns for VOS schools (see Figure 11) are similar over time to growth patterns for CMO schools. While the TPS baseline drops from year to year, VOS growth takes a dip in the 2012-13 growth year but then recovers part of the drop in 2013-14. The similarity in growth patterns for the VOS and CMO sectors aligns with the similarity in overall reading results in the two sectors.

Figure 10: Impact of VOS Charter Attendance on Academic Growth by Year, Math



* Significant at the 0.05 level, ** Significant at the 0.01 level

Figure 11: Impact of VOS Charter Attendance on Academic Growth by Year, Reading



* Significant at the 0.05 level, ** Significant at the 0.01 level

The math growth results for schools which are part of both a CMO and a VOS show a large drop in their growth rate during the 2013-14 growth year (Figure 12). However, their growth remains much stronger across all years than the non-Hybrid schools and TPS. Likewise, Figure 13 shows the reading growth for Hybrid schools slowing over the years, but remaining strong relative to the TPS sector reading growth.

Figure 12: Impact of Hybrid Charter Attendance on Academic Growth by Year, Math

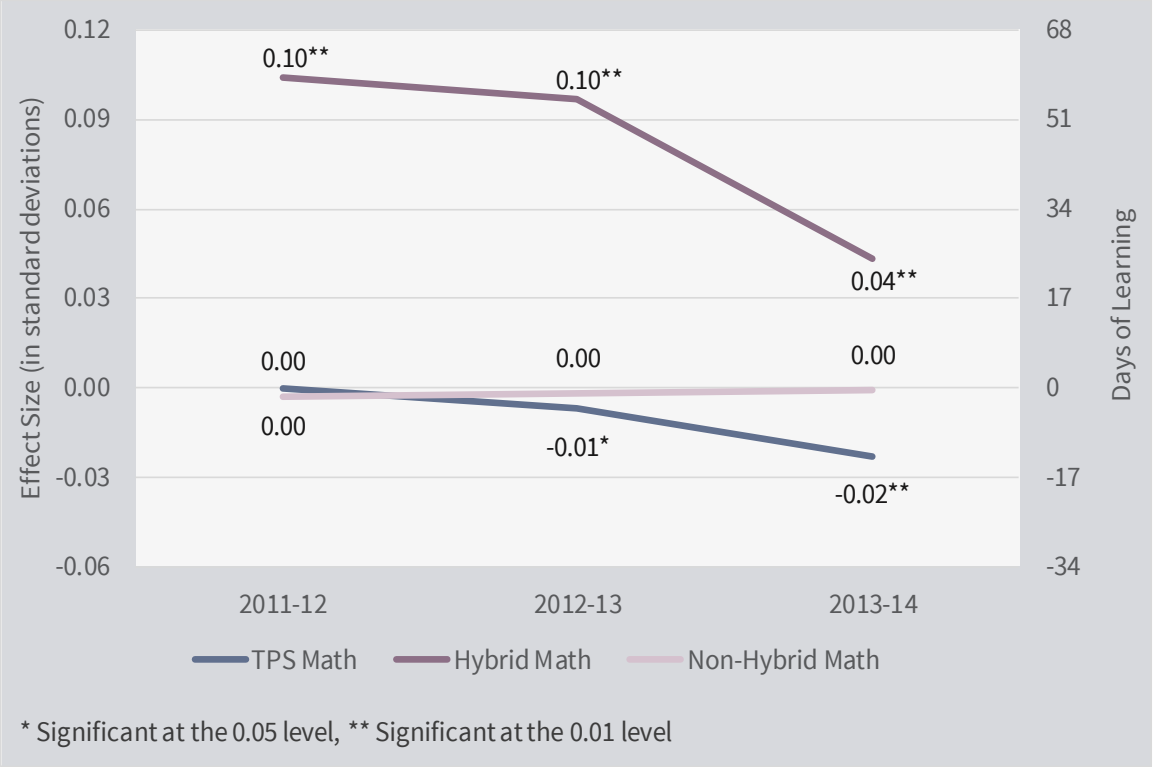
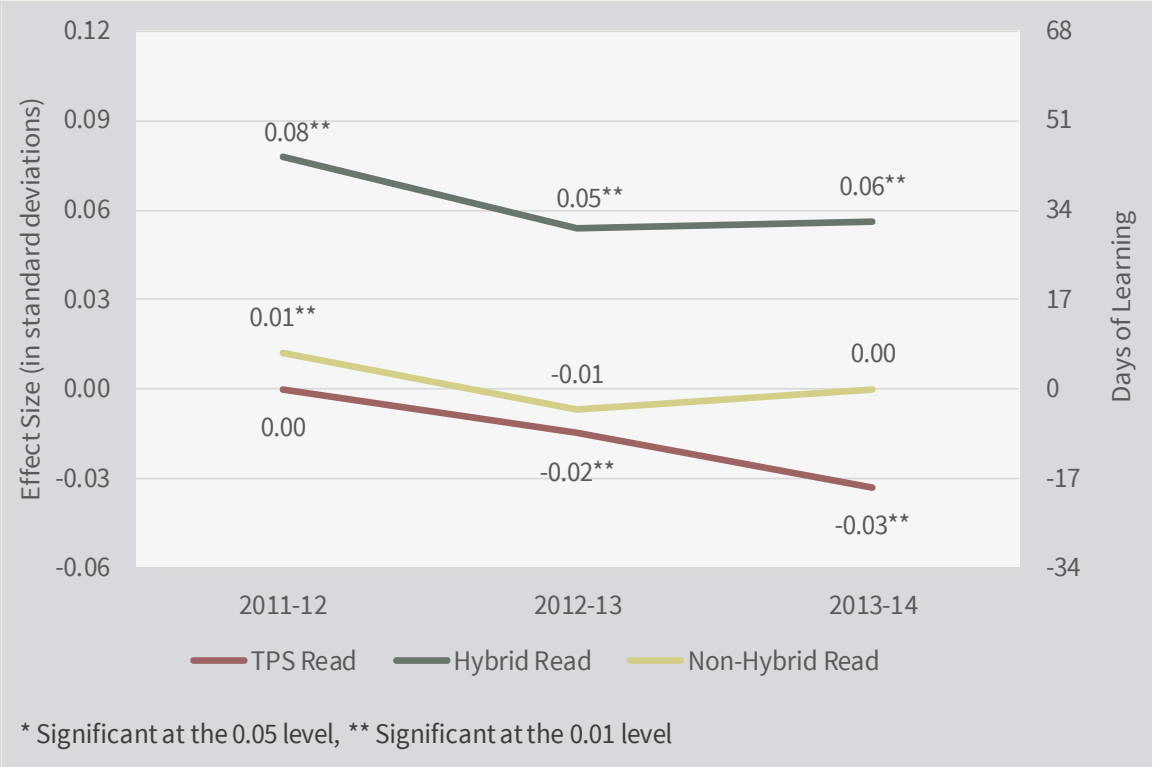


Figure 13: Impact of Hybrid Charter Attendance on Academic Growth by Year, Reading

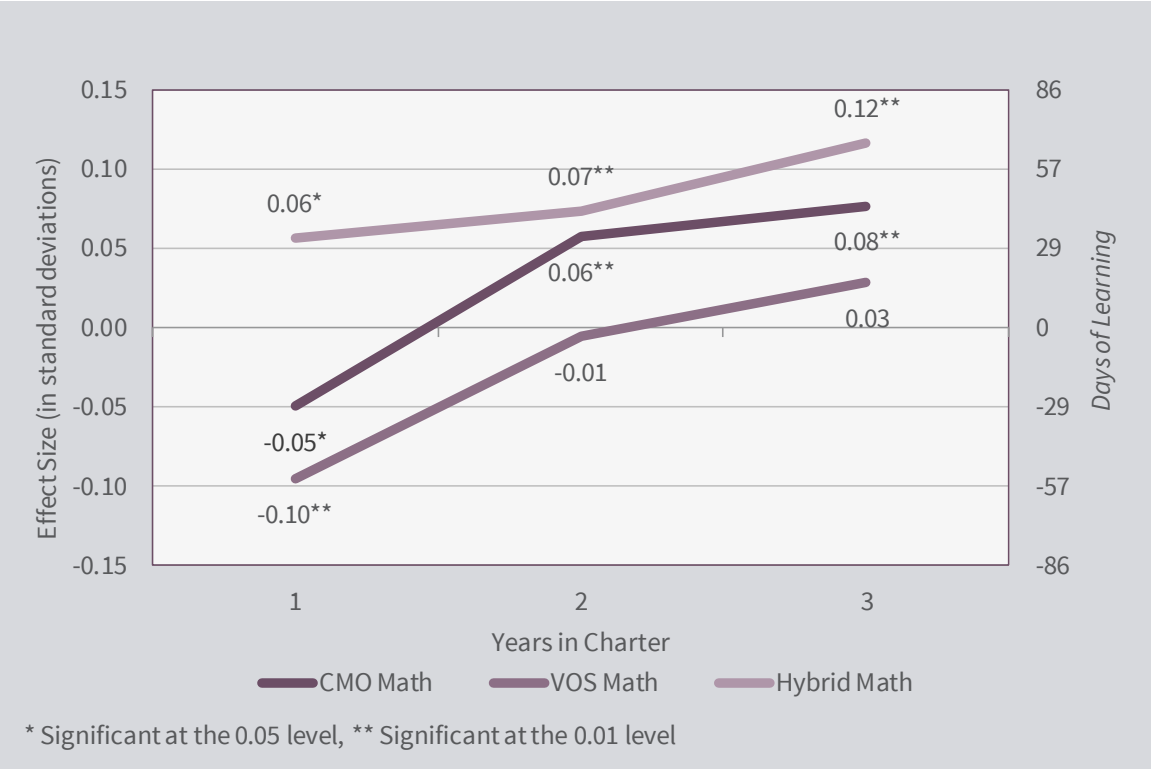


Overall, the growth of TPS students declines in the later years of the study, especially in reading. But with the exception of CMO math, the growth of students in each of the charter sectors also slows. This suggests the overall charter school effects we see are the result of charter students consistently obtaining stronger growth relative to the TPS sector across the entire timeline of the study even though charter growth has slowed somewhat since 2011-12. The results are consistent over time and are not caused by an anomalous single year of growth.

Results by Years in Charter

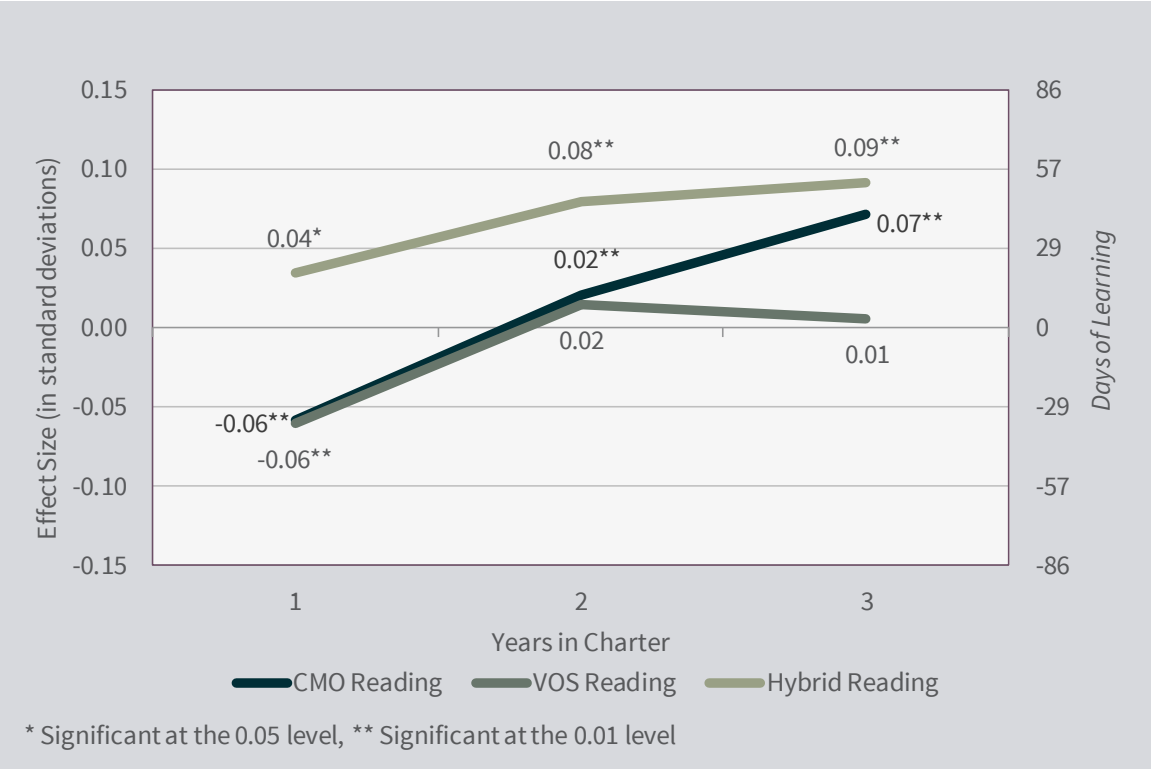
The effects on charter student growth are not constant with every year of enrollment. Typically, students in their first year at a charter school have weaker growth than their TPS peers. The trend reverses in the second year, often becoming significantly positive. In all three charter sectors, annual growth improves the longer students remain in charter schools. Figure 14 shows results from the statistical models for each sector in math. The pattern of improving growth can clearly be seen.

Figure 14: Annual Growth Rates Based on Years in Charter by Charter Sector, Math



The same pattern of increasing growth can also be seen in all three sectors in reading. As Figures 15 and 16 show, in both math and reading, students attending charter schools affiliated with both a CMO and a VOS had the strongest growth. However, CMO-affiliated students had the strongest increase in growth with additional years in charter schools in both math and reading.

Figure 15: Annual Growth Rates Based on Years in Charter by Charter Sector, Reading



Figures 14 and 15 include data from three different statistical models (CMO, VOS and Hybrid). Results for each individual sector's charters compared to non-sector charters are available in the data appendix.

Results by School Level

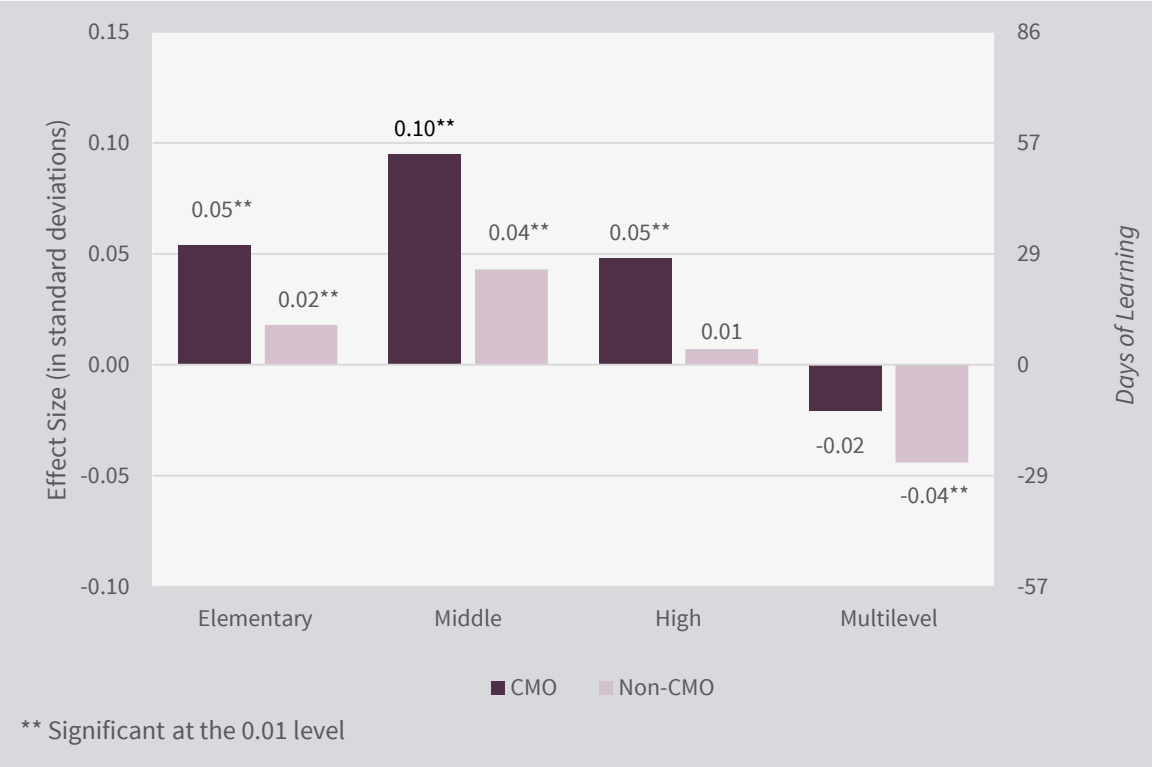
The National Center for Education Statistics (NCES) classifies schools into levels based on the grades served by the schools. Prior CREDO studies show that attending a charter school has different effects by school level. Generally, high schools[8] and multilevel schools have weaker charter effects than elementary and middle schools. Typically, the strongest charter effects are found in schools classified as middle schools.

All levels of CMO charter schools have significantly stronger math growth compared to TPS peers with the exception of CMO multilevel charter schools. As expected, Figure 16 shows CMO middle schools have the strongest results in math at 0.10 or 57 additional days of learning. CMO multilevel charter schools perform similarly to TPS multilevel schools, and non-CMO multilevel charters have weaker growth than their TPS peers. In addition to having stronger impacts than TPS schools, CMO elementary, middle and

[8] NCES classifies a school as a high school only if the school serves 12th grade students. CREDO classifies schools as high schools if the lowest grade in the school is ninth grade or above.

high schools have significantly stronger growth than the non-CMO schools of the same level. Effect size differences between CMO and non-CMO multilevel schools were not significantly different from each other.

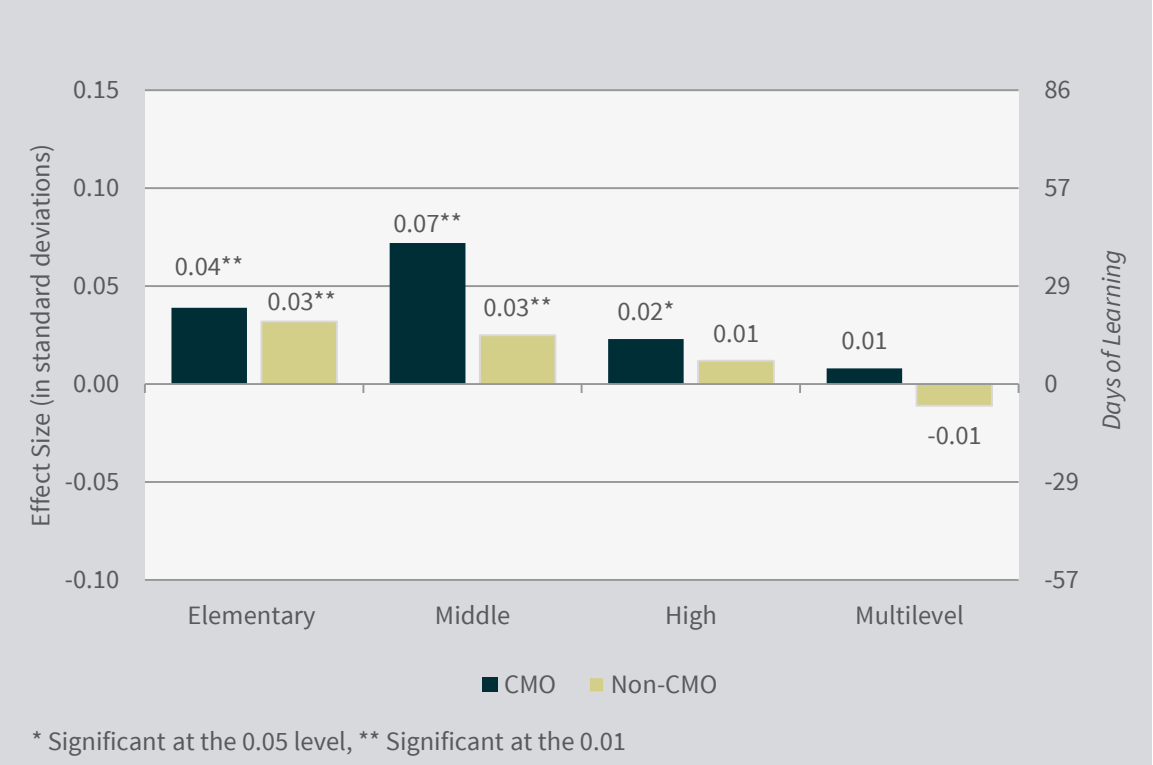
Figure 16: Impact of CMO Charter Attendance by Level, Math



The 0.00 line represents the average TPS growth for each level.

The reading results for CMO schools (see Figure 17) follow the same general pattern as CMO math except that the effect sizes in reading are smaller in magnitude than the math results. The largest reading effect size, 0.07, is equivalent to 40 days additional growth. As with math, middle school students attending a CMO charter school had the strongest growth of the three sectors (CMO, non-CMO charters and TPS). Only CMO middle schools have significantly different growth than their non-CMO charter peers. Middle school students attending a CMO middle school have reading growth which is 23 days stronger than non-CMO charter middle school students and 40 days stronger than TPS middle school students.

Figure 17: Impact of CMO Charter Attendance by Level, Reading

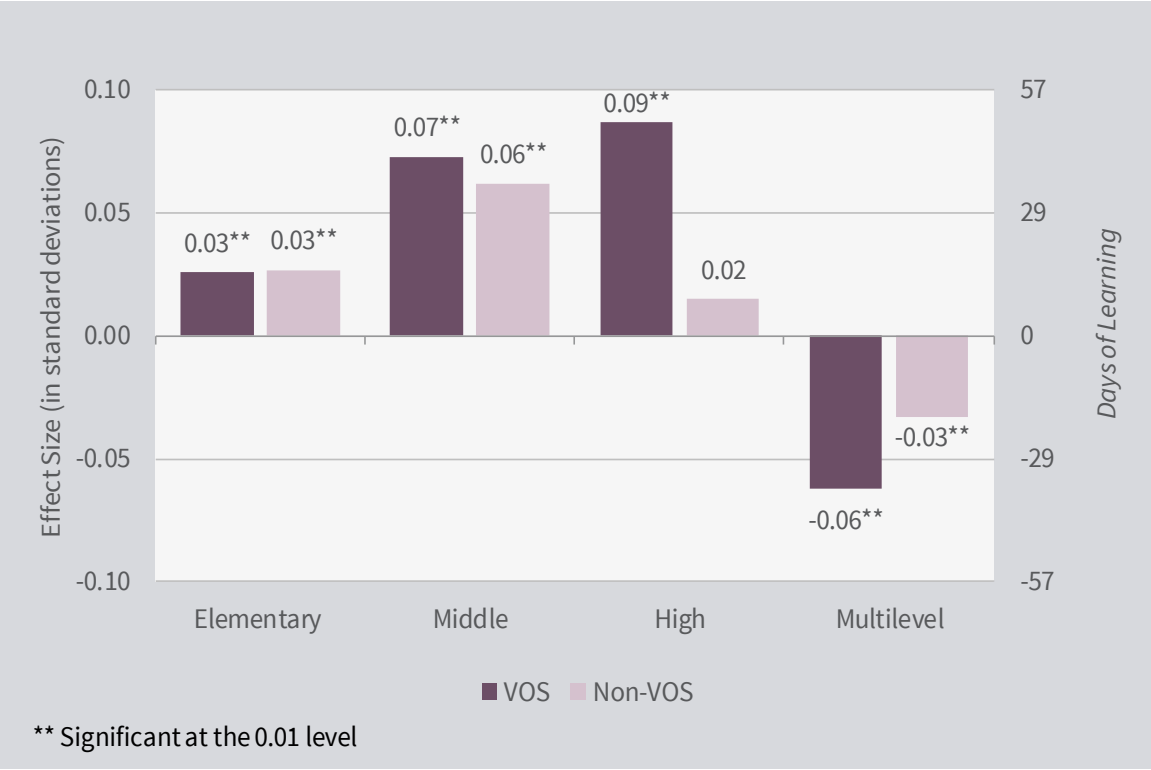


The 0.00 line represents the average TPS growth for each level.

The math effect for VOS charter schools has a different pattern than the patterns we have seen for CMOs (Figure 18). For VOS charter schools, high schools have the strongest effect size, 0.09. Further, multilevel VOS charter schools have particularly weak growth as the effect size is a significant -0.06. Multilevel non-VOS charters also have weaker growth than their TPS counterparts. Only VOS high school students had growth which was significantly different from non-VOS students at the same level. This means typically VOS charter students perform similarly to non-VOS charter students. The difference in effect sizes for students attending a VOS charter high school and those attending a non-VOS charter high school is 0.07[9] or the equivalent of 40 additional days of learning.

[9] 0.09 – 0.02 = 0.07

Figure 18: Impact of VOS Charter Attendance by Level, Math



** Significant at the 0.01 level

The 0.00 line represents the average TPS growth for each level.

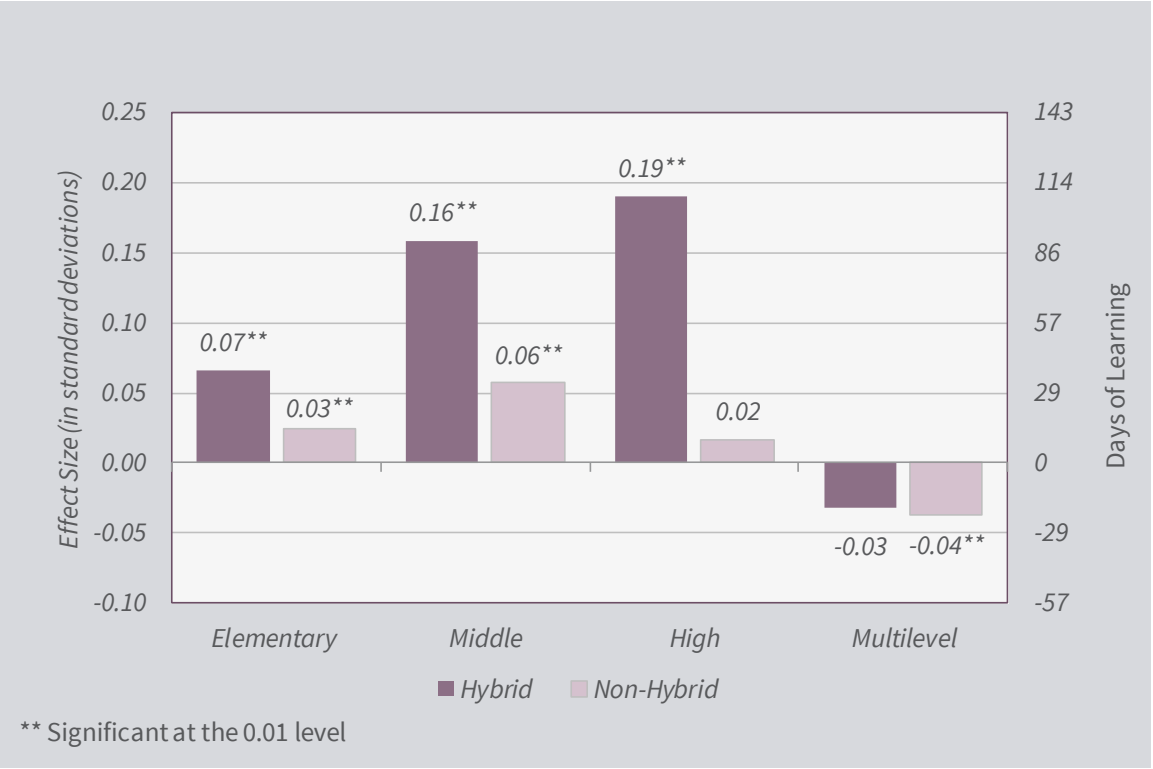
Reading results for VOS charter schools (Figure 19) are similar to CMO charter schools in both pattern and magnitude. Elementary and middle school students attending VOS-affiliated charter schools have significantly different reading growth compared to non-VOS charter schools. The high school and multilevel effects for VOS schools are not significantly different from the effects for non-VOS charter students.

Figure 19: Impact of VOS Charter Attendance by Level, Reading

The 0.00 line represents the average TPS growth for each level.

Charter schools affiliated with both a CMO and a VOS have particularly strong effect sizes for high school students (0.19) and middle school students (0.16) when compared to TPS students. These effects are the equivalent of 108 days and 91 days additional learning, respectively. The middle school and high school differences in effect sizes between Hybrid and non-Hybrid charter schools are also large. The difference between the two charter sectors for high schools is 0.17, roughly 97 days of learning; for middle schools 0.10 (57 days of additional learning); and 0.04 (23 additional days learning) for elementary students. The differences in effect sizes between Hybrid and non-Hybrid multilevel students are not significantly different in math.

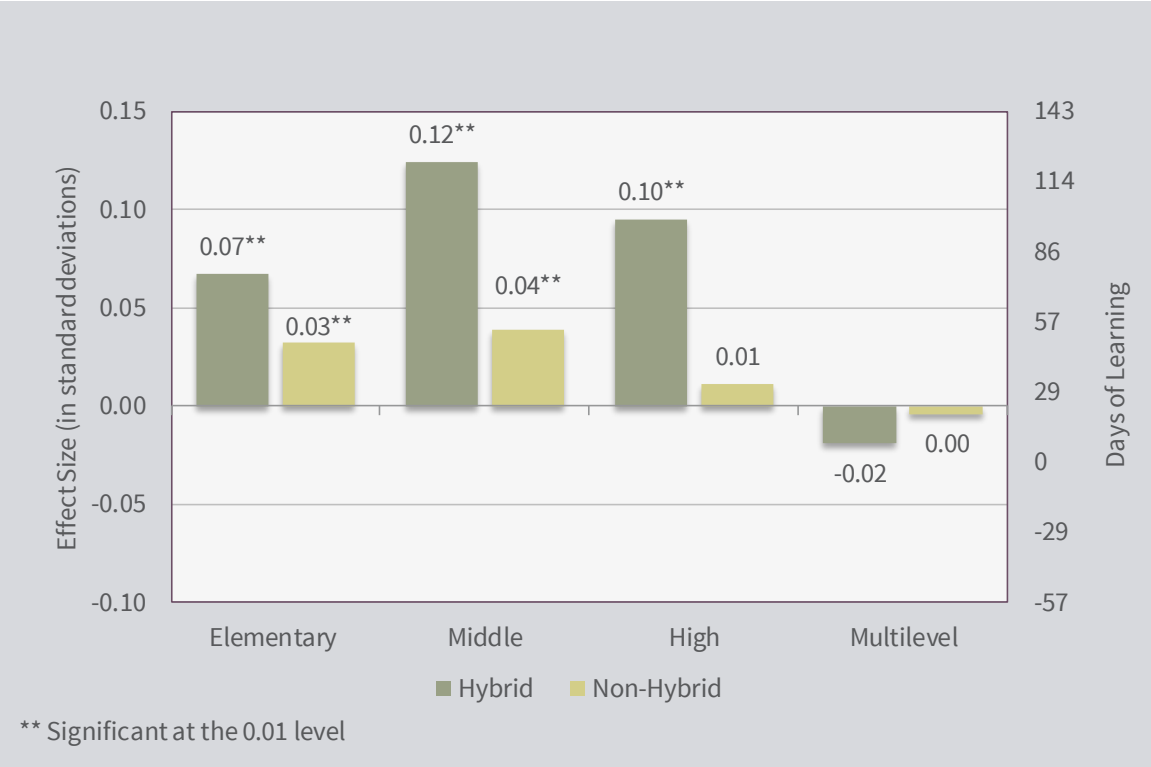
Figure 20: Impact of Hybrid Charter Attendance by Level, Math



The 0.00 line represents the average TPS growth for each level.

The effect sizes in reading for Hybrid charter schools are largest for middle schools (0.12) and high schools (0.10). As with Hybrid results for math, the differences between effect sizes for the two charter sectors, Hybrid and non-Hybrid, are significantly different for elementary, middle and high schools.

Figure 21: Impact of Hybrid Charter Attendance by Level, Reading



The 0.00 line represents the average TPS growth for each level.

Results by Profit Status

As discussed in the demographics section, 18 percent of charter school students attend schools operated by for-profit companies. The question of the performance of for-profit schools frequently arises in discussions of charter school policy. Often, the question is founded on a presumption that for-profit operators prioritize profit over student results or that the profit motive leads to short-run savings that mask longer run harms. On the other hand, profit-oriented operators may be more inclined to seek out ways to increase efficiency and may be able to simultaneously provide services at a lower unit cost as well as create a margin of profit. To investigate, we include a model which compares the performance of schools operated by for-profit companies to their VCRs. We can also compare the effect sizes of for-profit charter schools to those of nonprofit charters. Table 6 includes the number of students served by networks based on charter sector and profit status. We combine all types of for-profit providers for this analysis.

Table 6: Number of Students in Each Sector by Profit Status

	Independent	CMO	VOS	Hybrid
Non-Profit	1,032,417	420,423	32,942	569
For-Profit		94,089	212,051	43,319

In Figure 22 the nonprofit effect sizes are shown in the darker shaded bars while the for-profit effects are in the lighter bars. Nonprofit charter schools have a significant 0.02 effect size in both reading and math when compared to the TPS 0.00 baseline. This means students attending nonprofit charter schools have stronger growth than their VCRs in TPS. For-profit charter schools have a significant negative effect size in math and a non-significant effect in reading. Therefore, we conclude students attending a for-profit charter school have weaker growth in math than they would have in a TPS setting and similar growth in reading. Further, we are able to contrast the effect sizes of for-profit charter schools to those of nonprofit charter schools in both subjects. These comparisons show a significant difference between the two groups in both subjects. This means students in nonprofit charter schools have 0.04 or 23 days stronger math growth than those in for-profit charter schools. Even though the difference between nonprofit and for-profit reading effect sizes is only 0.01 or six days, this small difference is still significant at the .05 level.

Figure 22: Impact of Attending a Nonprofit or For-Profit Charter School, Math and Reading

Results by State

To delve deeper, we also include analyses of charter sectors by state. In the full-data general case analysis, we use statistical methods to control for differences between states. In the charter sector by state analyses, we examine the impact of attendance by charter sectors in each state as compared to the state's average student academic growth. Tables 7 through 9 have six columns of effect sizes. The first and fourth columns represent the average growth in the state for students in the specific charter sector (CMO, VOS, Hybrid) as compared to the VCRs with the first column being math and the fourth reading. The second and fifth columns represent average growth for nonspecific-sector charter students in math and reading, respectively, compared to the VCRs. The third and sixth columns show the difference between the specific sector effect size and nonspecific sector effect sizes. Therefore, Tables 7 through 9 tell us if each charter sector has stronger growth than the VCRs in the state (has a positive number with asterisks) and if one charter sector performs stronger than the other charters in the state (has a positive number with asterisks in the difference column).

In Tables 7 through 9, an effect size of 0.00 indicates students in that charter sector have growth equal to the average VCR student in the state. A positive effect size means the average student in the charter sector has stronger growth than the average VCR student. A negative effect size means growth for charter sector students is weaker than the average VCR comparison student. For columns three and six, a positive effect size indicates the specific sector has stronger growth than the non-sector charter schools. Asterisks represent whether the numbers are significantly different. If the number is not marked with asterisks, consider the value to be effectively zero.

Results for the CMO sector are shown in Table 7. Six states have CMO charter sectors which have stronger math growth than their VCRs and three states have CMO charter sectors with weaker math growth than their VCRs. For the non-CMO charter schools, eight states have significant and positive effects indicating stronger growth and five states have significantly weaker growth in the non-CMO sector. The CMO sectors in several states have large effect sizes. Massachusetts has the largest effect size, 0.31, which would be equivalent to 177 additional days of learning per year. At the same time, CMO charter schools in Nevada have a large negative effect size of -0.23, which would be equivalent to 131 fewer days of learning. These findings of wide variation in charter school performance across states are also found in CREDO's 2013 CGAR study (Woodworth and Raymond 2013). In general, the effect sizes in the non-CMO charter sector are smaller in absolute values than those in the CMO sector.

One of the major questions of this analysis is whether CMO-affiliated charter schools have stronger effects than non-CMO-affiliated schools. To make this comparison requires us to examine the difference between effect sizes. To isolate the difference, we subtract the non-CMO effect size from the CMO effect size for each state and compare them. In six states, the CMO schools have stronger growth than the non-CMO charter schools. However, these are not necessarily the same six states mentioned above with CMO growth stronger than the VCRs. For example, Washington, D.C., has stronger growth in both CMO and

non-CMO charter sectors compared to the VCRs, but neither sector is significantly outperforming the other. While some states have one sector significantly different from TPS and the other sector not significantly different, no states have one sector significantly positive and the other significantly negative. This suggests the two sectors have the same general trend in performance relative to their VCRs. Clearly, though, in some states one sector highly outperforms the other even if both have stronger or weaker growth than the VCRs. Massachusetts stands out as both charter sectors have stronger math growth than the VCRs; the CMO sector has much stronger growth, 125 days stronger, compared to the non-CMO charters. On the other extreme, Nevada again is the standout with its CMO sector having an effect size difference of -0.16, equal to 91 days less growth, compared to non-CMO charters in math, and -0.15, equal to 86 days less growth, in reading.

The patterns for reading are stronger for CMO charters. For reading, 13 states have CMO charter sectors with stronger growth than the VCRs and four states have weaker growth in the CMO sector. For non-CMO charters, 12 states have stronger growth and only three states weaker. When comparing the differences between the two charter sectors, we find six states in which the CMO sector has significantly stronger growth and three where the CMO sector's growth is weaker than the non-CMO charters. Again, if both charter sectors are significantly different from the VCRs, then they are both different in the same direction. That is to say, when both sectors are significant, either both charter sectors are significantly stronger than the VCRs or both sectors are significantly weaker.

Table 7: Performance of CMO and Non-CMO schools by State, Math and Reading

	CMO Math	Non-CMO Math	Difference Math[10]	CMO Reading	Non-CMO Reading	Difference Reading	
AR	0.05	-0.06*	0.10*	0.05*	-0.02	0.07*	Math
AZ	-0.01	-0.02	0.00	0.02	0.03**	-0.01	More than 0.08
CA	0.00	0.00	0.01	0.02*	0.02*	0.00	0.02 to 0 .08
CO	0.10	0.00	0.10	0.08*	0.01	0.07*	-0.02 to 0.02
DC	0.15**	0.13**	0.03	0.09**	0.07**	0.02	-0.02 to -0.08
FL	0.07**	-0.02	0.09**	0.05**	0.00	0.05**	Less than -0.08
IL	0.03	0.01	0.02	0.02	0.01	0.01	
LA	0.06	0.05	0.01	0.03	0.04	-0.01	Reading
MA	0.31**	0.09**	0.22*	0.23**	0.07**	0.17*	More than 0.08
MI	-0.02	0.05**	-0.07*	0.04*	0.07**	-0.03	0.02 to 0 .08
MN	0.00	-0.02	0.02	0.00	0.02	-0.02	-0.02 to 0.02
MO	0.08	0.09**	0.00	0.04	0.08**	-0.05	-0.02 to -0.08
NC	0.06	0.00	0.06	0.05*	0.03**	0.02	Less than -0.08
NJ	0.23	0.09**	0.14	0.20**	0.10**	0.11	
NM	-0.11	-0.02	-0.09	-0.17**	0.00	-0.17**	
NV	-0.23**	-0.07*	-0.16**	-0.19**	-0.05*	-0.15**	
NY	0.25**	0.10**	0.15*	0.15**	0.10**	0.05	
NYC	0.14**	0.06**	0.09**	0.05**	-0.01	0.07**	
OH	-0.02	-0.07*	0.04	-0.01	-0.03	0.01	
OR	-0.16*	-0.05*	-0.11	-0.11*	-0.06**	-0.05	
PA	-0.04	-0.05	0.01	-0.01	-0.02	0.01	
RI	0.22**	0.07**	0.15**	0.21**	0.11**	0.11**	
TN	0.01	0.07*	-0.05	0.05	0.08**	-0.02	
TX	0.02	-0.02	0.04	0.03**	0.01	0.02	
UT	‡	-0.05**		‡	-0.03*		
WI	0.01	0.02	-0.01	0.07	0.03*	0.04	

* Significant at the 0.05 level. **Significant at the 0.01 level.

‡ Data suppressed as number was result of single school.

Several states do not have VOS charter schools or have only one-VOS affiliated charter school. Even though fewer states have VOS charters as compared to CMOs, the findings for VOS and non-VOS charters are more complicated than those for CMO and non-CMO charters. One interesting aspect of the VOS analysis is the existence of differing directions in the effects. For example, in Louisiana, VOS-related charters have a significant negative effect on growth in math while non-VOS charters have a significant positive effect. These types of differences can be informative because they point to locations where differing practices or differing populations may lie at the root of the opposite outcomes for the two sectors. One statistical anomaly in the VOS results is Colorado's math results. While neither VOS nor non-

[10] The differences column is computed by subtracting the non-CMO effect from the CMO effect in each state. Significance of the difference was determined by a Wald test on the regression coefficients.

VOS effects in Colorado are significantly different from their VCRs, the two effects (-0.02 and 0.02) are significantly different from each other. This is the result of smaller sample sizes requiring larger effects to reach significance.

Table 8: Performance of VOS and Non-VOS schools by State, Math and Reading[11]

	VOS Math	Non-VOS Math	Difference Math	VOS Reading	Non-VOS Reading	Difference Reading	
AR	‡	-0.02			0.00		Math
AZ	-0.01	-0.02	0.00	0.04*	0.02*	0.01	More than 0.08
CA	-0.07	0.00	-0.07	0.06*	0.02**	0.04	0.02 to 0 .08
CO	-0.02	0.02	-0.04*	0.01	0.02*	-0.02	-0.02 to 0.02
DC	0.15**	0.14**	0.02	0.06*	0.08**	-0.03	-0.02 to -0.08
FL	0.02	0.00	0.02	0.04**	-0.01	0.04**	Less than -0.08
IL	0.02	0.02	0.00	0.01	0.02	-0.01	
LA	-0.14**	0.08**	-0.22**	-0.03	0.05*	-0.08*	Reading
MA	0.03	0.12**	-0.09	-0.05	0.10**	-0.15**	More than 0.08
MI	0.08**	-0.01	0.08**	0.09**	0.03**	0.06**	0.02 to 0 .08
MO	0.03	0.08*	-0.05	0.07	0.07**	0.00	-0.02 to 0.02
NC	0.04	0.01	0.03	0.01	0.03**	-0.02	-0.02 to -0.08
NM	-0.25**	-0.02	-0.23**	-0.23**	0.00	-0.23**	Less than -0.08
NV	-0.07	-0.12*	0.06	-0.03	-0.10*	0.07	
NY	0.22**	0.12**	0.10	0.12*	0.11**	0.00	
NYC	0.08*	0.10**	-0.02	-0.02	0.02*	-0.04	
OH	-0.02	-0.06**	0.05	0.00	-0.03	0.03	
OR	‡	-0.05*		‡	-0.06**		
PA	-0.04	-0.04	0.01	-0.03	-0.02	-0.01	
TX	-0.20**	0.01	-0.21**	-0.04**	0.03**	-0.07**	
UT	-0.04	-0.06**	0.03	0.01	-0.04**	0.05	
WI	-0.10	0.02	-0.12	0.02	0.03*	-0.01	

* Significant at the 0.05 level. **Significant at the 0.01 level.

‡ Data suppressed as number was result of single school.

Only eight states have charter schools associated with both a CMO and a VOS. Of these, the noticeable standouts are Florida and New York City. In Florida, the Hybrid charter schools have much stronger growth than the non-Hybrid-affiliated charters. The difference in math effect sizes for Florida is 0.14, approximately 80 days of additional learning. In New York City, the effects for Hybrid schools are weaker than those of non-Hybrid schools by -0.10 in math and -0.08 in reading.

[11] Blank values indicate no student attending a VOS took a test in the subject in that state. This is usually because the state does not have VOSs, but could also be because VOSs in the state serve only non-tested grades.

Table 9: Performance of Hybrid and Non-Hybrid schools by State, Math and Reading

	HYBRID Math	Non-HYBRID Math	Difference Math	HYBRID Reading	Non-HYBRID Reading	Difference Reading
AZ	-0.05*	-0.01	-0.04	-0.07	0.02**	-0.09
FL	0.12**	-0.01	0.14**	0.11**	-0.01	0.11**
IL	0.01	0.02	-0.01	0.02	0.01	0.00
MI	0.09*	0.05**	0.05	0.12**	0.07**	0.05**
NC	0.08	0.01	0.07	0.02	0.03**	-0.01
NY	0.13	0.13**	0.00	0.06	0.12**	-0.06
NYC	0.00	0.10**	-0.10*	-0.06*	0.02*	-0.08**
OH	0.02	-0.06**	0.08*	0.00	-0.03	0.02

Math
More than 0.08
0.02 to 0 .08
-0.02 to 0.02
-0.02 to -0.08
Less than -0.08

Reading
More than 0.08
0.02 to 0 .08
-0.02 to 0.02
-0.02 to -0.08
Less than -0.08

* Significant at the 0.05 level. **Significant at the 0.01 level.

Subpopulations

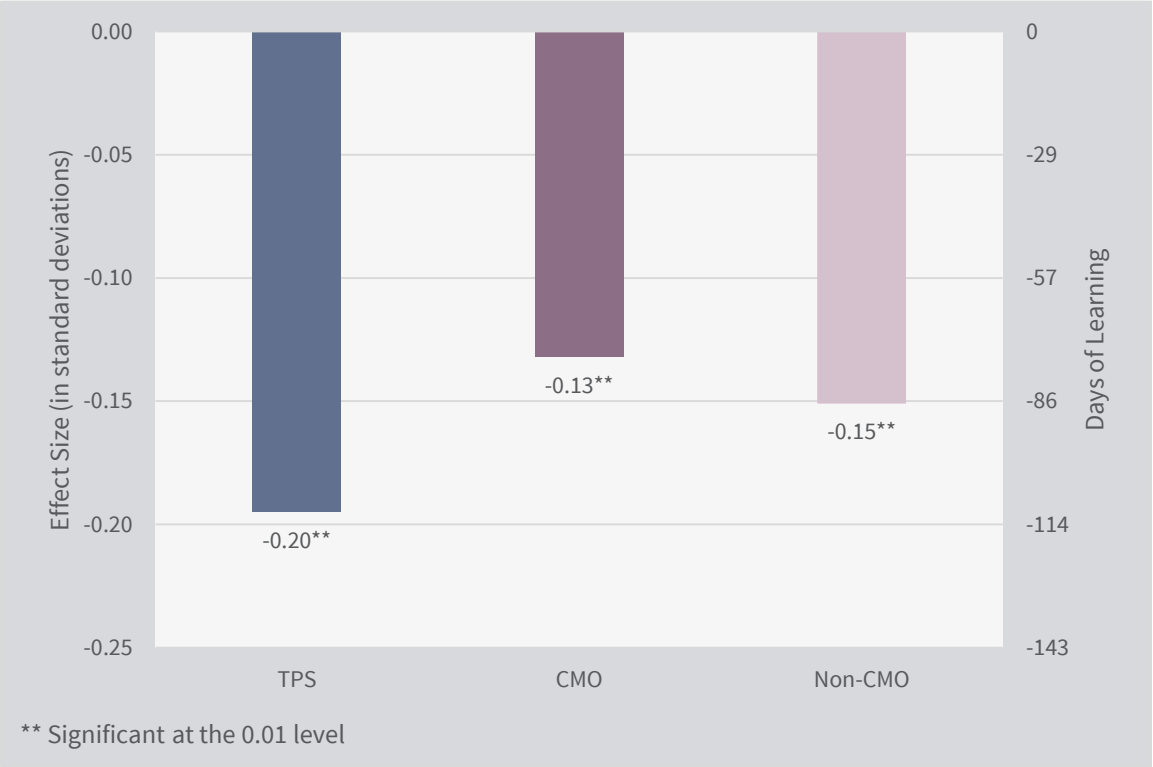
Exploring deeper into the performance question of schools requires us to examine the various subpopulations served by schools. In past studies of charter schools, CREDO has found evidence that students of different racial-ethnic backgrounds receive different impacts on academic growth from attending charter schools (Cremata et al. 2013). It has become standard practice for CREDO to report academic growth by racial-ethnic groups. Part of the motivation for the separate look at each student subgroup stems from the explicit mission of some charter school operators to work with "underserved" populations, those whose students have historically fared poorly in TPS.

Tables 3 and 4 in the previous section provide detailed breakouts of charter student demographics. Charter schools tend to serve a higher percentage of black students and a lower percentage of white students than TPS. Charter schools which are part of a CMO organization tend to serve higher percentages of Hispanic students, but not necessarily more ELL students. The remaining races are represented in charter school enrollment at a rate similar to TPS.

Black Students

The shortcoming of the traditional education system when it comes to serving minority students has long been documented in the United States. Many charter schools are established specifically to serve the unmet needs of black and Hispanic students. Charter schools are touted by many supporters as a means for minority students, especially those in the inner cities, to escape from low-performing TPS. Because an improved outcome for traditionally underserved communities is a major goal of many charter school networks, we place particular focus on these results.

Figure 23: Impact of CMO Charter Attendance for Black Students, Math



For black students attending a charter school, the results are both encouraging and disappointing. Black students attending school in all sectors experience growth which is significantly weaker than white TPS students. The magnitude of the growth difference is disturbing as well. In Figure 23, the 0.00 line represents the average growth of a white student in a TPS setting. The bar on the left is an estimate of the growth of the average black TPS student. The effect size for black TPS students is -0.20, which equates to approximately 114 days less learning than white TPS students. Black students attending a charter school have on average better growth than black students attending a TPS. For black students in a CMO the effect size is -0.13 or 74 days less than white TPS students. The effect size for black students in a non-CMO charter is -0.15 or about 86 days less learning. Figure 23 shows a typical black student will likely get the strongest growth from attending a CMO charter school.

The results for black students attending a VOS school or a Hybrid school are similar to the CMO schools. Black students in VOS charters have an effect size of -0.14 and black students in a Hybrid-affiliated school have an effect size of -0.15.[12] It is disappointing that the best option for black students is to attend a

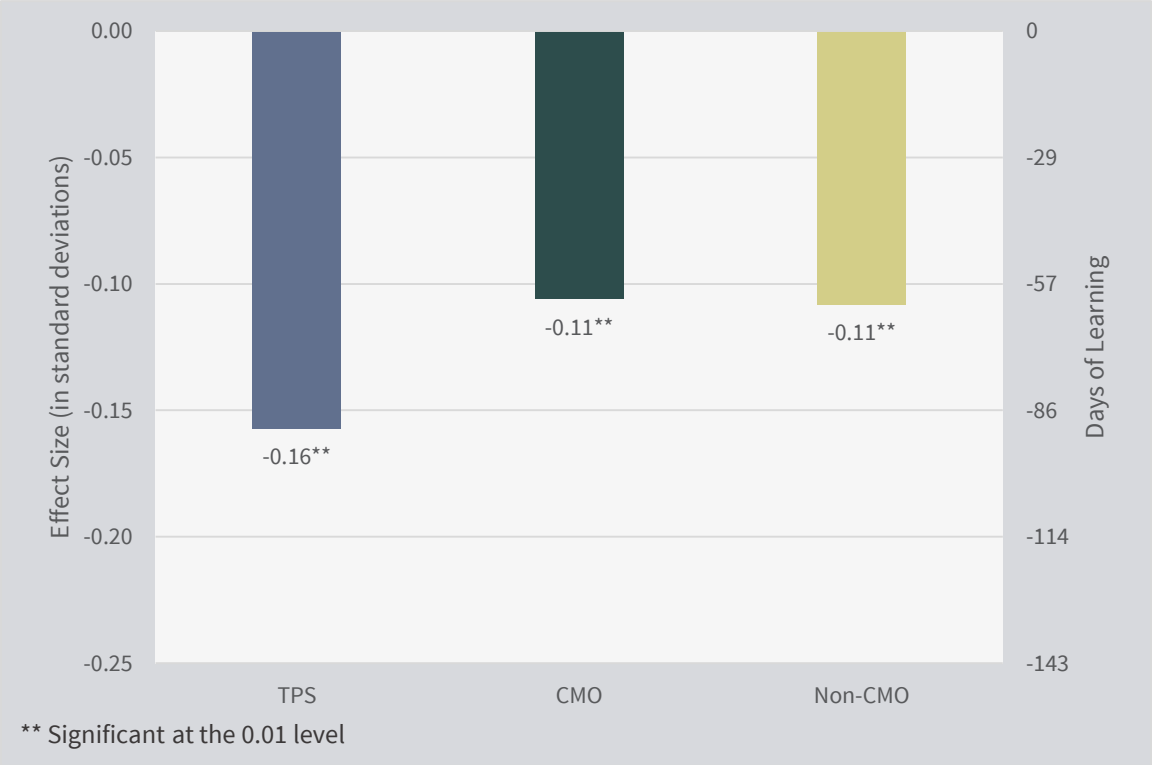
[12] Full results are available in the data appendix.

charter school in which they will fall behind white TPS students by “only” 74 days compared to the 114 days they fall behind in a TPS setting.

Reading outcomes for black students tell a similar tale. Black students attending a school in a TPS setting display on average growth which is a -0.16 effect size compared to white TPS students. The numbers are better for black students attending a charter school, but still weak compared to white TPS students. A black student attending a CMO will have growth 0.05 or 29 days stronger than a black student in TPS.

For reading, the effect size for CMO charters is not significantly different from that for black students attending non-CMO charters. Figure 24 shows that black students attending a charter school, CMO and non-CMO, have an annual effect size of -0.11 or 63 days weaker growth compared to white TPS students. Effect sizes for black students in VOSs and Hybrids were similar to effects for CMO at -0.11 and -0.12 respectively. As with math, the effect of attending a charter school compared to a TPS was significantly positive for black students; yet, black students still have significant room for improvement.

Figure 24: Impact of CMO Charter Attendance for Black Students, Reading



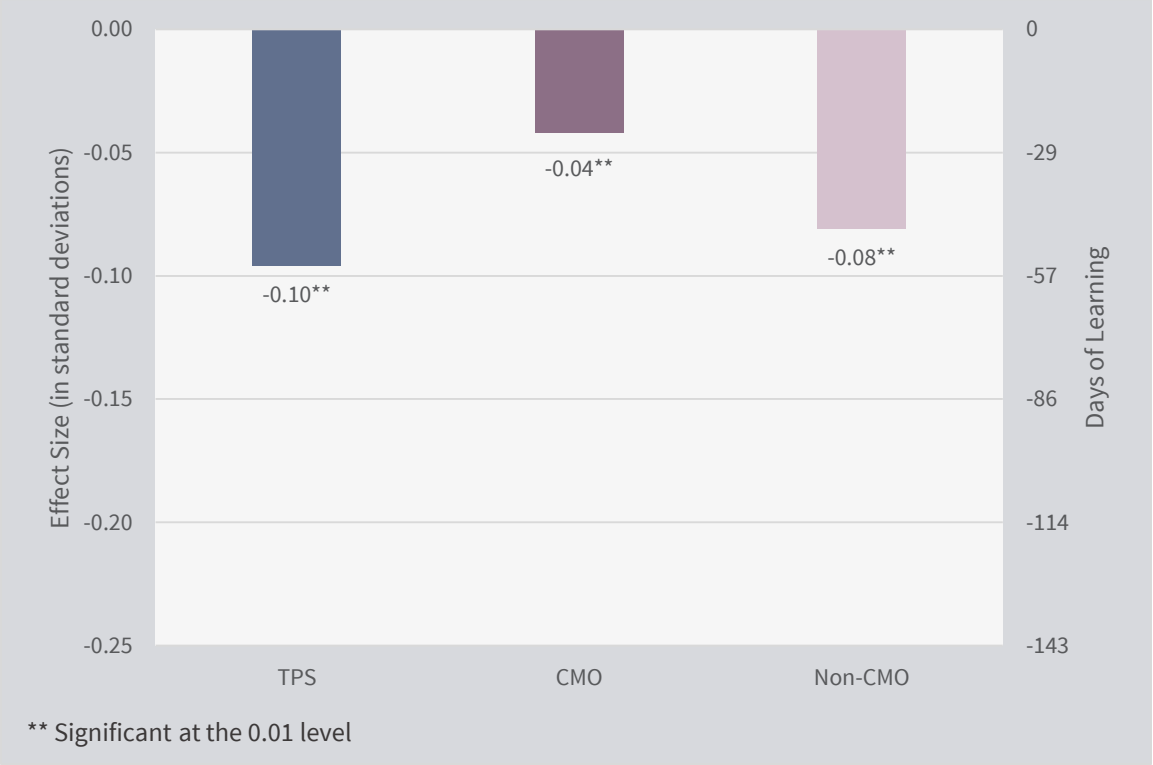
Hispanic Students

Another population which has been historically underserved is Hispanic students. Hispanic students are a diverse population with some students requiring additional assistance due to difficulties with English language proficiency. But even outside the English language learner community, which will be discussed

below, Hispanic students have traditionally lagged behind their white peers in TPS settings. As with black students, many charter schools have made providing support to Hispanic students a core part of their mission. Charter school effects for Hispanic students produce a more hopeful picture than the results for black students.

Hispanic students attending a TPS have on average growth which is -0.10 compared to TPS white students. This is to say the average Hispanic student will have annual growth equal to approximately 57 fewer days per school year compared to a white peer. For Hispanic students in CMO-affiliated charter schools, the deficit shrinks to -0.04 or about 23 fewer days of learning per 180-day school year. Figure 25 shows that the results for Hispanic CMO students are 0.06 stronger than for Hispanic TPS students. [13] This would be equivalent to about 34 days of additional schooling or almost seven weeks. Hispanic students who attend a non-CMO charter school also have growth which is significantly stronger than their Hispanic peers in TPS.

Figure 25: Impact of CMO Charter Attendance for Hispanic Students, Math

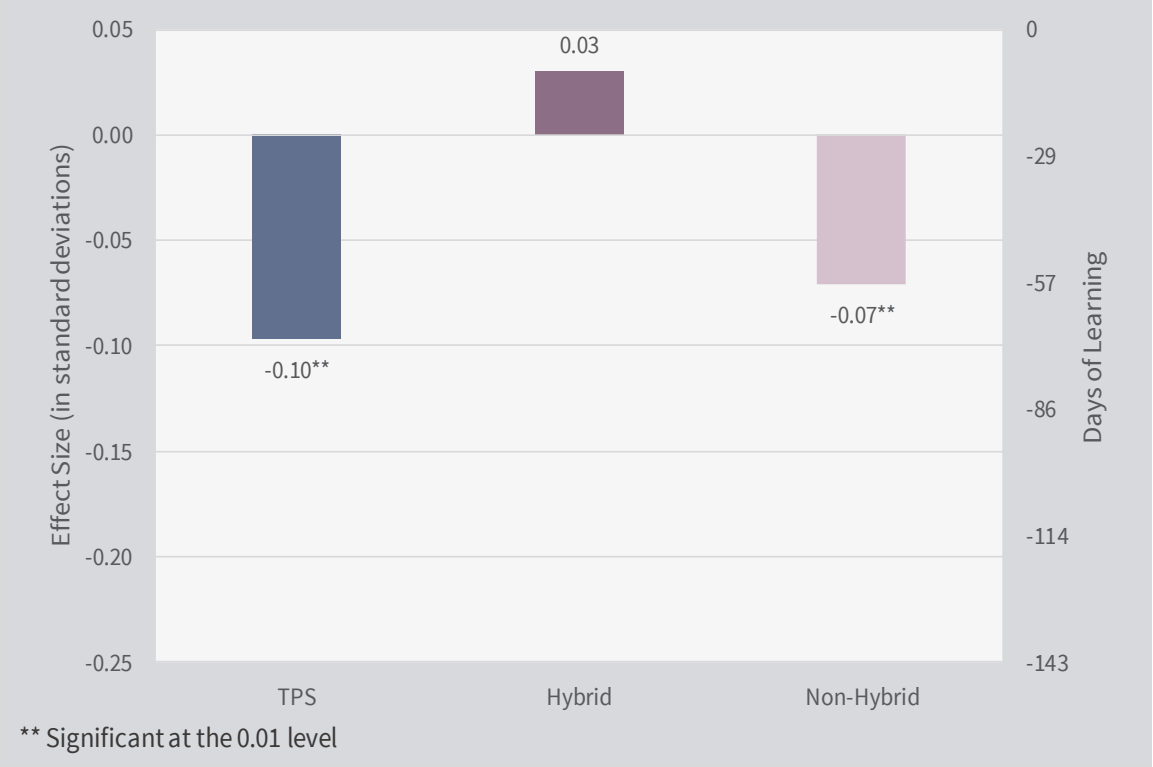


Results for Hispanic students attending VOS charter schools is somewhat weaker than for CMO charters. The math effect size for VOS schools is -0.07 compared to -0.04 for CMO and -0.10 for TPS. The brightest

[13] Subtracting the -0.04 CMO value from the -0.10 TPS value gives a difference of 0.06.

result in math for Hispanic students comes from the Hybrid schools. Hispanic students attending a charter school associated with both a CMO and a VOS have growth which is not only stronger than Hispanic students in TPS, but is not significantly different from white TPS students (see Figure 26). Sadly, the Hybrid affiliated schools also make up the smallest sector of charter schools.

Figure 26: Impact of Hybrid Charter Attendance for Hispanic Students, Math



Reading results for Hispanic students provide a much more positive outlook. Not only do Hispanic students attending a charter school in any sector have stronger growth than Hispanic students attending traditional public schools, but also Hispanic students attending a VOS and those attending a Hybrid school have growth which is equal to or significantly stronger than that of white TPS students.

Figure 27 displays the reading effects for Hispanic students attending TPS, CMO charter schools, and non-CMO charter schools. Hispanic students attending a traditional public school typically have growth which lags behind their white peers by -0.07, which is almost 40 days. However, Hispanic students attending a non-CMO charter school lag by -0.04, or 23 days; Hispanic CMO students lag by only -0.02, or 11 days per school year. Results for Hispanic students in VOS schools are not significantly different than for white TPS students.

Figure 27: Impact of CMO Charter Attendance for Hispanic Students, Reading

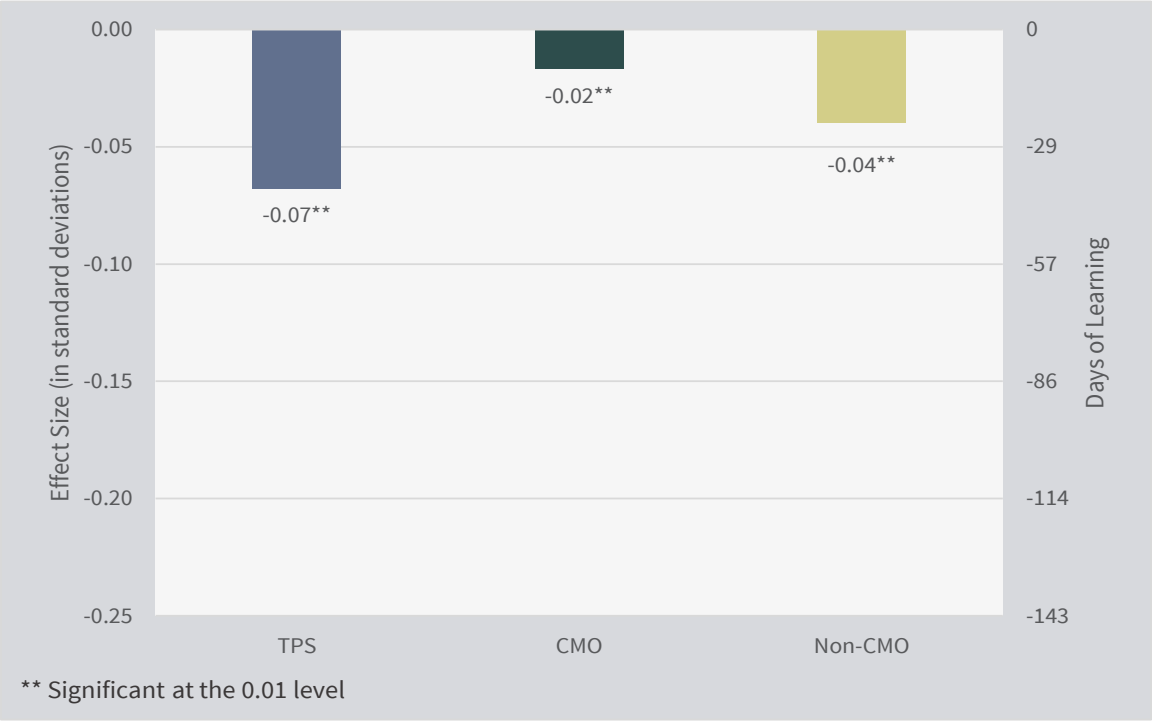
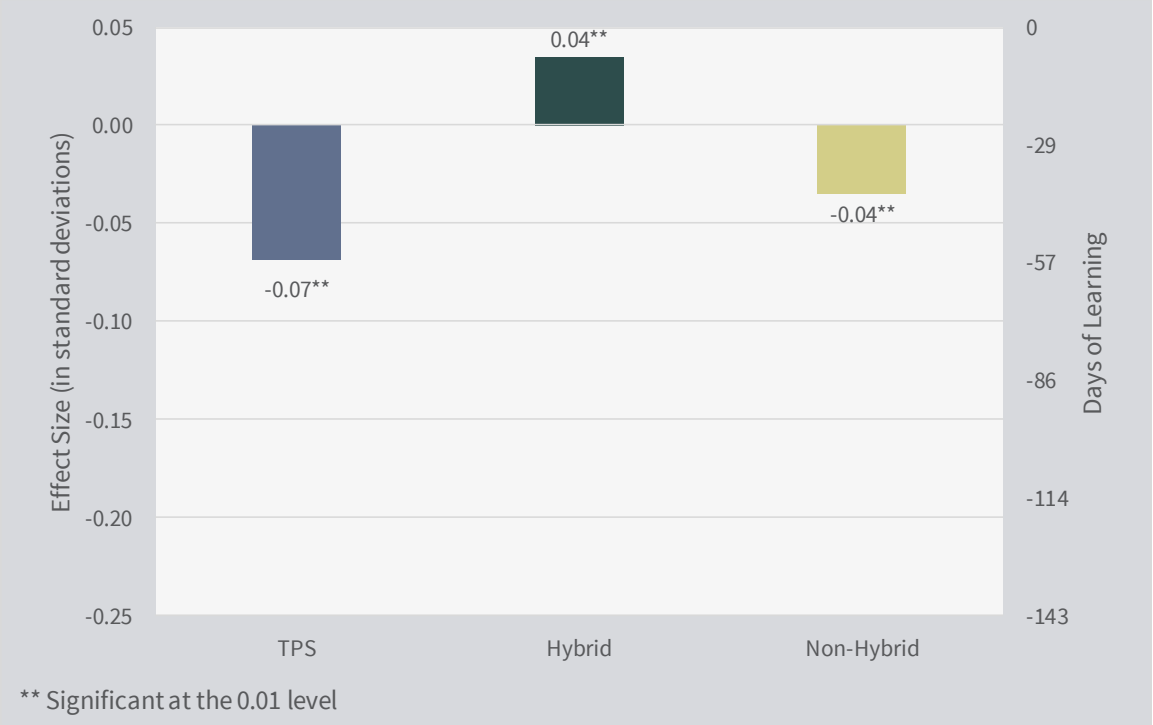


Figure 28: Impact of Hybrid Charter Attendance for Hispanic Students, Reading



Finally, Hispanic students attending a Hybrid charter school have growth which is 0.04 stronger than that of white TPS students (see Figure 28). This means this small selection of schools is closing the achievement gap between Hispanic students and white TPS students in reading.

Race-ethnicity is not the only student characteristic which commonly has an impact on students' academic growth. Students in poverty, those who are English language learners, and special education students also often have academic growth which differs from the typical comparison student.

Students in Poverty

The average growth for students in poverty is generally lower than that for students in the same sector who are not in poverty. Through the use of statistical models, we isolate the relationship between poverty and growth. This leaves a picture of the difference in the impact of charter attendance on students in poverty compared to similar students who are not in poverty. The effect sizes for charter students in the poverty/growth graphs consist of two pieces of information. The first portion of the effect size represents the average impact of attending a charter school in a particular sector. The remainder of the effect size represents the average difference between being a charter student in poverty and a charter student not in poverty. The total length of the bar is the average expected impact on growth of being a charter student in poverty compared to being a TPS student who is not in poverty.[14]

Figures 29 through 34 show that being a student in poverty usually results in lower academic growth in both math and reading for all student groups. Figures 29 and 30 show the most common outcome with CMO charter students in poverty having significantly weaker growth than non-poverty TPS students, but significantly stronger growth than TPS students in poverty. On average, a student in poverty would experience 34 days of additional math growth in a CMO charter as compared to the expected experience in a TPS setting and 23 more days in reading. In both reading and math, non-CMO charter students in poverty have growth which is not significantly different from TPS students in poverty.

[14] We use a Wald test including coefficients weighted by race/ethnicity, poverty, special education status, English language learner status and retained status to determine significance of the combined charter special status effect size compared to TPS non-special status and TPS special status VCRs.

Figure 29: Impact of CMO Charter Attendance for Students in Poverty, Math

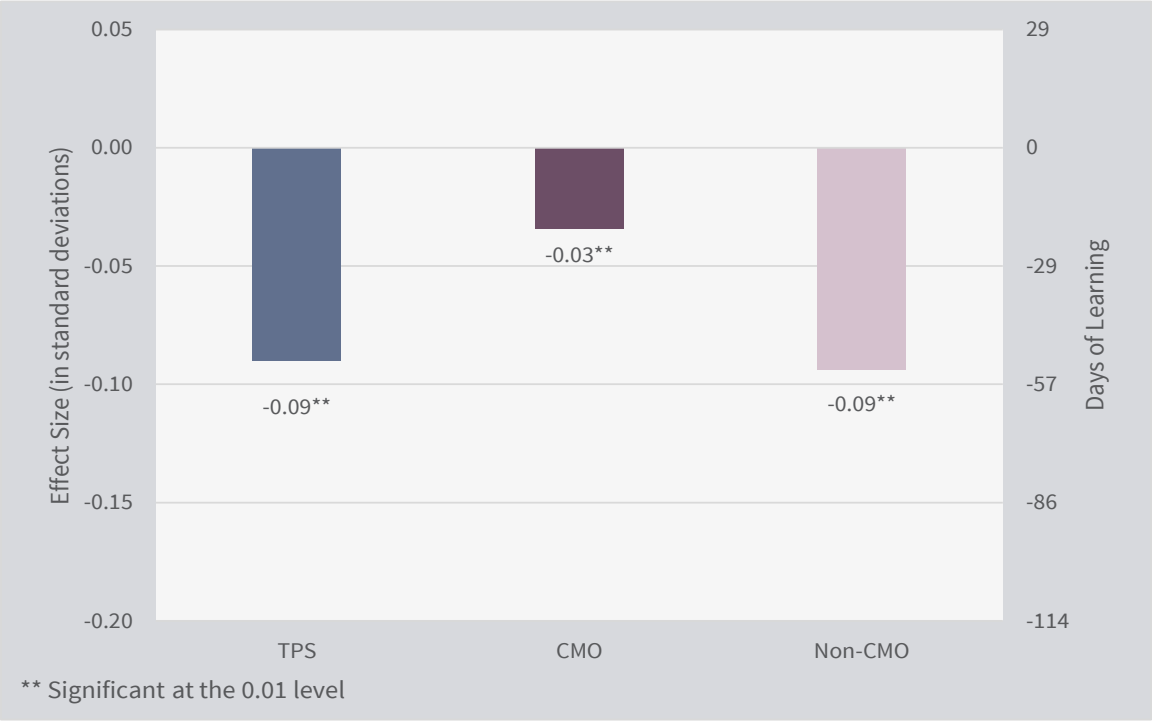
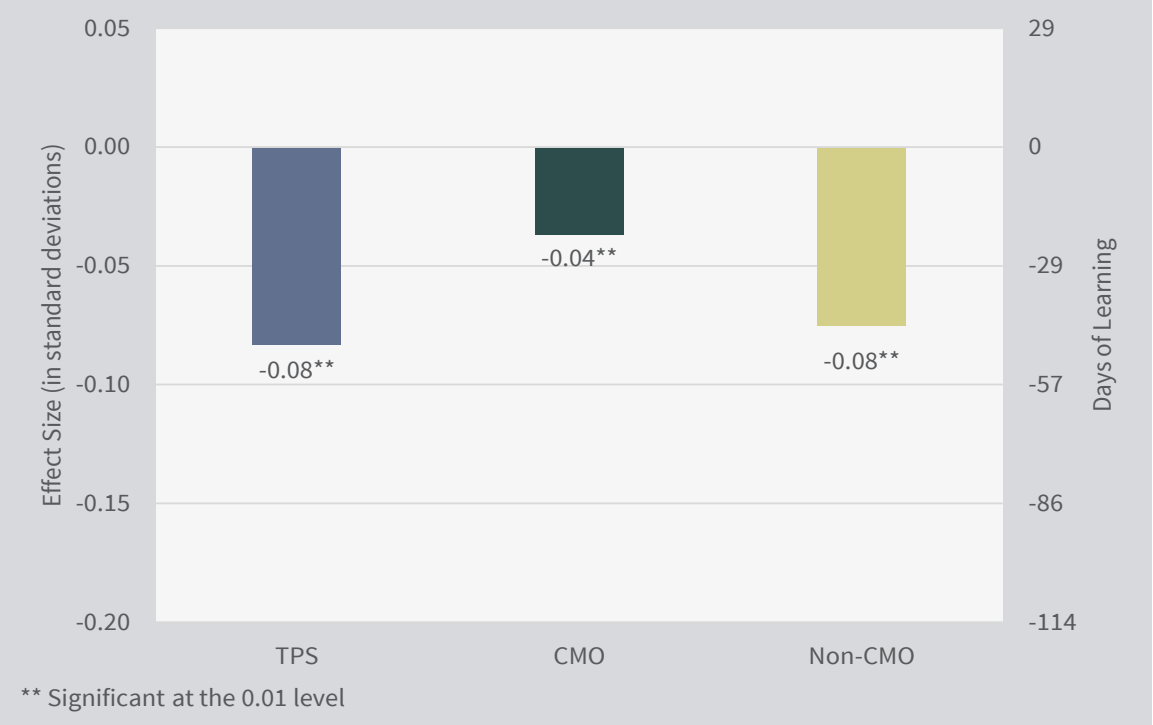
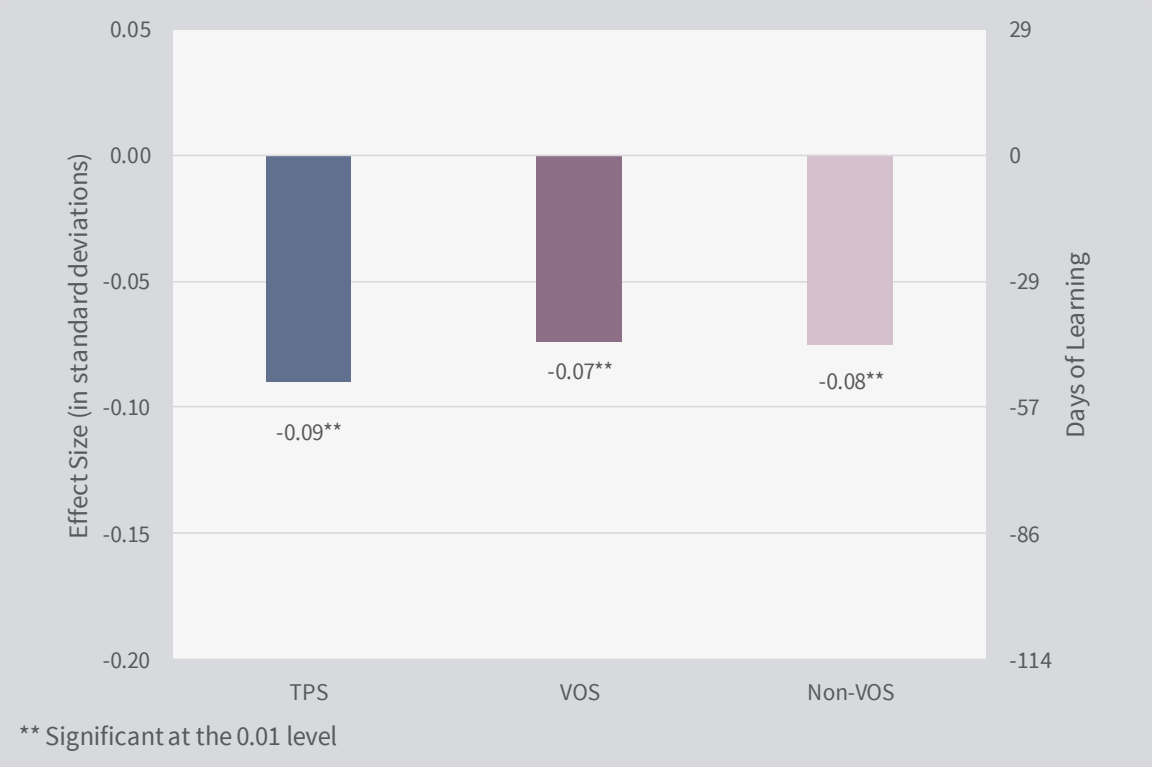


Figure 30: Impact of CMO Charter Attendance for Students in Poverty, Reading



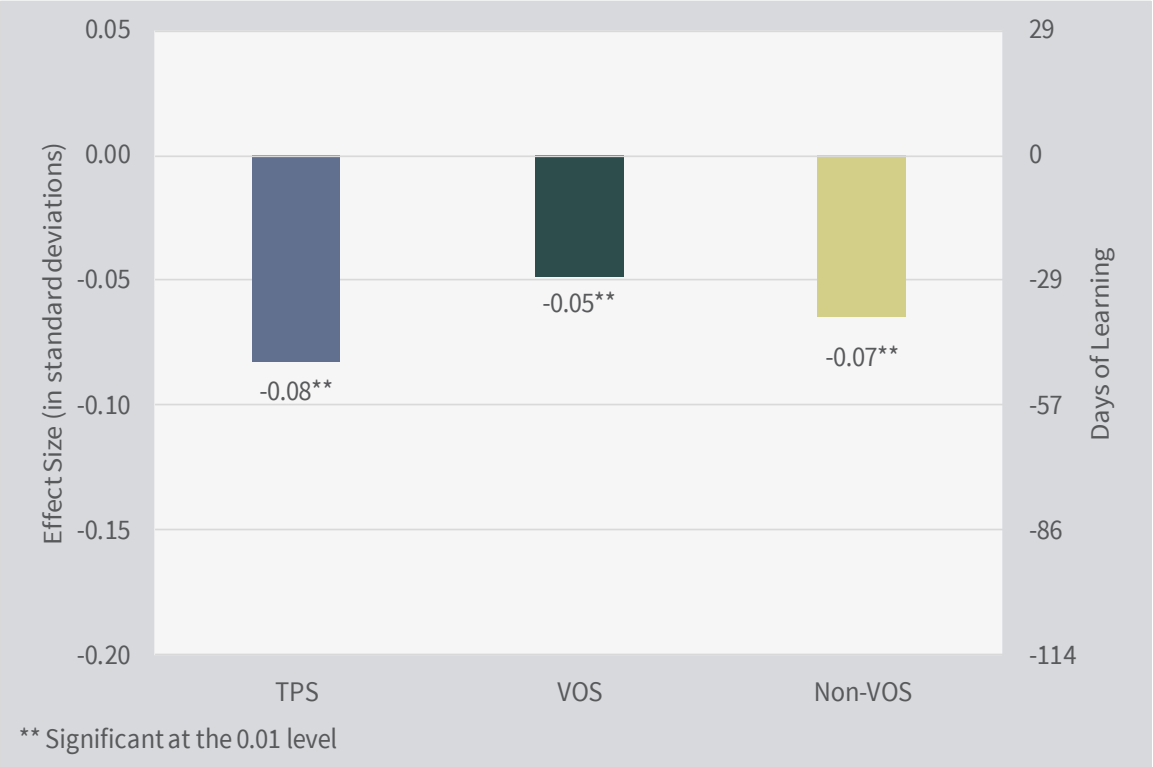
Results for VOS charter students in poverty are weaker than those for CMO charter students. VOS charter students experienced math growth, Figure 31, which is not significantly different from the expected growth for TPS students in poverty or non-VOS students in poverty. That is to say, -0.09 and -0.07 are not statistically different from each other nor from -0.08.

Figure 31: Impact of VOS Charter Attendance for Students in Poverty, Math



VOS charter students in poverty have reading growth which is -0.05 weaker than TPS non-poverty students (see Figure 32). This is equivalent to approximately 29 days less growth per year. The effect size for TPS students in poverty is -0.08 or 46 days weaker growth. While the negative effect size for VOS students in poverty is only -0.05 compared to -0.08 for TPS students in poverty, the difference between the two effect sizes is not significant. Therefore, we state that the two effect sizes are essentially not significantly different as the difference could be due to chance. When given the option of attending a TPS school or a VOS school, a student in poverty will likely have similar outcomes regardless of which is chosen.

Figure 32: Impact of VOS Charter Attendance for Students in Poverty, Reading



For Hybrid charter schools, Figures 33 and 34, the difference between being a student in poverty and a student not in poverty is about the same within the sectors; however, the average Hybrid effect is more positive than the negative effect of being in poverty for Hybrid students. This means while Hybrid students in poverty have weaker growth than their non-poverty peers in Hybrid schools, they have 11 days stronger math growth and five days stronger reading growth than TPS non-poverty students on average (see Figures 33 and 34). In theory, these schools are "closing the achievement gap" between their poverty students and non-poverty TPS students. But since the difference in growth is small, truly closing the gap will take more years than students spend in school. That being said, these schools should still be recognized for the strong growth of their students in poverty.

Figure 33: Impact of Hybrid Charter Attendance for Students in Poverty, Math

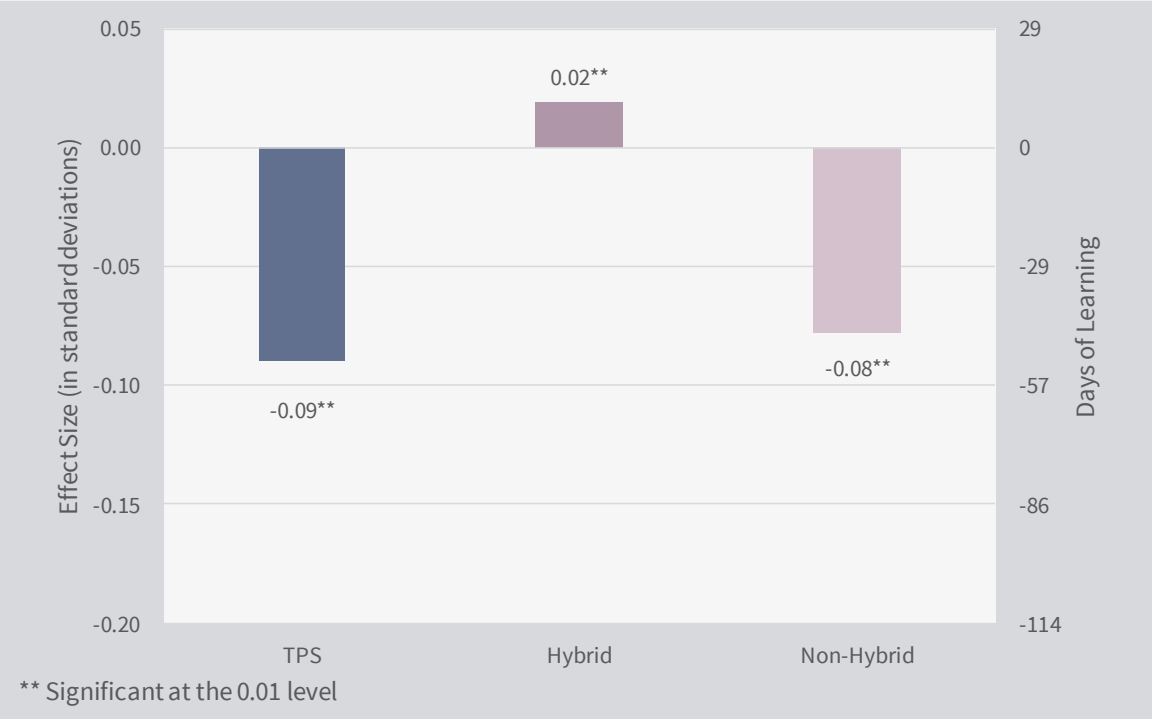
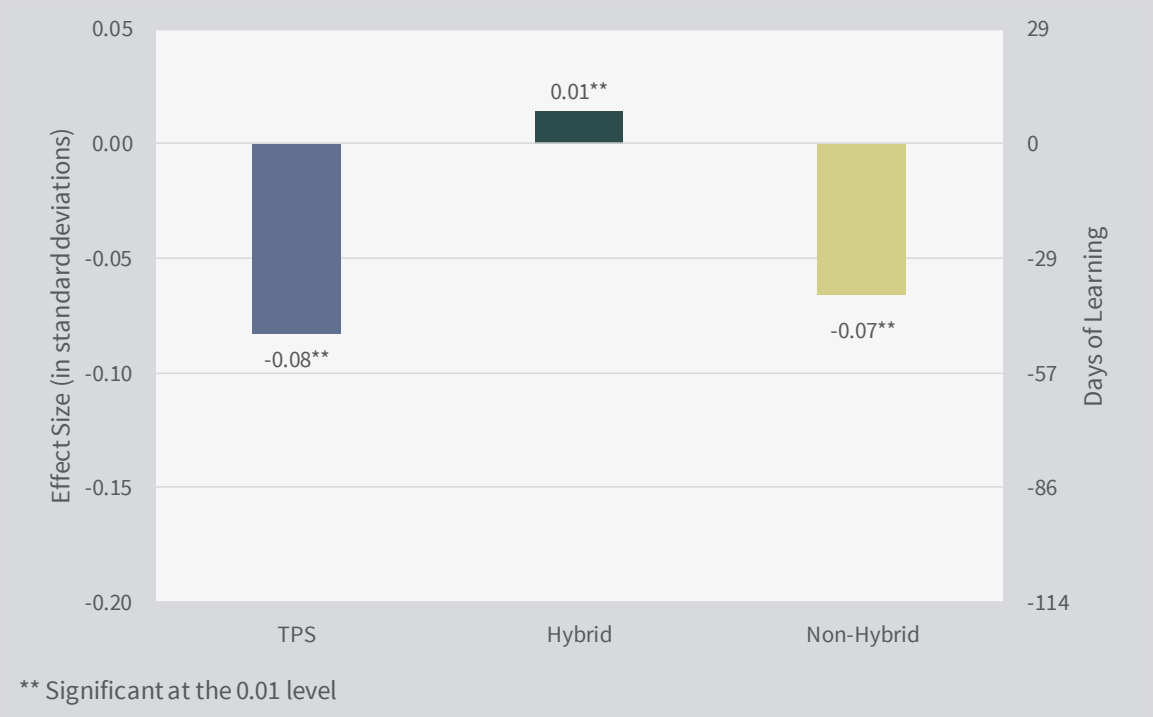


Figure 34: Impact of Hybrid Charter Attendance for Students in Poverty, Reading

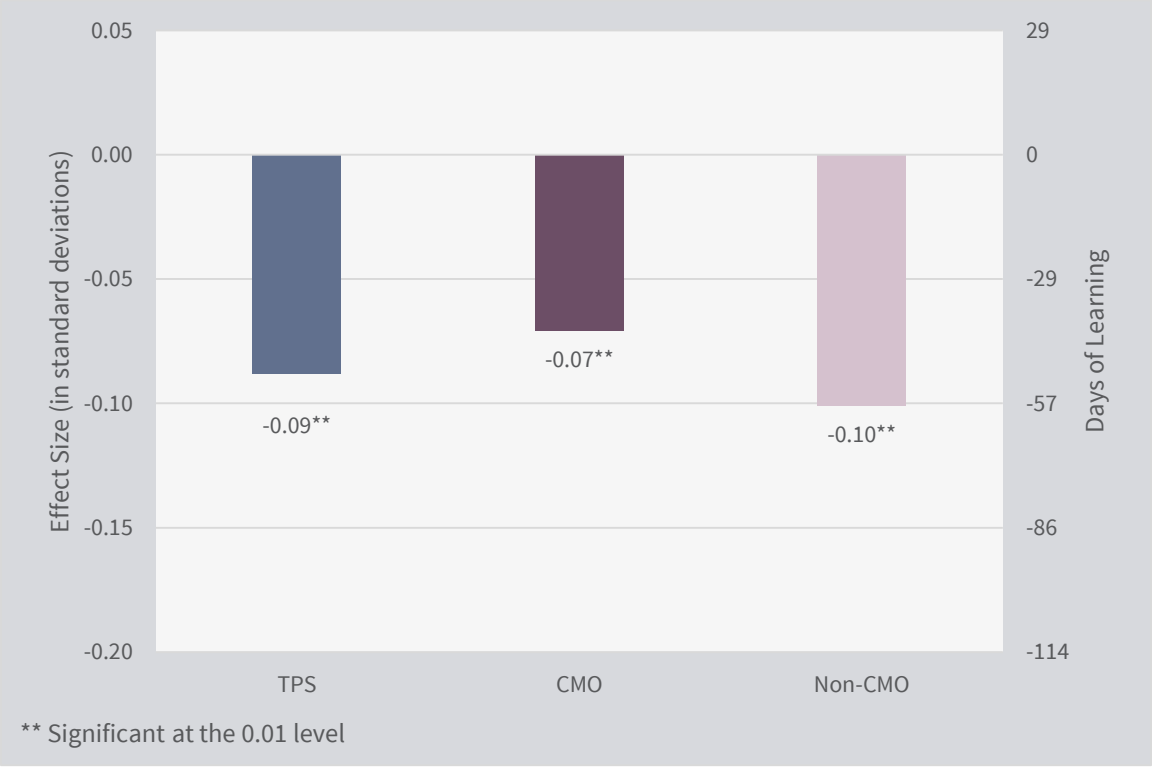


English Language Learners

Students who are English language learners (ELL) also tend to progress academically more slowly than students whose primary language is English. In each sector, ELL students have growth which is significantly weaker than their non-ELL peers. The difference between ELL students and non-ELL students in the same sector ranges from -0.03, 17 days less, in reading for Hybrid students to -0.12, 68 days less, for students attending a VOS charter school.

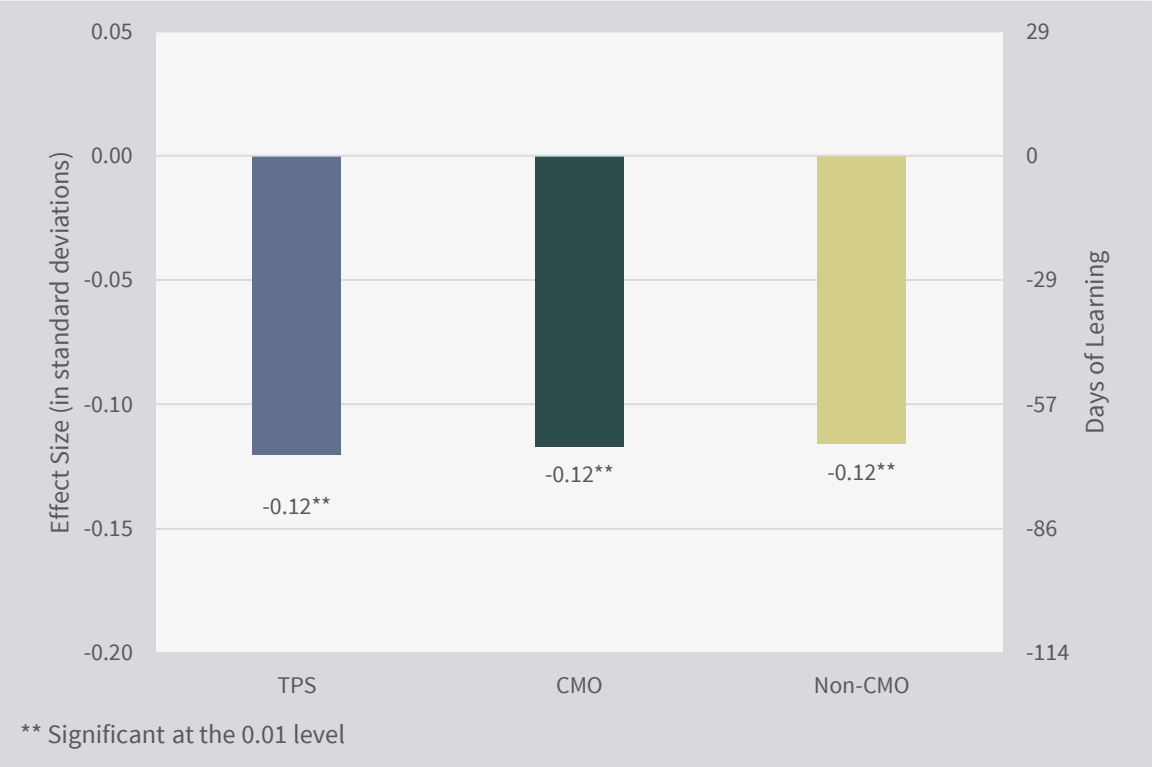
As with students in poverty, the most important question is not how ELL students perform compared to non-ELL students in the same sector, but how ELL students in one sector compare to ELL students in another sector. Focusing on the second comparison allows stakeholders to estimate in which setting ELL students will likely fare best. For math, CMO charter ELL students and TPS ELL students both lag behind their non-ELL peers, but the two groups have growth which is not significantly different from each other. CMO ELL students have math growth which is significantly stronger than non-CMO charter students. The difference between the two is 0.03 or about 17 days difference. The effect for non-CMO charter ELL students is similar to the effect for TPS ELL students.

Figure 35: Impact of CMO Charter Attendance for ELL Students, Math



For reading, ELL students across all three sectors have overall growth which is not significantly different between the sector and TPS ELL students. ELL students tend to experience reading growth which is about 68 days weaker than TPS non-ELL students regardless of which type of school they attend (see Figure 36).

Figure 36: Impact of CMO Charter Attendance for ELL Students, Reading

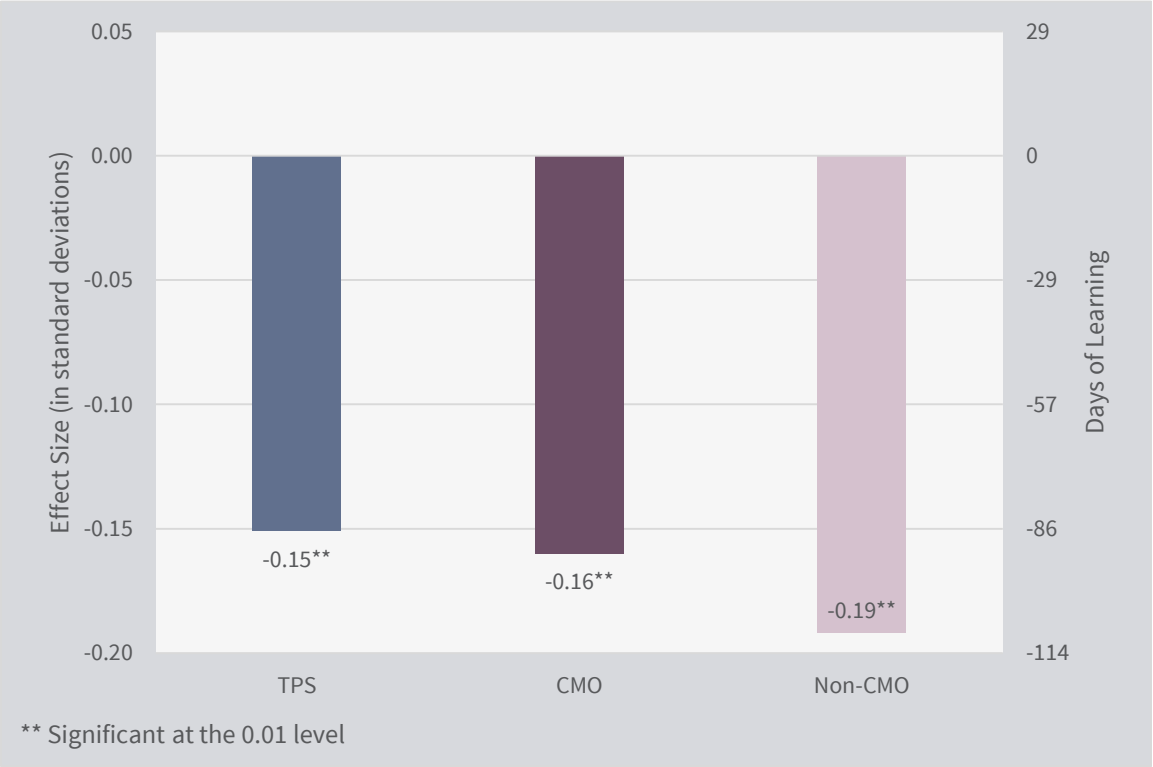


Special Education Students

The final special status group of students examined are students receiving special education services from their schools. For this analysis, the special education students included in the analysis are those who still took the standard examination with minor to no accommodations. Most states have an additional test for students whose special needs are so great they must be tested using a heavily modified test form. These students taking the separate accommodated form of the test are excluded from this analysis.

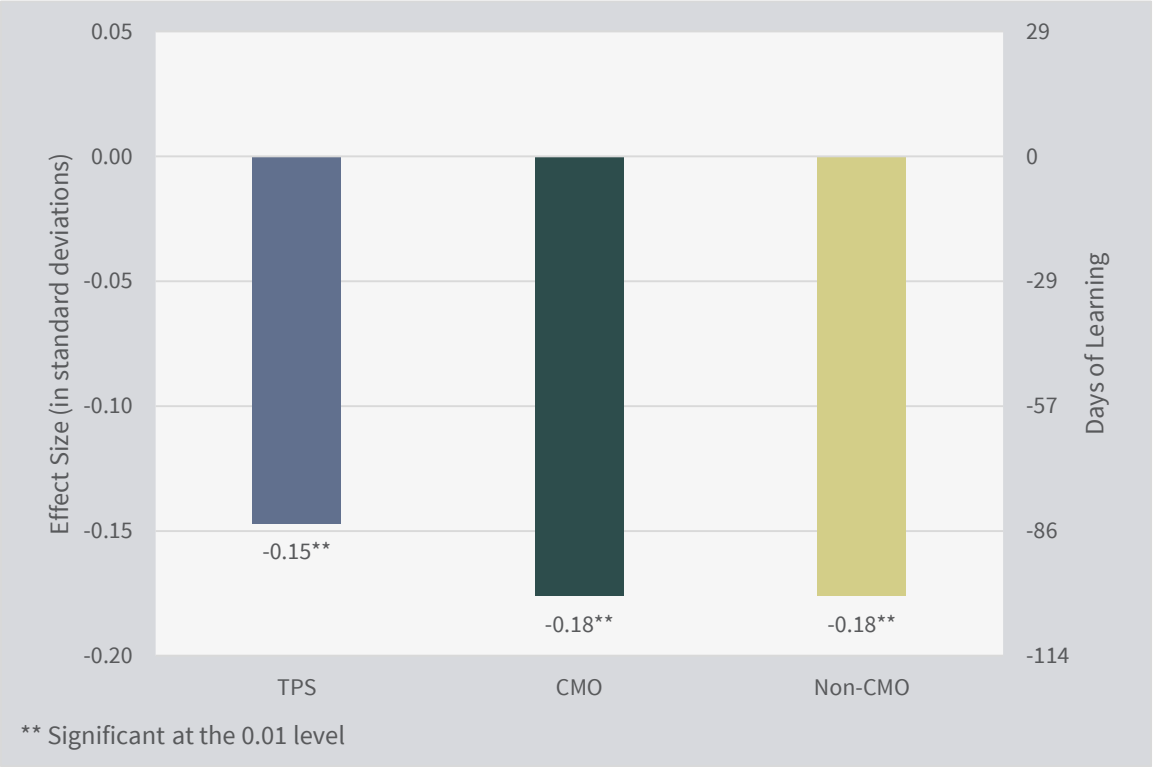
For all sectors of schools, a student who receives special education services lags behind non-special education peers by a large amount. In Figure 37, each bar represents the difference between non-special education students and special education students in math. For CMO math, special education students grow from -0.15 or 86 days less in math than TPS students to -0.19 or 108 days less for non-CMO charter students. Special education students in TPS have better overall growth than their special education CMO peers. Even though the effect size difference is small at 0.01 or six days, the effect is still statistically significant. The difference in reading between special education effect sizes for TPS students and CMO charter and non-CMO charter special education students is larger at 0.03 or 17 days.

Figure 37: Impact of CMO Charter Attendance for SPED Students, Math



For special education students in reading, the TPS sector has better results than either CMO charters or non-CMO charters. Figure 38 shows that a special education student attending a TPS will have reading growth which is 0.03 or 17 days stronger than if the special education student attends a charter school. Outcomes for CMO charter and non-CMO charter students will be similar.

Figure 38: Impact of CMO Charter Attendance for SPED Students, Reading



Results for the VOS/non-VOS charter sectors were similar to those found for CMO charter schools. However, among charter schools affiliated with both a CMO and a VOS, math growth of special education students was significantly stronger than math growth for special education students enrolled in TPS by a value of 0.05 or 29 days (Figure 39). Non-Hybrid special education students' growth lagged behind the growth of TPS students by 0.04 effect size. For the special education population, enrollment in one of the Hybrid charter schools could be expected to produce the strongest outcomes.

The pattern for special education students was similar in Hybrid reading as seen in Figure 40, although the differences in effect sizes are slightly smaller. The Hybrid special education students outgrow TPS special education students by 0.03. The non-Hybrid special education students have the weakest growth of the three groups at -0.18, which is -0.05 behind TPS special education students.

Figure 39: Impact of Hybrid Charter Attendance for SPED Students, Math

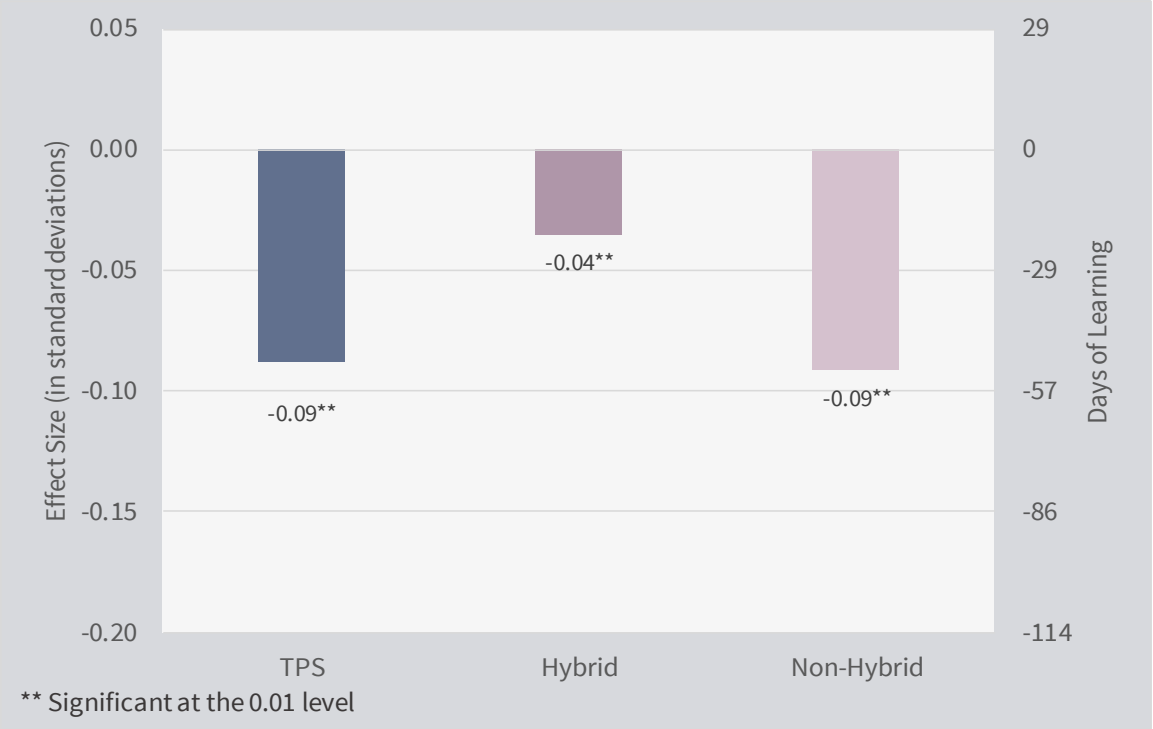
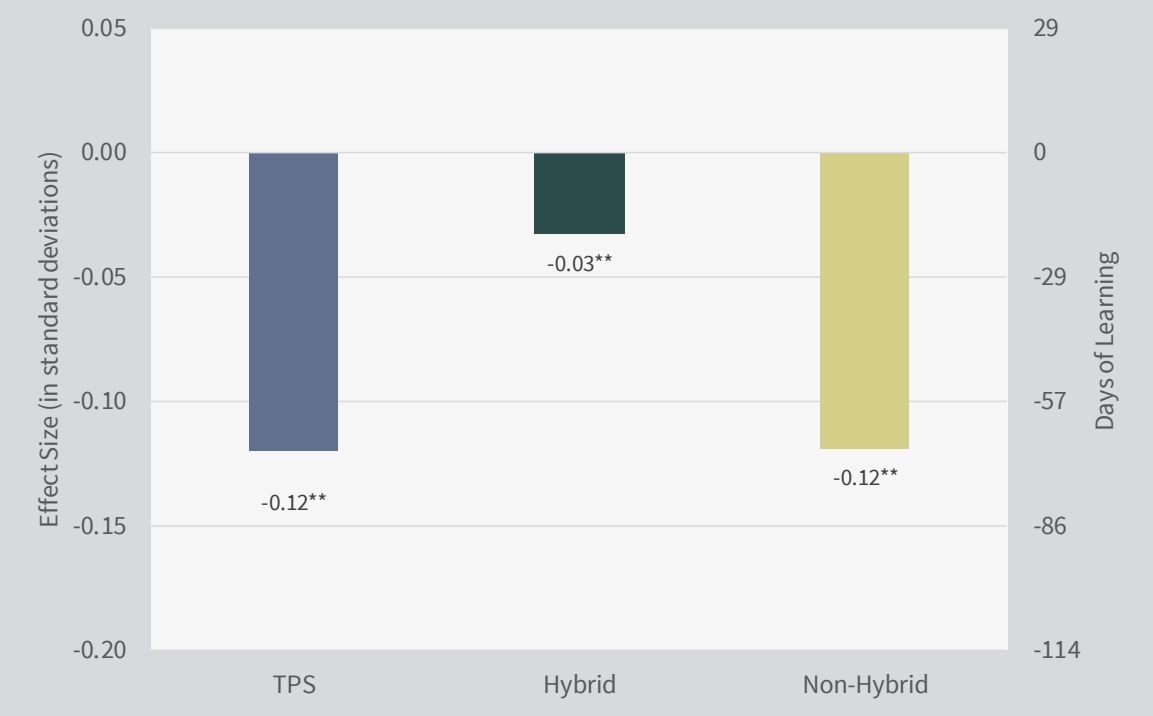


Figure 40: Impact of Hybrid Charter Attendance for SPED Students, Reading

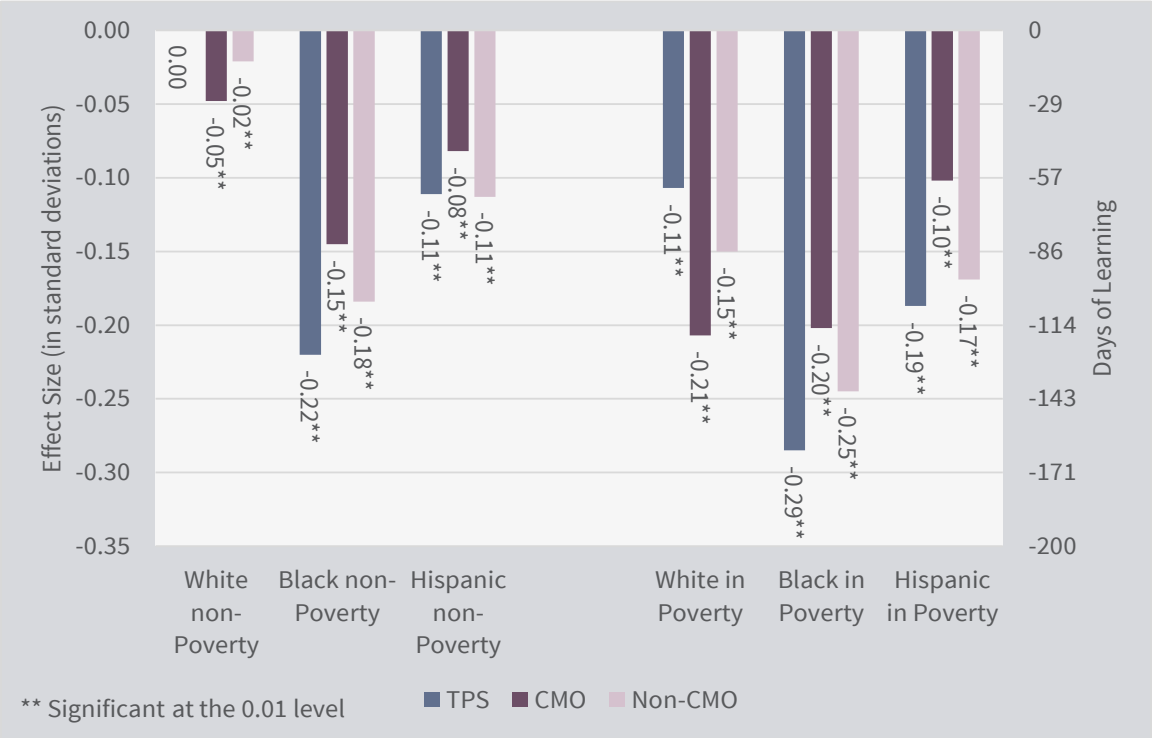


Minority Students in Poverty

As Figures 23 through 40 show, many students face hardships when it comes to educational opportunities. Minority students and those with special statuses such as poverty or ELL status have consistently weaker growth than their white non-special-status peers. When students have two or more of these characteristics, the negative impacts can often interact in such a way as to create a more extreme outcome. For example, Figure 41 shows black students in a TPS setting have an average effect size of -0.20. TPS students who are both black and in poverty have an effect size of -0.29. The difference between the two groups of black TPS students, those in poverty and those not in poverty, is an additional loss of 0.09 or 51 days of learning for those in poverty.

Figure 41 shows how these interactions between race/ethnicity and poverty can play out for a subsample of the data. Each group of bars represents growth of the shown subpopulation when that population enrolls in a particular sector of school as compared to white, non-poverty TPS students who have an effect size of 0.00. The blue bar in each set shows the effect size for students of that group enrolled in TPS schools; dark purple is CMO charters; and light purple is non-CMO charters. For black and Hispanic students, enrolling in a CMO sector school provides for stronger growth than the TPS or non-CMO sectors regardless of poverty status. Interestingly for Hispanic students in poverty, their growth is almost as strong in CMO charters as the growth of Hispanic non-poverty students in CMOs. The difference is only 0.02 (the difference between -0.10 and -0.08). This suggests CMO charters are particularly effective with Hispanic students in poverty.

Figure 41: Interaction of Race/Ethnicity and Poverty on Growth for CMO Students, Math



Results for students enrolled in VOS charter schools (Figure 42) show black students in VOSs have weaker growth than they would have in a CMO charter school (Figure 41). However, the VOS math results for black students and Hispanic students are stronger than growth for similar students in TPS.

Figure 42: Interaction of Race/Ethnicity and Poverty on Growth for VOS Students, Math

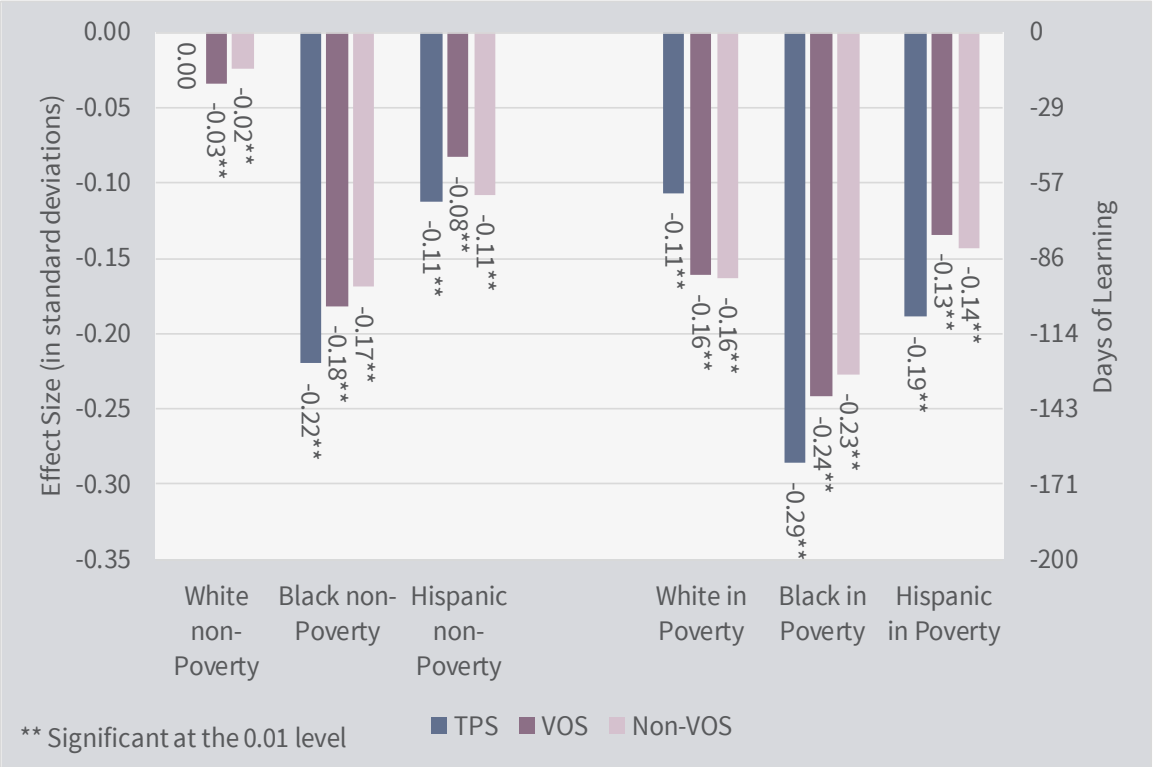
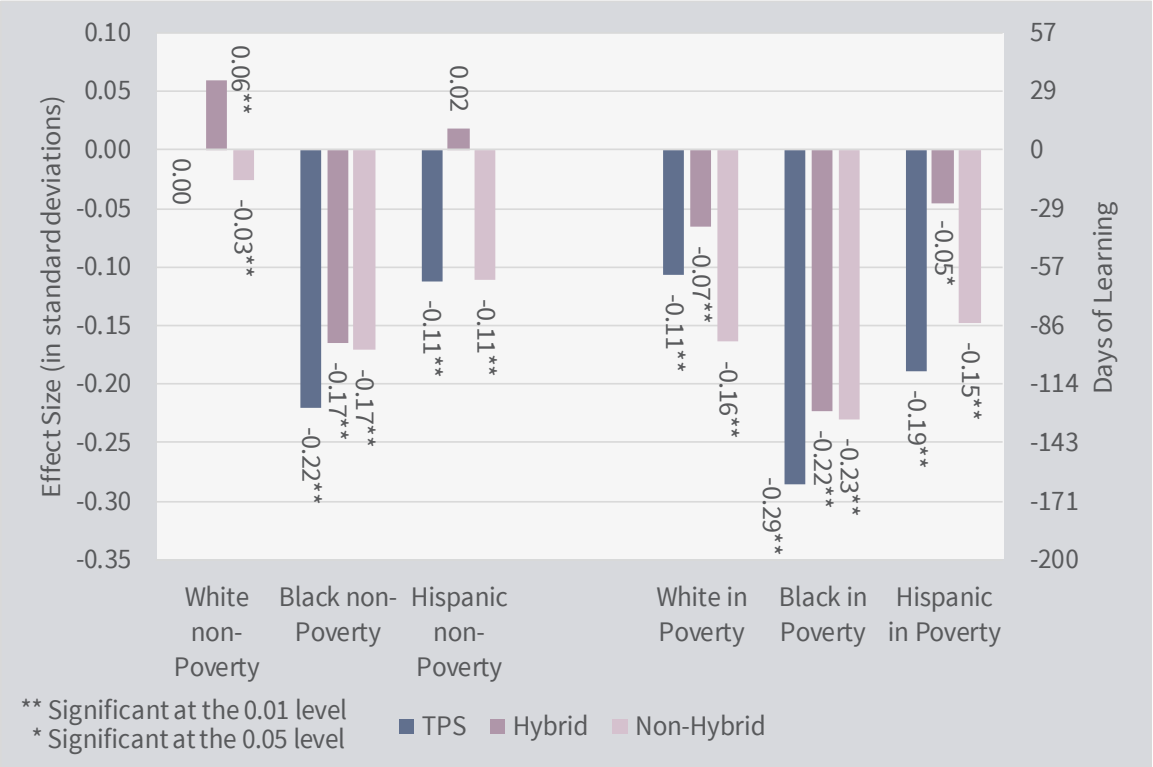


Figure 43 displays the math effect sizes for the same groups attending Hybrid charter schools. The Hybrid schools produce the strongest results for white and Hispanic students, especially those not in poverty. Results for black students attending Hybrid schools are similar to the effect sizes for black students attending a CMO charter school (see Figure 41).

Results in reading for race/ethnicity and poverty interactions follow the same pattern as the results for math. The reading results are available in the technical appendix.

Figure 43: Interaction of Race/Ethnicity and Poverty on Growth for Hybrid Students, Math

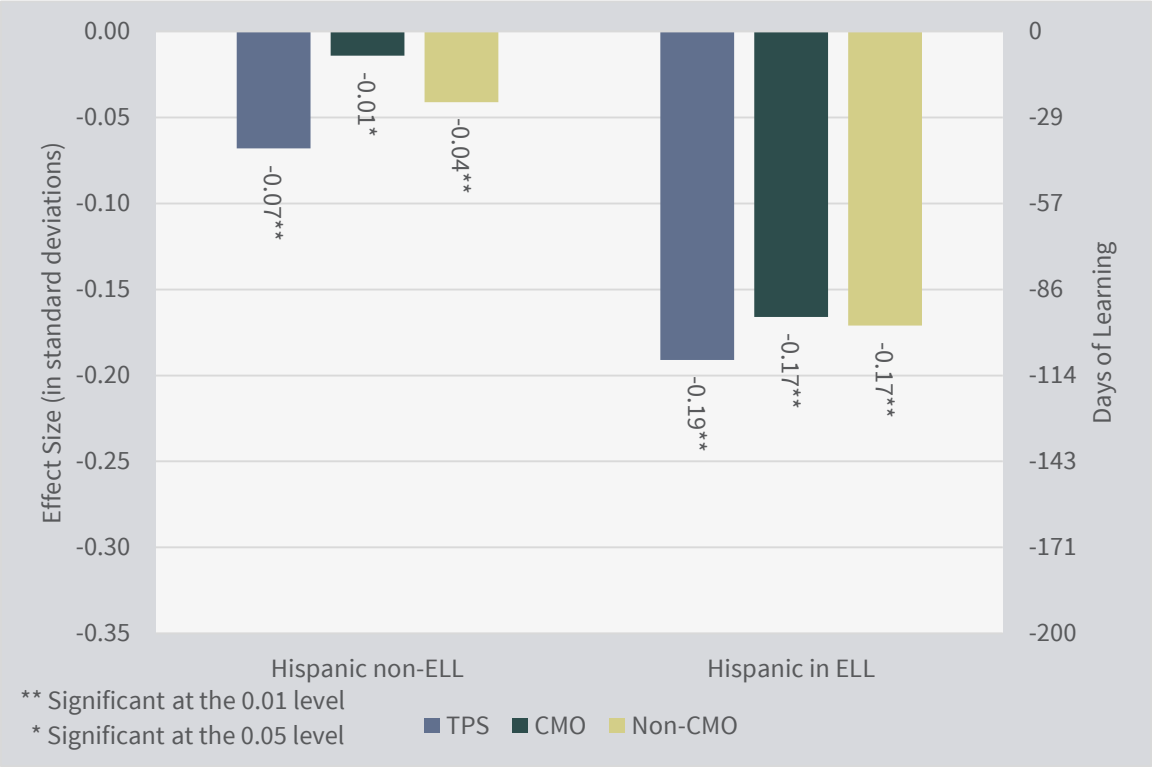


Hispanic Students and English Language Learner Status (ELL)

Hispanic students are a very diverse student subpopulation. Some Hispanic students belong to families who have been in the United States for generations. Other Hispanic students are the children of recent immigrants or are immigrants themselves. These two groups have very different educational needs and very different educational outcomes. An examination of Hispanic students divided by their status as English language learners provides some insight into these two groups within the Hispanic community.

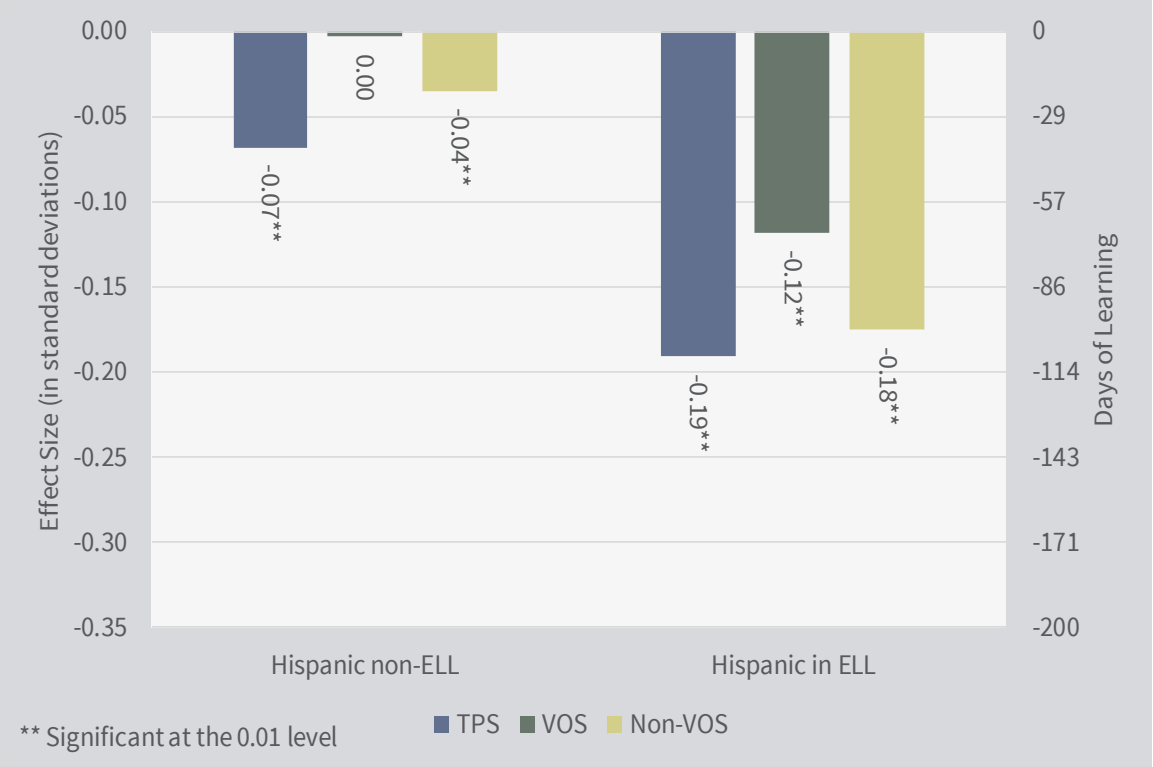
Figure 44 shows the reading growth effect sizes for Hispanic students who are ELL and Hispanic students who are not ELL based on attendance in TPS, CMO charter, or non-CMO charter. The obvious take-away from Figure 44 is the difference in growth based on ELL status. Hispanic students who are not ELL have growth which is much stronger than Hispanic ELL students. Hispanic non-ELL students attending a CMO have growth which is only -0.01 or six days per year weaker than white TPS students who serve as the 0.00 reference line. Hispanic ELL students in a CMO have growth which is -0.17 or 91 fewer days than white TPS students. Further, for Hispanic ELL students, the sector in which they are enrolled does not make a significant difference in their growth as the difference between -0.19 and -0.17 is not significant. Hispanic students who are not ELL have significantly stronger growth when they enroll in a CMO charter rather than TPS.

Figure 44: Interaction of Hispanic and ELL on Growth for CMO Students, Reading



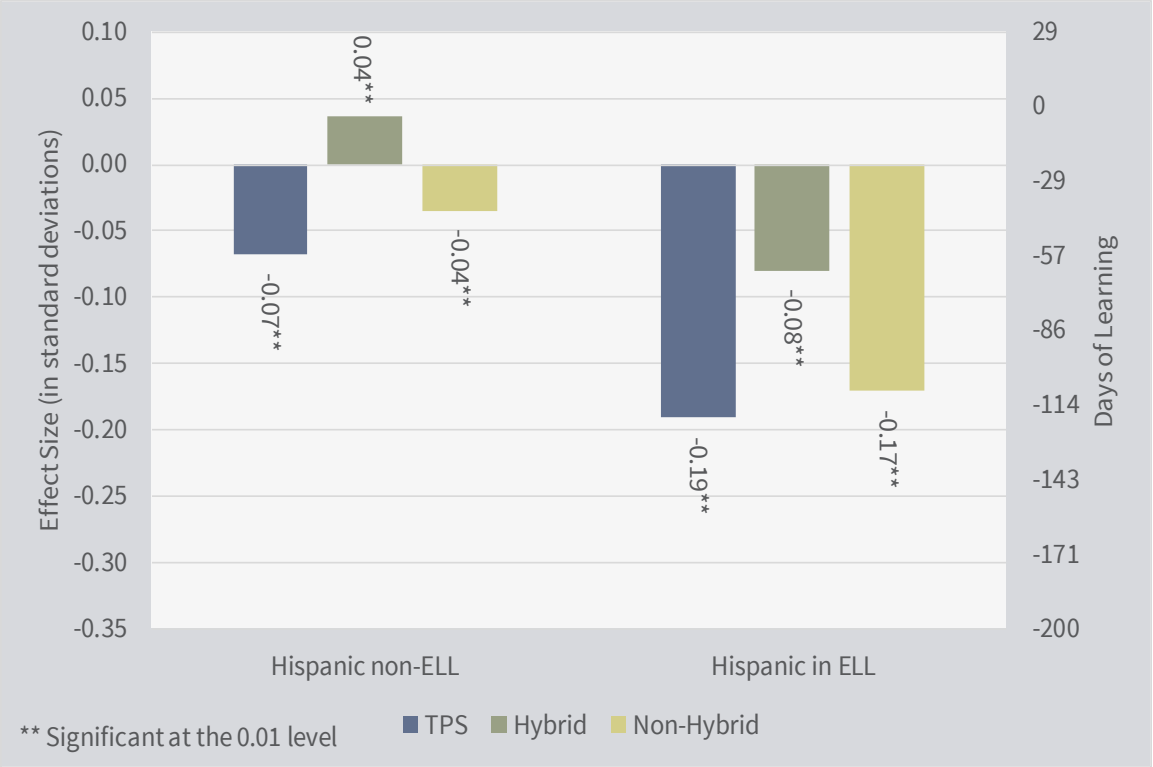
VOS charter schools show similar benefits for non-ELL Hispanic students as the CMO charter schools (see Figure 45). Hispanic non-ELL students enrolled in VOS schools have growth which is not significantly different from that of white TPS students. VOS charter schools do give a strong bump in growth to Hispanic ELL students compared to Hispanic ELL students attending TPS. The difference in effect sizes from Hispanic ELL students in TPS (-0.19) and Hispanic ELL students in VOS charters (-0.12) is 0.07 or about 40 days of learning. While Hispanic ELL students enrolled in VOS charter schools are still falling behind white TPS students, the deficit is much less on average than that seen by Hispanic ELL students enrolled in a TPS.

Figure 45: Interaction of Hispanic and ELL on Growth for VOS Students, Reading



Hispanic students — both ELL and non-ELL — have their strongest growth effects when attending a charter school affiliated with both a CMO and a VOS. Figure 46 shows Hispanic non-ELL students attending a Hybrid charter school outgrowing white TPS students. The non-ELL Hispanic students grow on average 23 more days in reading than white TPS students. Furthermore, both Hispanic ELL and non-ELL students have growth which is 0.11 or 63 days more growth than their Hispanic peers in TPS schools.

Figure 46: Interaction of Hispanic and ELL on Growth for Hybrid Students, Reading



As with the race/ethnicity poverty interactions, results for Hispanic ethnicity and ELL status show similar results for math as Figures 44 through 46 show for reading. The values for math are included in the data appendix.

Charter Schools Compared to TPS

Since the 2009 charter school study, CREDO reports have included a feature referred to as the quality curve. The quality curve uses a statistical model to compare each charter school to a virtual school consisting of the VCRs for students for that charter school. These school-level measures use a smaller growth period data window made of the last two growth periods.[15] To minimize the statistical

[15] California is not included in the quality curve analysis due to lack of data for 2013-14 and 2014-15.

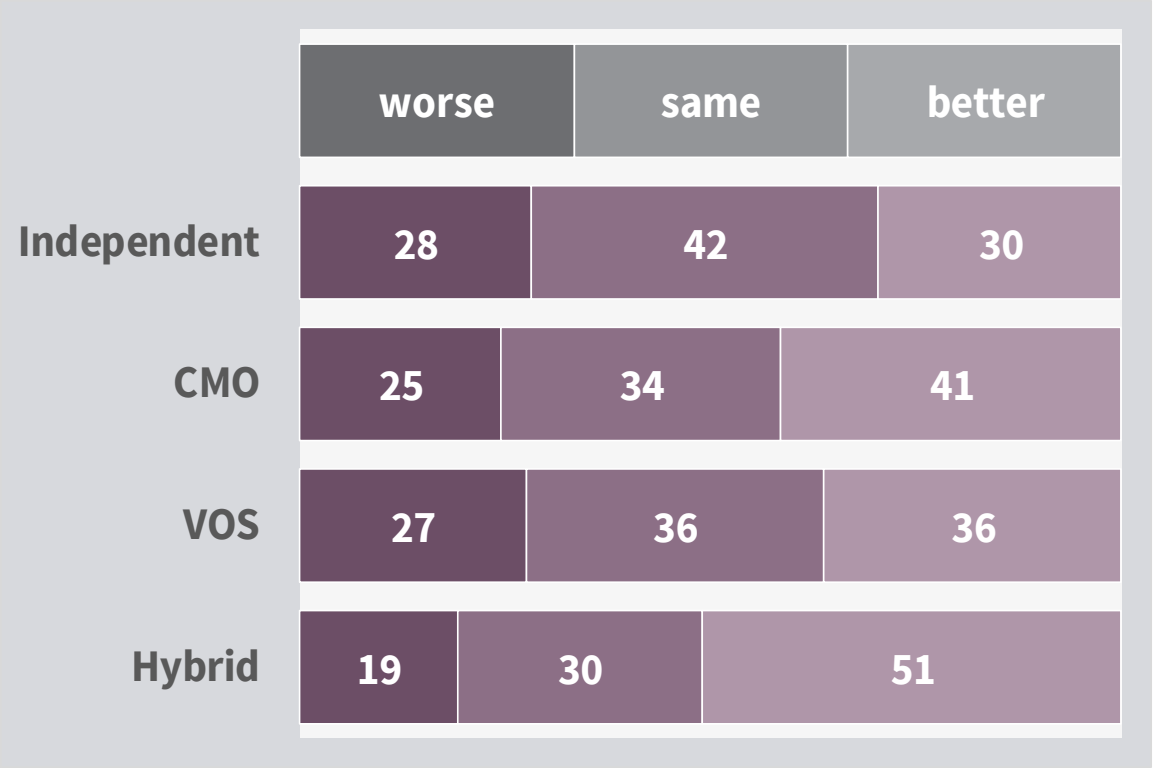
inconsistencies which may arise from including schools with only a few students, we limit this analysis to schools with at least 30 tested students per year.

There are three groups within the quality curve:

- those schools with average growth statistically significantly weaker than that of their feeders
- those with average growth which is not statistically different from their feeders
- those schools with average growth statistically significantly stronger than their feeders

These three categories are distinct. The placing of a school into each category has a different meaning as to the performance of the school. As such, readers should resist the urge to combine categories from this analysis. Specifically, it is improper and can be misleading to state "x percent of schools performed stronger or no different than their local market" just as it is improper to combine the weaker and no different schools. These numbers should always be reported as three separate categories.

Figure 47: Charter School Quality Curve by Sector: Math



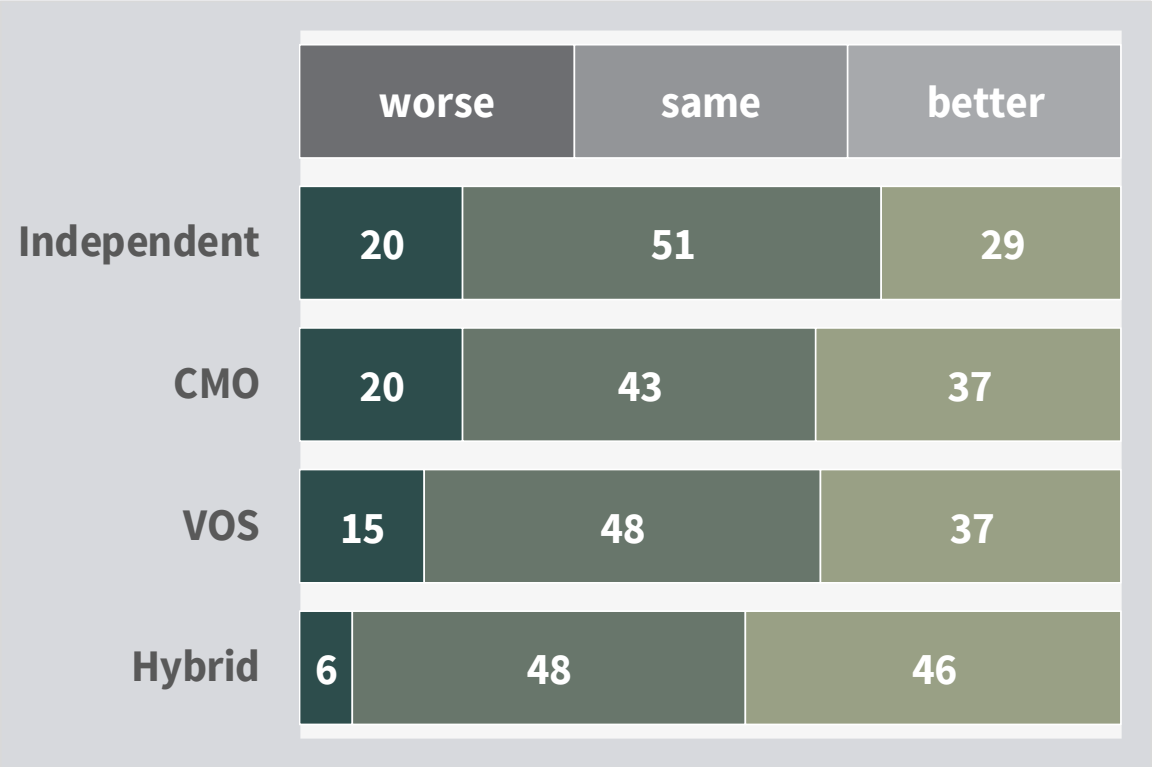
In Figure 47, the numbers in each cell represent the percentage of schools in each category for that sector. If all charter schools were performing at the same level as the traditional public school VCRs, 100 percent of the values would be in the "same" column. An even distribution across the quality curve with an equal number of schools doing worse than their comparison, same as their comparisons, and better than their comparisons would place 33 percent of schools in each category. VOS charter schools almost have this

equal distribution. Thirty-six percent of VOS charter schools have stronger growth than their comparison schools and 27 percent have weaker.

Growth for CMO charter schools is stronger overall. Forty-one percent of CMO charter schools have stronger growth than their TPS comparisons. Only 25 percent of CMO schools have average growth weaker than their comparisons. For schools which are part of both a CMO and a VOS, the results are even stronger. Half the Hybrid schools have stronger growth in math than their comparisons. Just 19 percent have weaker growth. All three charter network groups have stronger results than the independent charter schools.

The quality curve results for reading are given in Figure 48. The percentage of schools performing higher than their comparison schools is smaller for reading than it was for math. But so too is the percentage of charter schools performing worse. For CMO charters and VOS charters, just over a third of charter schools have stronger growth than their comparisons. For Hybrid charters, 46 percent have stronger growth. The real story in reading is the small percentage of charter schools with worse growth than their comparison schools. Only 6 percent of Hybrid charter schools have weaker growth. That is a strong finding, especially when combined with the fact 46 percent are stronger. The CMO sector and the VOS sector also have relatively small percentages of charter schools with weaker performance. While the CMO and independent charter sectors have the same percentage of schools with worse performance, the CMO sector has 8 percent more schools doing better than their comparison schools that the independent charter sector has.

Figure 48: Charter School Quality Curve by Sector: Reading



Growth and Achievement

While the quality curve provides some insight into the growth performance of charter schools compared to their VCRs, it does not speak to achievement — or, more specifically, the interaction of growth and achievement. While it is preferable for all students to demonstrate strong growth, it may be acceptable for schools with a large percentage of high achieving students to have weaker growth, as the students may have chosen the charter school for reasons other than growth. Further, students with high achievement have less room to grow than low achieving students. Therefore, examining both growth and achievement provides a more nuanced, informative analysis. [16]

Figures 49 through 54 include two axes. The horizontal axis places the schools into four categories based on the average achievement for each charter school. The lighter colored cells above the axis have achievement stronger than average; the darker colors represent weaker achievement. The vertical axis divides the schools into four groups based on the growth effect size of the school. The purple cells on the right have stronger than average growth; the blue on the left have weaker growth.

[16] California is not included in this set of analyses due to lack of data for 2013-14 and 2014-15. Louisiana is not included in this set of analyses due to data access issues.

Figure 49 presents the distribution of independent charter schools compared to their comparisons. Twenty-five percent of independent charter schools have high growth and high achievement. These schools are located in the top right, light purple quadrant. Twenty-four percent of independent charter schools are in the lower right quadrant. This means those schools have below average achievement but above average growth. Charter schools may have low achievement for a variety of reasons, but for schools with high growth, the most likely cause of low achievement is that those schools are taking in students who were academically lagging when they arrived. Being in a school with higher than average growth will eventually move these low achievement students above their state average if the school has enough time with the students. Fourteen percent of independent charter schools have high achievement but low growth. These are the light blue schools in the top left quadrant. While these schools should be closely watched to ensure their students do not begin to fall behind, this quadrant is not of as great concern because the students are doing well on average. The quadrant of schools which requires the most observation and perhaps intervention is the low achievement, low growth group of schools in the bottom left quadrant. These schools make up 36 percent of independent charter schools. The students in these schools are behind academically and will likely remain there without intervention.

Figure 49: Growth and Achievement for Independent Charter Schools, Math

In reading, 57 percent of independent charter schools have positive growth, all the green circles in Figure 50. A full 31 percent of the independent charter schools are in the light green quadrant which means they are high achieving as well as high growth. Twenty-seven percent of independent charter schools are in the bottom left, red quadrant. These are the schools which have low achievement and low growth. These schools are unlikely to move their students upward out of low achieving status.

Figure 50: Growth and Achievement for Independent Charter Schools, Reading

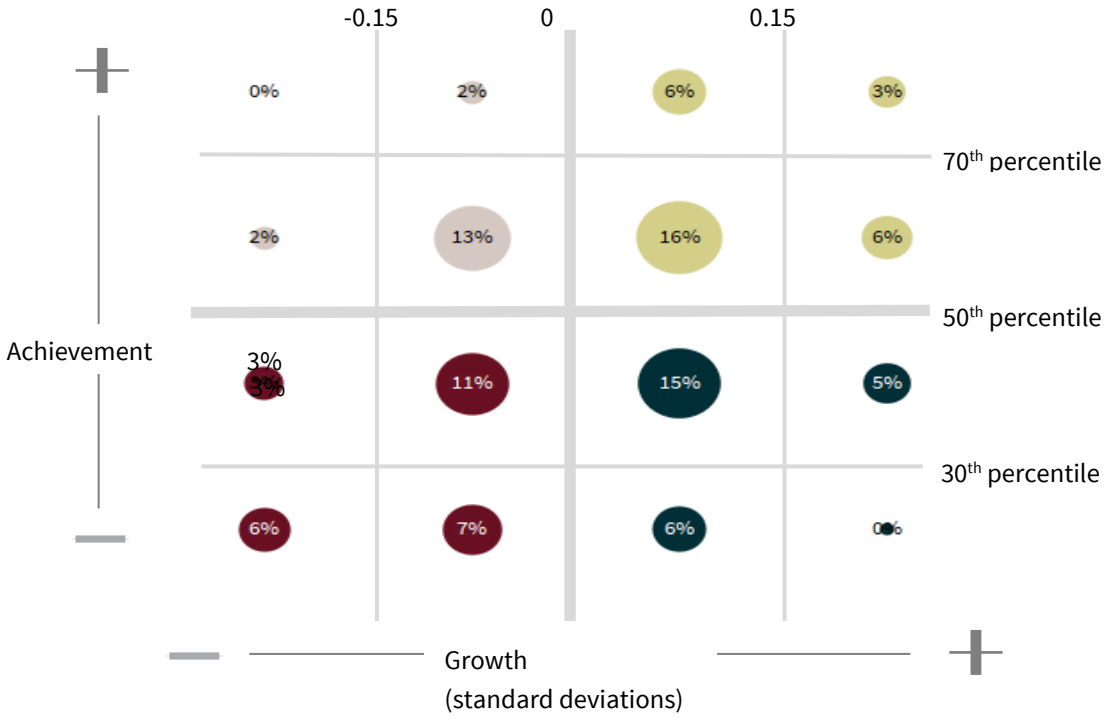
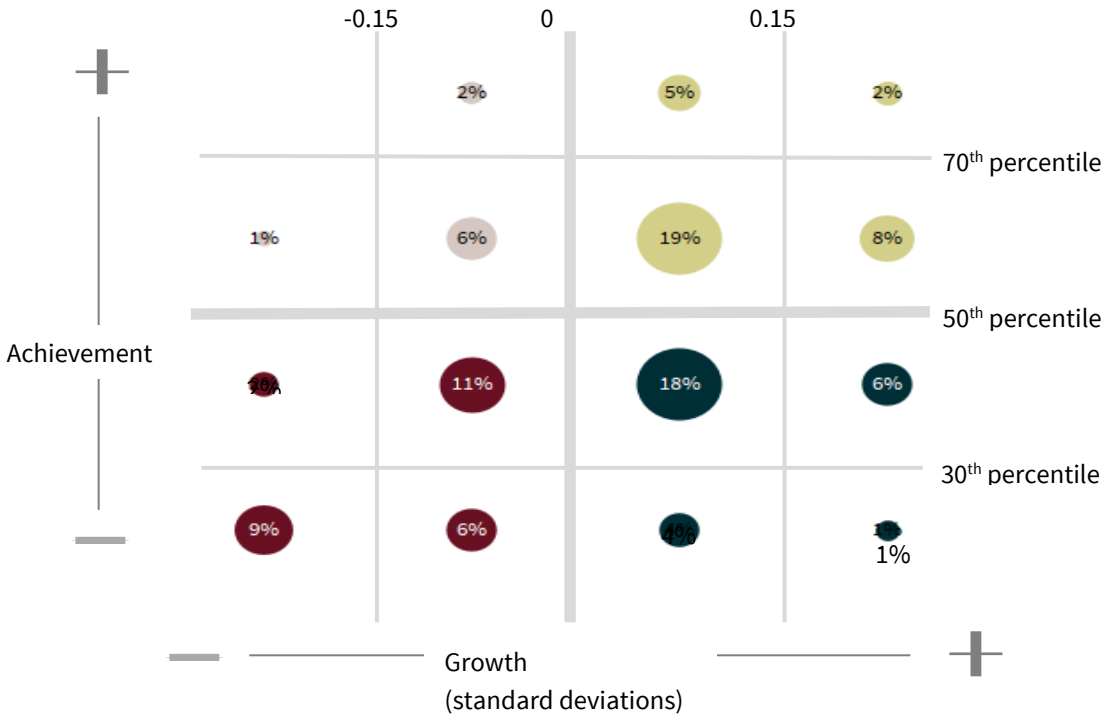


Figure 51 shows the percent of CMO charter schools which fall into each cell. The top right quadrant which represents schools with both high growth and high achievement contains 31 percent of the schools. This is the ideal quadrant where we would like to see all schools. The bottom right quadrant, in dark purple, includes the schools which have low achievement but strong growth. Given enough time and a continuing trend, the 24 percent of schools in the dark purple quadrant will eventually become high achieving as well. Nine percent of schools are high achieving with low growth. The bottom left quadrant contains the schools of greatest concern. These are the schools which are both low achieving and low growing. Thirty-five percent of CMO charter schools fall into the low achievement, low growth quadrant. These are schools which need to make major improvements in student outcomes or face closure by their authorizer.

Figure 51: Growth and Achievement for CMO Charter Schools, Math

Figure 52 has the same information for CMO charter schools in reading. Thirty-four percent of CMO charter schools are both high achieving and high growing in reading. An additional 29 percent of CMO charter schools have low achievement but are high growing. As with math, the bottom left quadrant in dark red is the area of greatest concern as these schools are both low achieving and low growing. In reading, 28 percent of schools fall into this category of special scrutiny.

Figure 52: Growth and Achievement for CMO Charter Schools, Reading



The growth and achievement distributions for VOS charter schools are similar to those for independent charter schools. In math, 26 percent of VOS charter schools are in the high growth, high achievement (upper right) quadrant. The lowest performing quadrant in the bottom left has 33 percent of the VOS charter schools for math. Results for VOS charters in reading also closely mirror those for independent charters. Thirty-one percent of VOS charter schools are in the top right, high-performing quadrant in reading and 27 percent are in the bottom left, low-performing quadrant.

While results for CMO schools and VOS schools are similar, the results for schools which are part of both a CMO and a VOS are much different. The Hybrid sector has more schools in the top right quadrant. This is especially true in reading. For math (see Figure 53), 38 percent of Hybrid charter schools have both high growth and high achievement. Forty-three percent of Hybrid charters have achievement which is below average. However, only 21 percent of Hybrid charter schools fall into the bottom left quadrant in math. These are the schools which are both low achieving and have low growth. The remaining schools with low achievement, 22 percent, have high growth and with time can be expected to move their students to above-average achievement.

Figure 53: Growth and Achievement for Hybrid Charter Schools, Math

The results for Hybrid charter schools are strongest in reading. The majority of Hybrid charter schools, 52 percent, are in the high growth, high achievement quadrant. Further, an additional 25 percent of Hybrid charter schools are in the high growth, low achievement quadrant, dark green in Figure 54. Only 14 percent of Hybrid charter schools are in the low growth, low achievement quadrant which is of greatest concern.

Figure 54: Growth and Achievement for Hybrid Charter Schools, Reading

Network Affiliation

To this point, we have discussed charter schools in categorical context. We have grouped charters by the type of management organization — CMO, VOS, Hybrid, or independent — to which they belong. These categories contain students from 294 different networks. Using a statistical model, we are able to compute an effect size for each charter network. Because these models rely on statistical principles, we do not list results for the five networks with fewer than 30 students in the data set. An estimate based on so few students would be unreliable.

While it might seem logical that all charter school networks would have on average strong growth effect sizes, the truth is many networks have extremely negative effect sizes. The distribution of average effect sizes over the range of charter school networks includes a disturbingly low left tail in both math and reading. The most common effect size is 0.05, but many networks are well below that mark. A preferred outcome would be for all or at least a majority of charter networks to have average effect sizes above 0.00. Figures 55 and 56 give the distribution of network effect sizes in math and reading, respectively. Individual network effect sizes are listed in Appendix A of this report. A question for further research includes the process and policies behind the charter networks with low average growth. It would be informative to know if these were strong performing schools which expanded poorly or if the original schools in these networks were low performing all along.

Figure 55: Distribution of Network Average Effect Sizes, Math

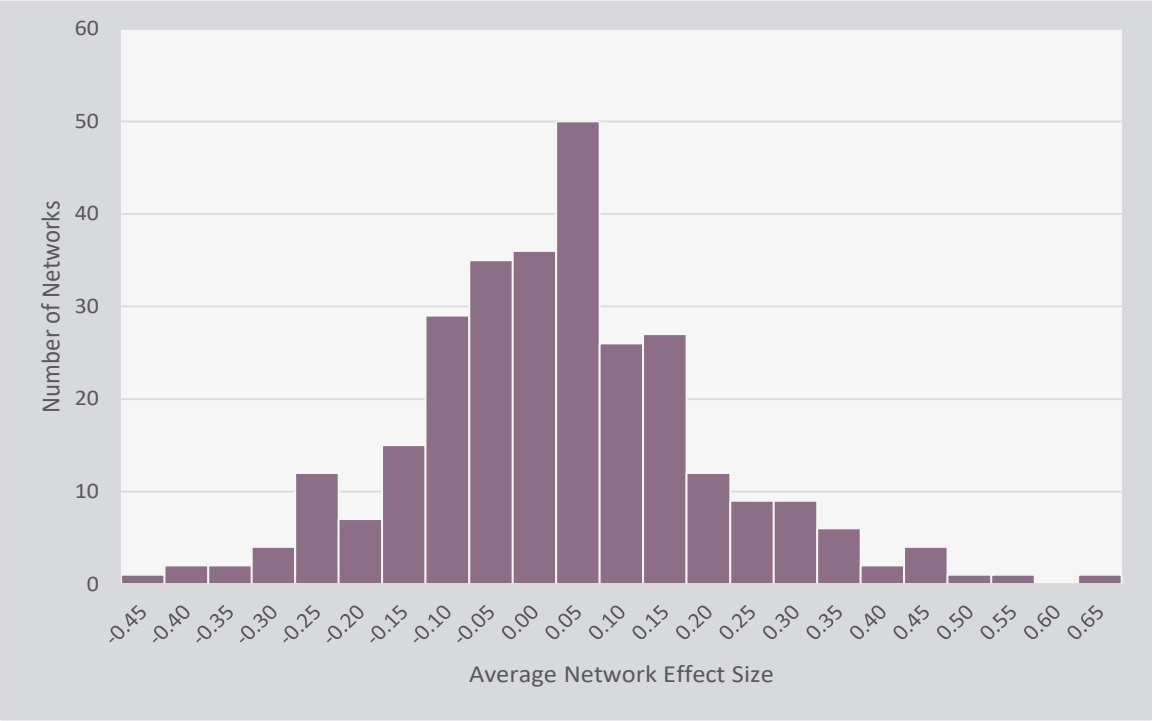
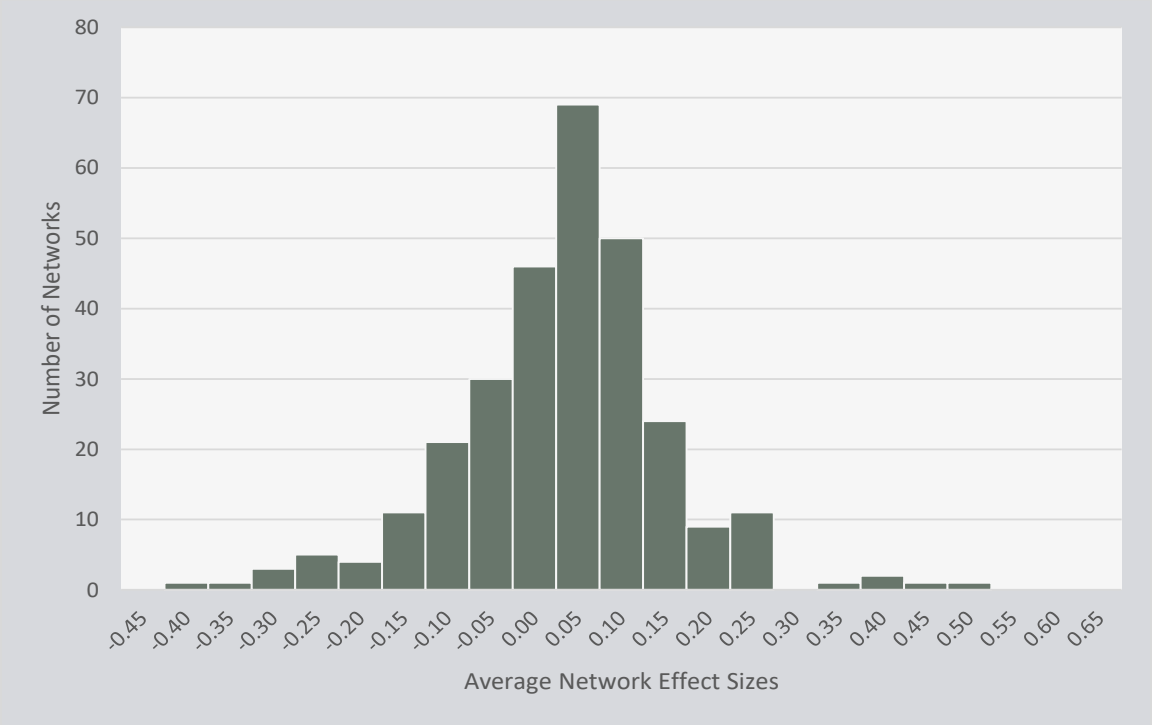


Figure 56: Distribution of Network Average Effect Sizes, Reading



Super Networks

In the 2013 Charter School Growth and Replication report, CREDO introduced the concept of super networks. A super network is a network of charter networks. There are two primary models of super networks.

The first consists of national organizations which oversee multiple regional networks which themselves function semiautonomously. An example of this type of super network would be an organization such as the KIPP Foundation. KIPP schools are overseen at the regional level by a local organization such as KIPP Houston or KIPP Chicago. These regional networks receive support from a central national organization which provides a level of leadership and mission to the entire super network. Thus, schools in a super network maintain a shared vision and practices while allowing for customization to the needs and problems of the local region.

The second type of super network places multiple brands of charter schools under a single larger organization. Under this model, each brand of charter schools may have a different mission or different practices, but all the brands are overseen by a second-level organization in a hierarchical structure.

Regardless of which organizational model is used by a super network, the common factor is that schools in a super network have a multitiered organizational structure. The schools are part of a first-level organization which itself then is part of a second-level organization.

For this report, CREDO identified eight organizations with structures we feel align with the concept of a super network. These organizations are Aspira Association, Big Picture Learning, K12, KIPP, Learning Matters Education Group, ResponsiveED, Uncommon Schools and White Hat Management. Some of these organizations operate only physical schools, some operate online education programs, and others have a combination of physical and online schools. The Learning Matters Education Group and White Hat Management are classified as VOSs. The rest of the super networks include CMO charter schools.

Table 10: Super Network Effect Sizes, Math and Reading

SUPER NETWORK NAME	MATH	READING
Aspira Association	0.04*	0.01
Big Picture Learning	-0.35**	-0.14**
K12	-0.21**	-0.11**
KIPP	0.10**	0.08**
Learning Matters Education Group	-0.08*	0.00
ResponsiveEd	-0.21**	-0.04
Uncommon Schools	0.24**	0.15**
White Hat Management	-0.02	-0.05**
** Significant at the 0.01 level. *Significant at the 0.05 level.		

Table 10 includes the average math and reading effect sizes for each of the super networks. The values range from a low of -0.35 or 200 fewer days of learning to 0.24 or 137 days of additional learning. These results show wide variation in results for charter school super networks. While the basic super network results are informative, these results must be interpreted with the understanding that the single values in Table 10 are representative of the super network as a whole. Individual component networks may have differing effects. For example, a positive super network effect does not mean every regional or brand network within the super network has the same outcome. The network listings in Appendix A include an indicator for networks which comprise part of a super network. [17]

Network Virtual Charter Schools

In 2015, CREDO — in conjunction with Mathematica Policy Research and the Center on Reinventing Public Education — released a set of reports on virtual charter schools. The findings from the Online Charter School Study showed extremely negative results for students attending full-time online charter schools (Woodworth et al. 2015). The effect size in reading was -0.10 and for math -0.25.

One of the questions included in this study was whether full-time online charter schools which were part of a network would have different outcomes than those found in the Online Charter School Study. To this end, we include a statistical model which estimates the effect sizes for four groups of charter schools,

[17] For Big Picture Learning and K12, the individual regional networks could not be identified at the school level. Therefore, the effect size for the network in Appendix A is the same as the super network effect size.

brick-and-mortar charter schools, non-network online charter schools, online schools which are part of a CMO, and online schools which are part of a VOS. There were no Hybrid online charter schools.

Figure 57 shows that the results for online charter schools are significantly negative and large regardless of network affiliation. While the effect size for VOS online charter schools was significantly different from the effect size for CMO online charter schools in math, both values are so low the fact that they are significantly different from each other is simply differentiation between two levels of failure.

Figure 58 displays the results for online charter schools by sector in reading. While the reading numbers are less abysmal than those in math, they still show consistent and persistent negative effect sizes for online charter schools. It is worth noting that some of the networks included in this study consist primarily or exclusively of online charter schools. In other instances, the effect sizes of the network or even super network have been negatively affected by the results of a single, large online charter school which is part of the network. However, these online schools are part of the networks' operations by choice. Therefore, it is appropriate to include them as part of the networks' overall results.

Figure 57: Online Charter School Effect Sizes by Sector, Math

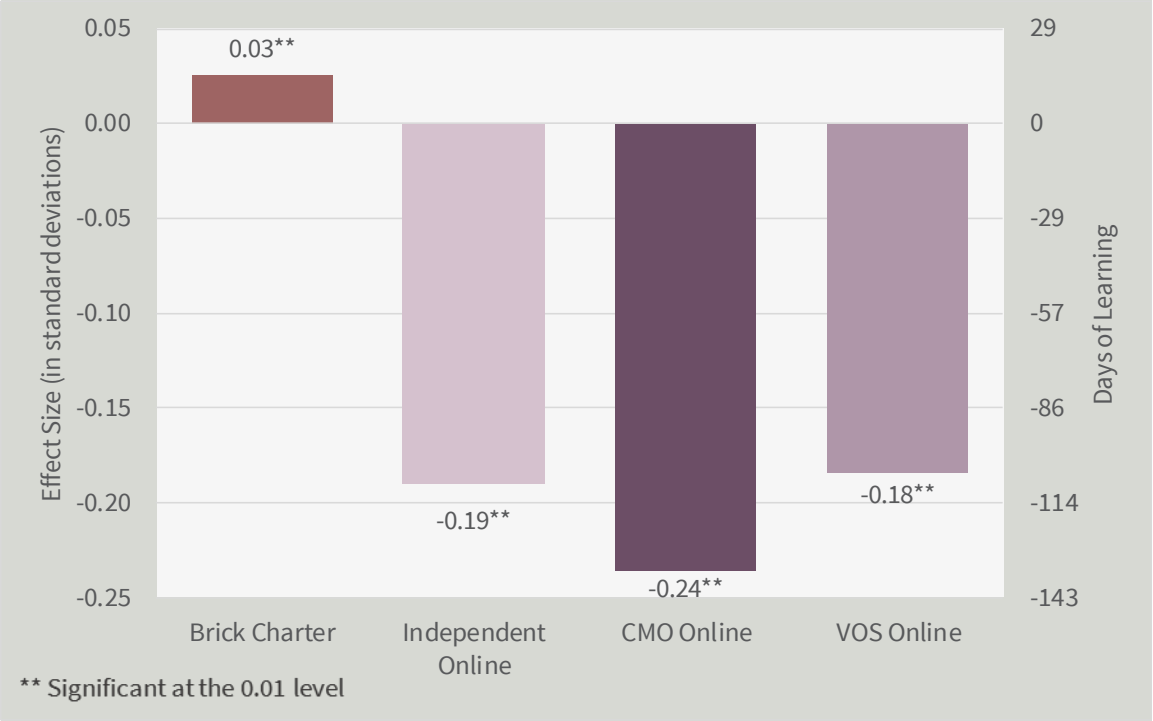
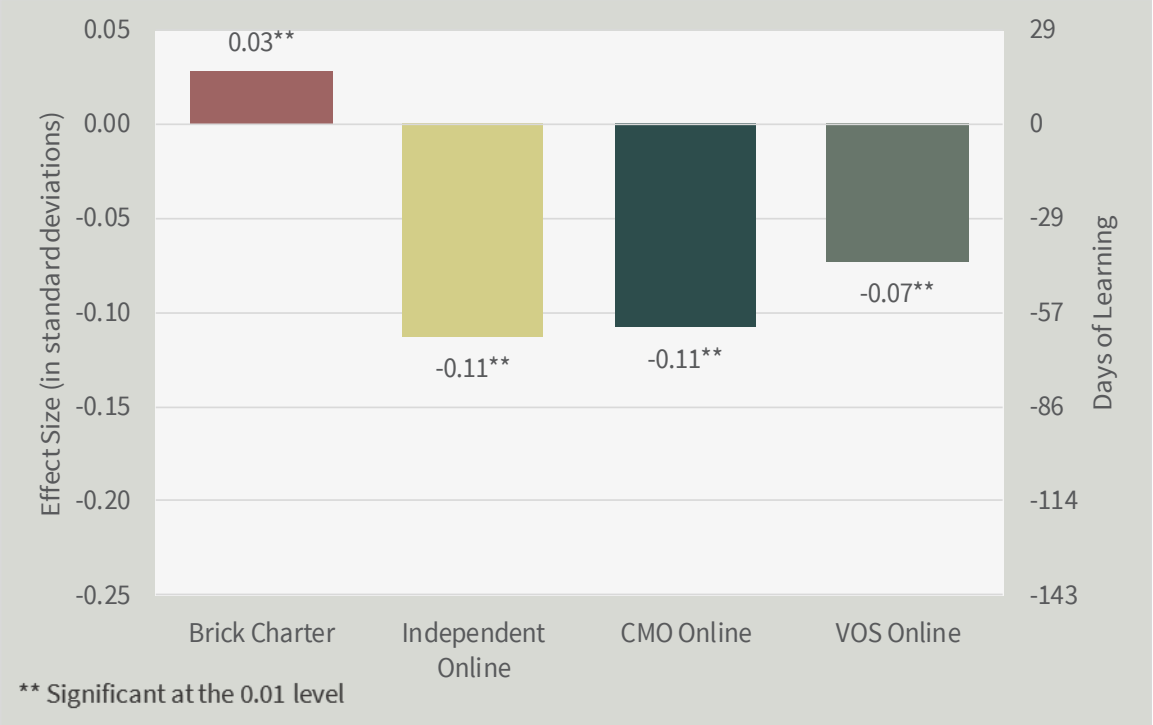


Figure 58: Charter School Effect Sizes by Sector, Reading

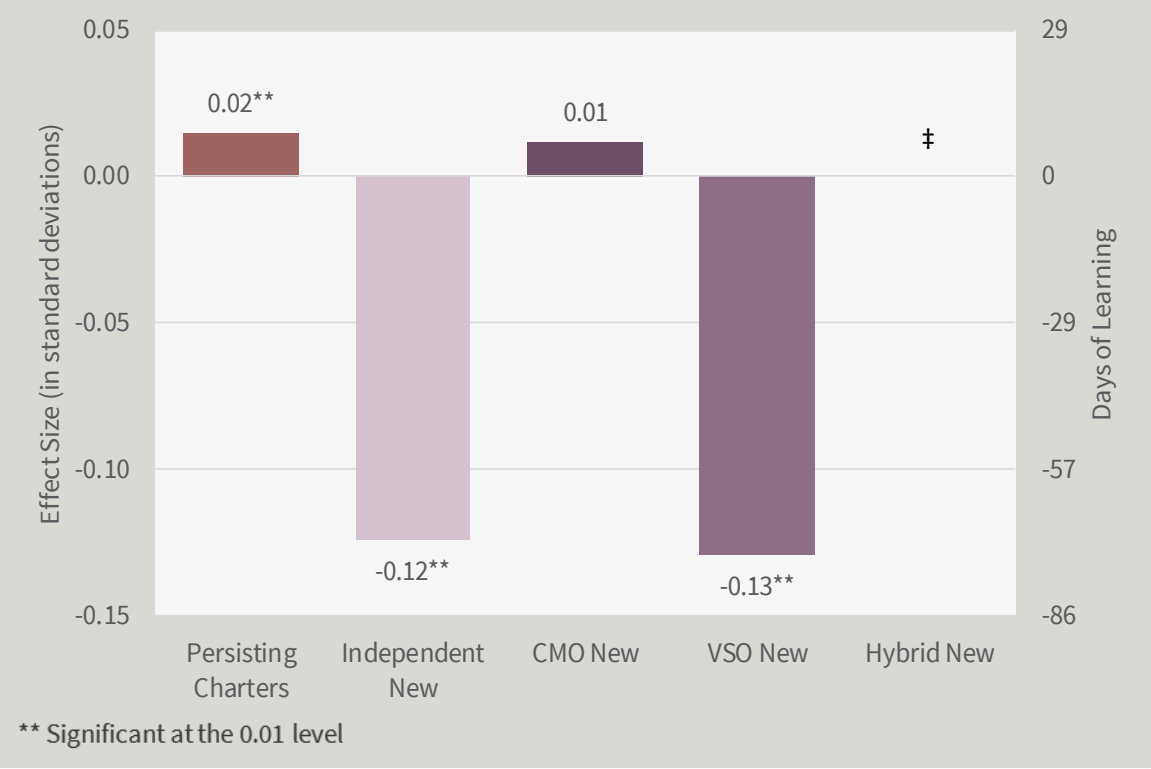


New Schools and Networks

One of the advantages of belonging to a charter network is the existence of institutional knowledge into which new schools can tap. If such knowledge exists, then newly opened schools which are part of a network should fare better than new independent charter schools. Part of the extensive school-level database maintained by CREDO includes information on what year a school opened. In order to identify a network effect on new schools, we include a model which differentiates among persisting charter schools (those which existed in the previous year), new charter schools in a network and those new schools not in a network.

The results in Figure 59 show the persisting charter schools have an effect size of 0.02 in math. Students attending first-year charter schools have significantly weaker growth than their TPS comparisons. Students in a new VOS school have a math effect size which is similar to that of new independent charter schools. This suggests VOS schools do not benefit from network institutional knowledge. CMO new schools, on the other hand, have growth which is not significantly different from their VCRs or from the growth of students attending persisting charter schools. The Hybrid sector does not have enough students in new schools to produce a reliable estimate.

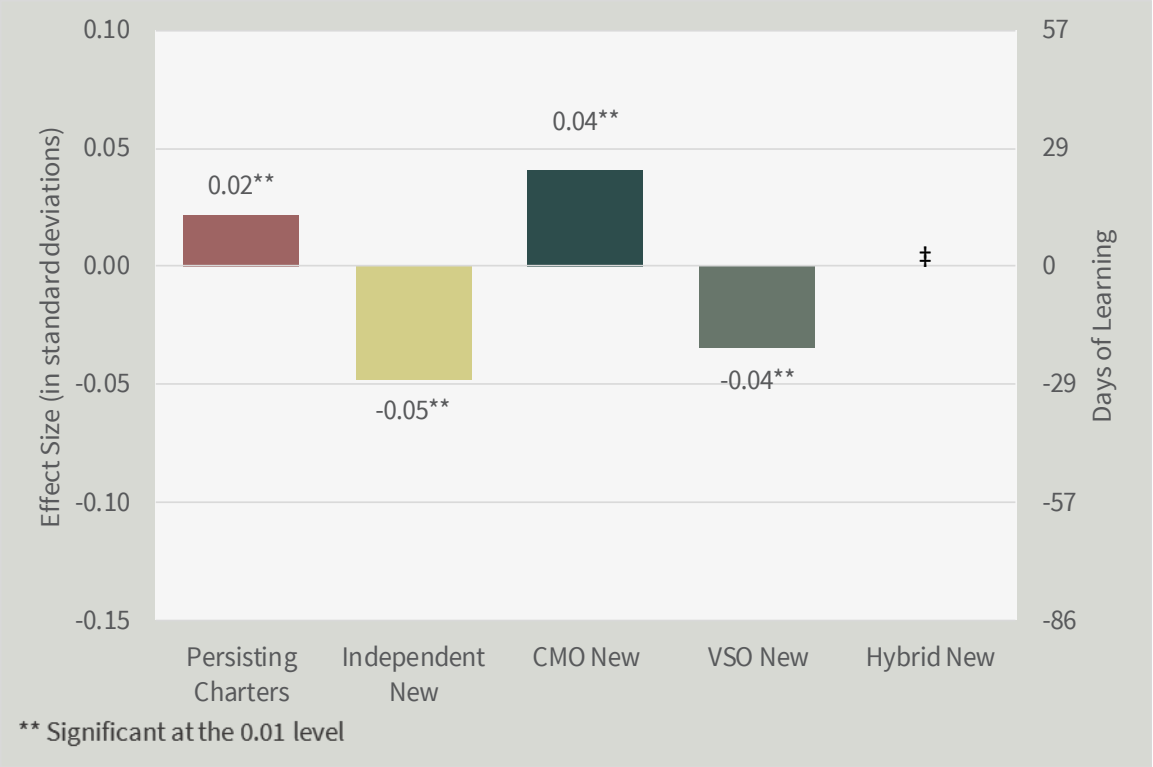
Figure 59: New Charter School Effect Sizes by Sector, Math



‡ Too few students for reliable estimate

The pattern of growth is similar in reading. Persisting charter students have a 0.02 effect size in reading. The non-network and VOS charter students attending new schools have growth which is significantly weaker than that of the persisting charters as well as that of their VCRs. In reading, the students attending a new CMO charter school actually have growth which is stronger than the persisting charter schools. New Hybrid charter schools do not have enough students to produce a reliable estimate.

Figure 60: New Charter School Effect Sizes by Sector, Reading



‡ Too few students for reliable estimate

The results for students attending new charter schools show a relationship between growth and the sector of the new school. The difference in effect size between new non-network charter schools and new CMO charter schools suggests CMO networks pass on some institutional knowledge to their new schools which enable those schools to mitigate the negative impacts of operating a new school.

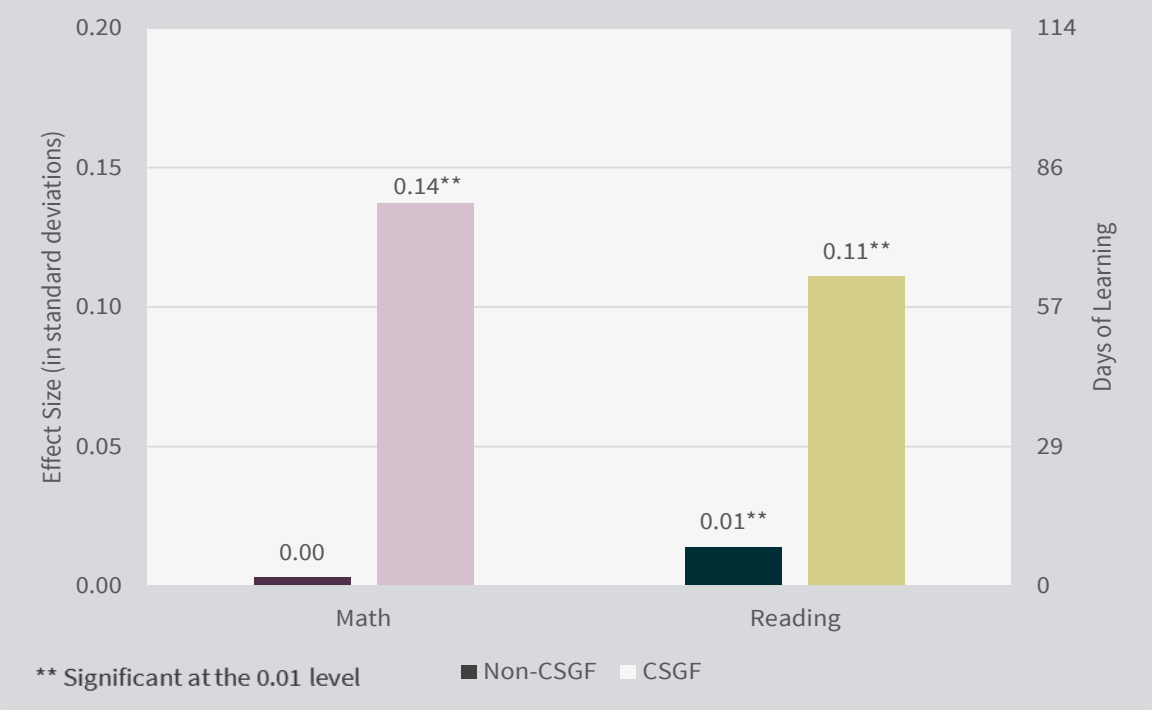
Charter School Growth Fund Schools

In the 2013 CGAR study, CREDO examined the effect size of charter school networks which were funded in part by the Charter School Growth Fund (CSGF). Charter School Growth Fund is a national nonprofit which makes multi-year investments in charter schools to help them grow into multi-school networks. In the 2013 study, Charter School Growth Fund schools had stronger growth than other charter schools. This showed Charter School Growth Fund seemed to have the ability to predict which successful charter operators were likely to remain successful as they increased the scale of their operations.

For this study, we wanted to see if Charter School Growth Fund has continued its prognostic success by helping to grow charter school networks that operate effective schools. Because CREDO defines a charter school network as an organization having at least three schools, some of Charter School Growth Fund's more recent selectees are not included as Charter School Growth Fund for this analysis. However, as one of the goals of Charter School Growth Fund is to support charter operators in opening more schools, the networks which did not meet our three-school cutoff are newer additions to the Charter School Growth Fund portfolio. This means those schools have not yet received a typical Charter School Growth Fund investment for the purposes of scaling up operations; thus, they should be excluded anyway.

In Figure 61, non-Charter School Growth Fund charter schools are represented by the dark shaded bars, and charter schools funded by Charter School Growth Fund are represented by the light shaded bars. In both math and reading, the effect size for Charter School Growth Fund schools greatly exceeds that of the non-Charter School Growth Fund charter schools when both are compared to the VCRs baseline of 0.00. The difference between the two groups is equivalent to 80 additional days learning for Charter School Growth Fund school students in math and 57 additional days in reading.

Figure 61: Charter School Effect Sizes by Charter School Growth Fund Participation, Math and Reading



Although the difference between non-Charter School Growth Fund charter and Charter School Growth Fund schools is smaller than in the 2013 CGAR study, the continued strong effect size of Charter School Growth Fund schools suggests that Charter School Growth Fund has developed a screening process to identify operating charter schools that are more likely to operate successful schools as they grow. To go

a step further than the previous study and ensure the results were not the result of success with just a subset of the population, we evaluate the Charter School Growth Fund results on a variety of breakouts. Results for these breakouts, which show consistent positive effects across multiple subgroups, are included in the data appendix of this report.

Summary and Implications

As we state in the opening section, the primary question of this analysis is, "Do schools which are part of a larger management structure create student academic growth that is different from that seen in independent charter schools?" Based on the information presented in this report, the simple answer seems to be, "Students attending a charter school which is part of a network have stronger growth than they would in TPS or an independent charter school." Of course, this is a simple answer to a complex question. Results are not monolithic, nor are charter schools. Thus, nuances of each situation matter.

Having replicated is not a guarantee of quality.

The analysis of charter network average effect sizes is disturbing. There are a significant number of charter schools which have been allowed to replicate into a multi-campus network even though their average impact on academic growth is extremely low. This was a finding of the 2013 CGAR study as well, and this study supports continued concern. While some of these charter schools may argue they provide additional services to their students which make up for lower academic gains, it is incumbent on authorizers to investigate these claims and evaluate the charter schools to determine if the additional benefits, in fact, balance the weak academic results.

Charter quality varies by network.

Network-level analyses show charter performances across the country differ greatly. This indicates there are characteristics of the charter school operations or the public school environment which change across locations. At least some of these differences should be identifiable. One of the early theories behind charter schools is that they would be a laboratory/incubator for new educational ideas which could then be shared with other schools. This spirit should still hold true today. Some networks have highly effective charter schools in multiple locations. These should be examined and studied for practices which can be adopted by other schools.

Management arrangements matter.

There are three insights from this analysis that pertain to management practices. First, at the average, independent charter schools show lower gains for their students than CMOs. Despite the wide range of CMO quality, larger organizations of charter holders have taken advantage of scale to the benefit of their students. Second, in larger organizations, maintaining direct operating control produces better results than relying on contract VOS operators. The third point is actually an exception to the second but, due to the small number of cases in the Hybrid group, requires caution. When CMOs take either a portfolio approach to their school operations or develop deep and enduring relationships with VOSs, it appears that both sides of the exchange bring out the best in each other and the results are, on average, superior to other arrangements. Further exploration is needed to better understand the mechanisms that lead to such strong results.

Authorizers have more work to do.

The two items above lead to a frank conclusion. Some charter authorizers are not holding their schools adequately accountable. Why are charter schools with weak academic track records allowed to replicate? Why are some networks with terrible average growth allowed to continue to operate multiple schools? Charter school authorizers are charged with acting as the gatekeepers to ensure schools of choice are beneficial to their students. Some of them seem to be abdicating that responsibility. If authorizers will not step up to their responsibilities to regulate charter performance, then legislatures need to acknowledge their responsibilities to regulate authorizers.

Charter quality varies by state.

Just as we find variation by charter network, we also find variation by state. State policies and practices have a strong bearing on school operations. States with lower performing schools should take a moment to look at the practices of neighboring states where kids have stronger growth. While every state is different, some policies can be adapted across state borders.

Overall, charter schools are having a positive academic impact.

In every sector of charter schools, a higher percentage of charter schools have better growth compared to their VCRs than have worse growth compared to their VCRs. This holds true in both math and reading. Strong authorizing policies can increase this percentage by holding charter schools to their end of the charter bargain of accountability in exchange for flexibility.

Charters have more success with middle schools and high schools.

Results presented in this study support the assertion that networked charter schools have their strongest effect on students in the middle school and high school settings. Equally important is the finding that multilevel charter schools seem to struggle greatly with providing better outcomes for students than the students would otherwise achieve in TPS.

Virtual charter schools don’t work for most kids.

As far back as the 2011 "Charter School Performance in Pennsylvania" report, CREDO has found that virtual charter schools are not effective for the average student attending full-time virtual schools (Center for Research on Education Outcomes 2011). This finding was confirmed on a large scale in the 2015 "Online Charter School Study" (Woodworth et al. 2015) and again in this report. This report shares only one growth period with the 2015 "Online Charter School Study" and adds two more years of data, but finds almost identical results. It is time for operators, authorizers and legislatures to step up to their responsibilities to ensure virtual schools, both traditional and charter, are only used when they are the best option for students.

It is not an exaggeration to say that good schools can make all the difference in a child's future. Charter school networks can provide a structure and means for identifying and propagating high quality educational opportunities for students. But they also can be the means by which poor quality programs expand and survive. The responsibility to ensure only the best schools operate and multiply rests at every level of accountability. As this study shows, there is still much work to be done in regulating and maintaining the pool of charter school networks. But overall, charter school networks have a beneficial influence on the provision of education services in the United States.

Appendix A: INDIVIDUAL NETWORK EFFECT SIZES IN MATH AND READING

NETWORK NAME	N	SECTOR	MATH	READING
Academica	23,788	VOS	-0.02	0.04*
Academy of Tucson	733	CMO	-0.04	0.02
Accelerated Learning Solutions	402	VOS	0.00	-0.15**
Accelerated School, The	766	CMO	0.06	0.05**
ACH Corporation of America	292	VOS	0.00	-0.05
Achievement First	5,262	CMO	0.22**	0.10**
AdvancED	426	VOS	0.12*	0.02
Albert Einstein Academies	373	CMO	-0.15**	0.04**
Algiers Charter School Association	5,678	CMO	0.11**	0.00
Alliance for College-Ready Public Schools	5,185	CMO	0.12**	0.09**
Altus Institute Network of Charter Schools	1,459	CMO	-0.16**	-0.14**
America CAN!	3,468	CMO	-0.06	-0.15**
American Indian Public Charter School	636	CMO	0.43**	0.22**
American Leadership Academy, Inc.	3,988	CMO	0.00	-0.07**
American Quality Schools	607	CMO	‡	‡
AmeriSchools (Ideabanc, Inc.) (The Charter Foundation, Inc.)	758	CMO	0.02	0.04*
Amethod Public Schools	271	CMO	0.53**	0.39**
AppleTree Institute for Education Innovations	160	CMO	-0.22**	-0.19**
Archimedean Academy	1,084	CMO	0.20**	0.21**
Arizona Agribusiness & Equine Center	1,220	CMO	0.23**	0.07**
Arizona Community Development Corporation	2,112	CMO	0.00	-0.01
Arrow Academy, Inc.	540	CMO	-0.15*	0.00
Ascend Learning	1,668	CMO	-0.01	0.02
Aspira Inc. of Florida[A]	3,696	CMO	-0.08	-0.07
Aspira Inc. of Illinois[A]	1,582	CMO	0.02*	0.02**
Aspira Inc. of Pennsylvania[A]	3,494	CMO	0.04	0.01
Aspire Public Schools	5,695	CMO	0.05	0.01
Association for Development of Academic Excellence	626	CMO	-0.03	-0.09
BASIS Schools, Inc.	12,010	CMO	0.18**	0.17**
Bay Area Charter School, Inc.	280	CMO	-0.13**	-0.07
Ben Gamla Charter School Foundation	1,458	Hybrid	0.13*	0.06
Benjamin Franklin Charter Schools	2,391	CMO	0.16**	0.06*
Betty Shabazz International Charter School	787	CMO	0.08	-0.01
Big Picture Learning Network[B]	268	CMO	-0.35**	-0.16**
Blackstone Valley Prep Mayoral Academy	542	CMO	0.19**	0.17**

NETWORK NAME	N	SECTOR	MATH	READING
Blueprint Education	299	CMO	-0.08**	-0.09*
Brazos School for Inquiry & Creativity (BSIC) - Democratic Schools Research, Inc.	372	CMO	0.11	0.07**
Breakthrough Schools	1,600	CMO	0.26**	0.21**
Bright Star Schools	768	CMO	-0.05*	-0.02
Brighter Choice Charter Schools	932	CMO	0.03	0.02
Brooke Charter Schools	574	CMO	0.60**	0.47**
Broward Community Schools	440	CMO	-0.21*	-0.02
California Montessori Project	654	CMO	-0.09*	0.02
California Pacific Charter Schools	271	CMO	-0.29**	-0.16**
Calvin Nelms Charter Schools	383	CMO	-0.12	-0.01
Camino Nuevo	904	CMO	0.08	0.09**
Capital City Public Charter School	775	CMO	-0.07*	0.03*
Career Success School District	749	CMO	-0.10**	-0.04
Carl C. Icahn Charter Schools	658	CMO	0.30**	0.08*
Celerity Educational Group	960	CMO	0.25**	0.12**
Center City Public Charter Schools	1,454	CMO	0.06	0.06
Center for Academic Success	858	CMO	-0.11*	-0.02
Cesar Chavez Academy	2,458	CMO	-0.08**	-0.09**
Cesar Chavez Academy District	1,086	VOS	0.01	0.02**
Cesar Chavez PCS for Public Policy	1,359	CMO	0.00	-0.05
Chandler Park Academy	1,763	CMO	-0.04**	0.04**
Charter School Administration Services	337	VOS	-0.15**	-0.08
Charter School Associates	7,063	VOS	-0.13**	-0.01
Charter Schools USA	48,407	VOS	-0.02	0.01
Chicago International Charter Schools	9,921	Hybrid	-0.11*	-0.07*
Choice Foundation	2,066	CMO	0.00	0.05
Choice Schools Associates	1,182	VOS	-0.02	0.02
Civitas Schools	690	Hybrid	0.14**	0.10**
Collegiate Academies	426	CMO	0.41**	0.01
Community Academy PCS	391	CMO	0.01	0.05*
Community Options for Resources in Education	505	CMO	-0.12**	-0.05*
Concept Schools	6,384	VOS	0.04	-0.01
Confluence Academies	1,939	CMO	-0.03	-0.03
Connections Academy, Inc.	24,045	VOS	-0.19**	-0.07*
Constellation Schools	2,872	CMO	0.02	0.01
Cornerstone Charter Schools	1,245	CMO	-0.07*	0.02

NETWORK NAME	N	SECTOR	MATH	READING
Crescent City	454	CMO	0.04	‡
CS Partners, LLC	3,995	VOS	-0.02	0.02
Daisy Education Corporation (DEC) (Sonoran Science Academy)	2,001	CMO	0.06	0.05
DC Prep Charter Schools	668	CMO	0.43**	0.23**
Democracy Prep Public Schools	5,421	CMO	0.17**	0.08*
Denver School of Science and Technology Public Schools	5,499	CMO	0.30**	0.22**
Doral Academy	5,373	Hybrid	0.25**	0.10**
e_Institute[E]	569	Hybrid	0.04	-0.11
Ed Futures, Inc.	706	VOS	-0.05	0.04
Ed Tech Schools	5	VOS	‡	‡
Edge School Inc., The	179	CMO	0.25**	-0.03
Edison Learning	10,417	VOS	0.01	0.04*
EdKey Schools	1,633	CMO	-0.17**	-0.11**
Education for Change	793	CMO	0.06	-0.01
Education Management and Networks	366	VOS	-0.07	0.07*
EdVantages Academies	2,481	VOS	-0.03	-0.01
El Paso Education Initiative, Inc.	1,222	CMO	0.14**	0.07**
Environmental Charter Schools	550	CMO	-0.13**	0.01
Envision Schools	582	CMO	-0.09*	0.00
eSchool Consultants	8	VOS	‡	‡
Espiritu Community Development Corp.	512	CMO	0.27*	0.13**
eStem Public Charter Schools	1,382	CMO	0.00	0.02
Evans Solution Management Company	159	VOS	-0.06	-0.14**
Evolution Academy	247	CMO	-0.11**	-0.38**
Excel Academy (TX)	705	CMO	-0.43**	-0.41**
Explore Schools, Inc.	1,543	CMO	-0.01	-0.06**
Faith Family Academy Charters	2,743	CMO	-0.09**	-0.11**
Fenton Charter Public Schools	998	CMO	0.21*	0.06
Firstline Schools	3,004	CMO	0.05	0.06*
Foundation for Behavioral Resources	304	CMO	0.02	0.04
Founders Classical Academy[F]	964	CMO	-0.05	0.08*
Friendship Schools	3,207	VOS	0.13*	0.03
Gateway Community Charters	1,254	CMO	-0.01	-0.03
Gestalt Community Schools	1,678	CMO	-0.08	0.02
Global Educational Excellence	1,980	VOS	-0.02	0.01
Golden Rule Charter School	774	CMO	0.07**	-0.01*

NETWORK NAME	N	SECTOR	MATH	READING
Golden Valley Charter Schools, Inc.	507	CMO	0.02	0.12**
Great Hearts Academies	9,878	VOS	0.09**	0.10**
Green Apple School Management, LLC	1,005	CMO	0.06**	0.06**
Green Dot Public Schools	5,499	CMO	0.05	0.02
Gulf Coast Council of La Raza	140	CMO	-0.28**	-0.18**
Hamadeh Educational Services	2,043	VOS	0.07*	0.15**
Hanely Harper Group	35	VOS	0.06**	0.13**
Harmony Schools (Cosmos Foundation, Inc.)	34,203	CMO	0.13**	0.07**
Harvest Power Community Development	679	CMO	-0.03	-0.03
Helicon Associates	1,846	VOS	0.05	0.05**
Heritage Academy (AZ)	300	CMO	-0.20**	-0.21**
Hickman Community Charter District	520	CMO	0.07**	0.07*
High Tech High	2,409	CMO	-0.16*	0.00
Honors Academy	739	CMO	0.02	-0.06
Hope Academies[H]	2,157	CMO	-0.11**	-0.11*
Houston Gateway Academy	1,731	CMO	0.44**	0.14**
Howard Road PCS	86	VOS	-0.01	0.04**
Humanities and Sciences Academy of the United States, Inc.	421	CMO	-0.18**	-0.13**
IDEA Public Schools	17,020	CMO	0.14**	0.13**
Imagine Schools	29,812	CMO	-0.03	-0.02
Information Referral Resource Assistance, Inc. (IRRA) (One Stop Multiservice Charter School)	409	CMO	-0.13**	-0.28**
Inner City Education Foundation (ICEF)	2,157	CMO	0.03	0.00
Innovative Education Management	3,905	VOS	-0.13**	0.04
Innovative Teaching Solutions	1,003	CMO	-0.03	0.00
Insight Schools, Inc.	282	VOS	-0.08	0.12
Intelli-School Charter High Schools	311	CMO	-0.06*	-0.03
International Leadership Of Texas (ILT)	2,958	CMO	0.01	0.01
iSchool High[F]	252	CMO	-0.10**	0.04
John H. Wood Jr. Public Charter District	633	CMO	-0.25**	-0.24**
Jubilee Academic Center, Inc.	2,653	CMO	-0.10	-0.01
K12 curriculum only	1115	CMO	-0.16	-0.05
K12, Inc.[C]	44,559	CMO	-0.22**	-0.11**
King/Chavez	1,131	CMO	-0.08	-0.05*
Kingman Academy of Learning	1,439	CMO	0.02	0.01
KIPP Austin[D]	3,292	CMO	0.15**	0.07**

NETWORK NAME	N	SECTOR	MATH	READING
KIPP Bay Area[D]	1,356	CMO	0.25*	0.20**
KIPP Chicago[D]	1,576	CMO	-0.07	-0.03
KIPP Colorado[D]	2,199	CMO	0.23**	0.24**
KIPP DC[D]	2,739	CMO	0.29**	0.13**
KIPP Delta[D]	1,577	CMO	0.21**	0.06
KIPP Houston[D]	9,054	CMO	0.03	0.07**
KIPP LA[D]	915	CMO	0.22**	0.16*
KIPP Memphis[D]	1,888	CMO	-0.12	-0.03
KIPP National[D]	8,789	CMO	0.11**	0.07*
KIPP New Jersey[D]	2,394	CMO	0.02	0.07**
KIPP_New Orleans	3,964	CMO	0.05	0.05
KIPP New York City[D]	5,004	CMO	0.18**	0.10**
KIPP Philadelphia[D]	2,160	CMO	0.15*	0.11*
KIPP San Antonio[D]	2,395	CMO	0.01	0.06*
La Amistad Love & Learning Academy	20	CMO	‡	‡
Leadership Public Schools	523	CMO	0.31	0.13
Leading Edge Academy	912	CMO	0.04	-0.02
Learn Charter School	2,585	CMO	0.08	0.04
Learning Foundation and Performing Arts (CAFA, Inc.)	686	CMO	-0.04	0.05
Learning Matters Educational Group (LMEG)	924	VOS	-0.09**	0.04**
Legacy Traditional School	6,441	CMO	0.04	0.07**
Leona Group, LLC	13,264	VOS	-0.06**	-0.05**
Life Schools	5,384	CMO	0.02	0.04**
Life Skills Centers[H]	379	CMO	-0.26**	-0.31**
Lighthouse Academies	2,387	CMO	0.04*	0.05
Lincoln-Marti management services, LLC	522	CMO	-0.10	0.08
Lisa Academies	1,132	CMO	0.02	0.01
Magnolia Science Academy (Magnolia Foundation)	2,315	CMO	-0.03	-0.02
Mastery Charter Schools	8,433	CMO	0.03	0.10**
Mastery Learning Institute (Arthur Academy)	821	CMO	0.13**	0.15**
Mater Academy, Inc.	12,358	Hybrid	0.17**	0.07**
Mavericks in Education, LLC	622	CMO	-0.28**	-0.27**
McKeel Academies	3,887	CMO	0.04**	-0.03*
Midwest Management Group	2,012	VOS	-0.06	0.01
Minnesota Transition Schools (MTS)	571	CMO	-0.08	-0.05
Mosaica	5,707	VOS	-0.02	0.05*
National Heritage Academies	26,782	VOS	0.14**	0.11**

NETWORK NAME	N	SECTOR	MATH	READING
National University Academy	170	CMO	-0.14**	-0.06**
Neighborhood Centers, Inc. (Promise Community School)	417	CMO	-0.05	-0.11**
New Beginning Schools Foundation	2,158	CMO	-0.15**	-0.03
New Orleans College Prep Academies	793	CMO	0.23**	0.00
Renew (Louisiana)	2,397	CMO	0.10	0.08**
New America Schools	437	CMO	-0.24**	-0.19**
New Frontiers Charter School, Inc.	608	CMO	0.00	-0.03
New Paradigm for Education	136	CMO	0.33**	0.22**
New Visions Academy	14	CMO	‡	‡
New Visions for Public School	2,754	CMO	-0.04	0.10
Newpoint Schools	1,160	VOS	-0.20**	-0.10**
Noble Network of Charter Schools	577	CMO	0.31**	0.19
Nova Academies	887	CMO	0.14**	0.09**
Ombudsman Educational Services, Ltd., a subsidiary of Educational Services of America	640	CMO	-0.09**	-0.15**
Omega Academy, Inc.	115	CMO	-0.11	-0.07
OmniVest Preperties Management, LLC	5,313	VOS	0.11**	0.08**
Open Sky Education	717	CMO	-0.04**	0.07**
Opportunities for Learning	1,411	CMO	0.05	0.02
Options for Youth	1,939	CMO	0.06	-0.02
Orenda Education	1,256	CMO	-0.12**	-0.01
Panola Schools	110	CMO	-0.06	-0.11**
Para Los Ninos	165	CMO	0.10	0.03
Partnerships for Uplifting Communities (PUC)	2,533	CMO	0.19*	0.03
Perspectives Charter Schools	1,614	CMO	-0.04	-0.13
Pinecrest Academy	4,568	Hybrid	0.08*	0.06**
Pinnacle Education, Inc.	306	CMO	-0.19**	-0.20**
Pivot Charter School (Roads Education Organization)	73	CMO	-0.42**	-0.23**
Plato Academy Schools	1,990	CMO	0.13**	0.05**
Pointe Schools	1,938	CMO	-0.13**	-0.01
Pontiac Academy for Excellence	540	CMO	-0.10**	-0.04
Por Vida, Inc.	221	CMO	-0.17**	-0.26*
Portable Practical Educational Preparation Training for Employment Centers (PPEP & Affiliates)	619	CMO	0.01	-0.11
Premier High School[F]	1,263	CMO	-0.02	-0.03
Priority Charter Schools	453	CMO	-0.32**	-0.03
Propel Schools	2,966	CMO	0.09*	0.11**

NETWORK NAME	N	SECTOR	MATH	READING
Public Preparatory Network, Inc.	829	CMO	0.09**	0.07**
Quest Middle Schools[F]	932	CMO	-0.01	0.06
Rader Group	2,054	VOS	-0.16	-0.17
Rapoport Academy Public School (East Waco Innovative School Development, Inc.)	585	CMO	0.02	0.05
Raul Yzaguirre School for Success	1,920	CMO	0.02	0.03
Renew Charter Schools	2,397	CMO	0.10	0.08**
RePublic Charter Schools	715	CMO	0.26**	0.22**
Responsive Education Solutions (RES)[F]	9,208	CMO	-0.32**	-0.10**
Richard Allen Schools (Institute of Management and Resources, Inc.)	753	CMO	-0.08**	-0.07*
Richard Milburn Academies	1,387	CMO	-0.21**	-0.32**
Riverwalk Education Foundation, Inc.	2,365	CMO	0.11**	0.05**
Rocketship Education	1,205	CMO	0.12*	-0.02
Rocklin Academies	624	CMO	0.05	0.12**
Rose Management Group	917	CMO	-0.06**	-0.04*
Rylie Family Faith Academies, Inc. (A+ Charter Schools, Inc.)	3,629	CMO	0.04	0.03
S.M.A.R.T. Management	806	VOS	-0.08	0.05
Sabis International Schools Network	6,332	VOS	-0.04	-0.04
Scholar Academies	2,004	CMO	0.13	0.12
School of Excellence in Education (SEE)	1,185	CMO	-0.16	-0.06
See Forever Foundation (Maya Angelou PCS)	306	CMO	-0.15**	-0.09**
Ser-Ninos, Inc.	716	CMO	0.11**	0.06**
Shekinah Learning Institute, Inc.	987	CMO	-0.19*	-0.09*
SIATech (School for Integrated Academics and Technologies)	71	VOS	-0.27**	-0.17**
Sky Partnership	4,187	CMO	0.02	-0.07
Skyline Schools, Inc.	405	CMO	-0.07	-0.08
Solid Rock Management Company	955	VOS	-0.03	0.04**
Somerset Academy	14,951	Hybrid	0.11**	0.06**
South Texas Education Technologies, Inc.	810	CMO	-0.05	0.05
Southwest Schools (Educational Leadership, Inc.)	1,391	CMO	-0.08	-0.05
Southwest Winners Foundation, Inc.	795	CMO	-0.31**	-0.23**
St. Hope Public Schools	853	CMO	0.21**	0.15**
Strive Prep Charter Schools	5,279	CMO	0.17**	0.11**
Student Alternatives Program, Inc.	878	CMO	-0.03	-0.13**
Success Charter Network	168	CMO	0.40**	0.21**

NETWORK NAME	N	SECTOR	MATH	READING
Summit Academies	206	CMO	-0.14**	-0.10
Summit Public Schools	398	CMO	-0.06*	0.07
Synergy Academies	665	CMO	-0.04	-0.01
Tekoa Academy of Accelerated Studies	212	CMO	0.47**	0.35**
Texas Boys Choir	1,180	CMO	0.01	0.03
Texas Education Centers (Salvaging Teens at Risk)	568	CMO	-0.18*	-0.07*
The Charter Schools of Excellence	637	CMO	-0.04	-0.05
The Classical Academy (CO)	3,559	CMO	0.10*	0.04
The Classical Academies (CA)	1,262	CMO	0.04	0.05
The Graham Family of Schools	360	CMO	0.14**	0.03
The Influence 1 Foundation	455	CMO	0.01	0.03
The Romine Group, LLC	1,460	VOS	0.09	0.10**
The University Of Texas System (Tyler)	630	CMO	-0.26**	-0.08**
Tracy Learning Center	409	CMO	-0.06	0.02
Trinity Charter Schools	333	CMO	-0.24**	-0.07
Tucson International Academy	526	CMO	-0.14**	-0.05*
Two Dimensions Preparatory Charter	81	CMO	0.25**	0.17**
Uncommon Schools New York City[G]	7,099	CMO	0.17**	0.10**
Uncommon Schools Newark[G]	3,516	CMO	0.35**	0.25**
Uncommon Schools Rochester[G]	1,987	CMO	0.36**	0.20**
United Neighborhood Organization Charter School (UNO)	10,145	CMO	0.05**	0.04**
Universal Education Management Company	3,236	VOS	0.05	0.03
University of Chicago Charter School Corporation	1,465	CMO	0.01	0.05**
University of Texas - University Charter School	815	CMO	-0.33**	-0.20**
University Preparatory Academy	813	VOS	0.11**	0.09**
Uplift Education	8,425	CMO	0.04	0.08**
Varnett School, The	642	CMO	0.04	0.08**
Victory Schools	4,669	VOS	0.18**	0.09**
Vista Academies[F]	2,556	CMO	-0.07**	0.04**
Wayside Schools	645	CMO	0.00	-0.03
White Hat Management[H]	14,179	VOS	-0.12**	-0.11**
Widening Advancements for Youth	14	CMO	‡	‡
Winfree Academy Charter School	266	CMO	-0.17**	-0.28**
Woodbridge Management & Education Services	445	VOS	0.07**	-0.02
YES Prep Public Schools	12,821	CMO	0.11**	0.10**

[A] – Part of Aspira Associates, [B] – Part of Big Picture Learning, [C] – Part of K12, [D] – Part of KIPP, [E] – Part of Learning Matters Education Group, [F] – Part of ResponsiveEd, [G] – Part of Uncommon Schools, [H] – Part of White Hat Management

Networks in bold are for-profit organizations or associated with for-profit organizations for Hybrid charter networks.

**Significant at the 0.01 level. *Significant at the 0.05 level.

Appendix B: TECHNICAL APPENDIX

After constructing a VCR for each charter student, we then set out to develop a model capable of providing a fair measure of charter impact. The National Charter School Research Project provided a very useful guide to begin the process (Betts and Hill 2006). First, it was useful to consider student growth rather than achievement. A growth measure provided a strong method to control for each student's educational history as well as the many observable differences between students that affect their academic achievement. The baseline model included controls for each student's grade, race, gender, free or reduced-price lunch status, special education status, English language learner status, and whether they were held back the previous year. The literature on measuring educational interventions found that the best estimation techniques must also include controls for baseline test scores (Betts and Tang 2011). Each student's prior year test score is controlled for in our baseline model. Additional controls are also included for state, year and period (first year in charter, second year in charter, etc.). The study's baseline model is presented below.

$$\Delta A_{i,t} = \theta A_{i,t-1} + \beta X_{i,t} + \rho Y_t + \sigma S + \gamma C_{i,t} + \varepsilon_{i,t} \quad (1)$$

where the dependent variable is

$$\Delta A_{i,t} = A_{i,t} - A_{i,t-1} \quad (2)$$

And A_{it} is the state-by-test z-score for student i in period t; A_{it-1} is the state-by-test z-score for student i in period t – 1; $X_{i,t}$ is a set of control variables for student characteristics and period, Y_t is a year fixed effect, S is a state fixed effect; C is a vector of variables for whether student i attended a charter school and what type of charter school in period t; and ε is the error term. Errors are clustered around charter schools and their feeder patterns as well.

In addition to the baseline model above, we explored additional interactions beyond a simple binary to indicate charter enrollment. These included both "double" and "triple" interactions between the charter variable and student characteristics. For example, to identify the impact of charter schools on different racial groups, we estimate models that break the charter variable into "charter_black," "charter_Hispanic," etc. To further break down the impact of charters by race and poverty, the variables above were split again. For example, black students in charter schools are split further into students who qualify for free and reduced-price lunches ("charter_black_poverty") and those who do not ("charter_black_nonpoverty").

For the charter interactions with race/ethnicity variables, we determine statistical significance of the coefficient for a group based on the p-value of the coefficient. To compare between two different

subpopulations of students, we employ a Wald test between the two groups' coefficients. For example, to determine if tps_black is significantly different from ch_black, we include both in the same model and then compare the coefficients with a Wald test. If the p-value of the Wald F-statistic is less than .05, then we consider the difference significant.

The model in which we compute race/ethnic effect sizes also includes variables for special statuses such as charter students in poverty, charter students who receive ELL services, charter students who receive special education services and charter students who are retained. However, since every charter student must be included in one of the six charter_race/ethnicity dummy variables, the coefficient for the charter_special status interaction dummy variables takes on a marginal relationship to the average charter effect. Essentially, a record cannot be charter_poverty without also being charter_some race/ethnic group. Thus, the charter_poverty coefficient produced in the regression model is the marginal difference between being the average charter student not in poverty and the average charter student in poverty.

We are interested in displaying the overall impact on the growth of a charter student in poverty compared to the 0.00 baseline which is a white TPS student who is not in poverty, not ELL, does not receive special education services and was not retained in the previous year. In order to determine if these charter special status interaction estimates plus the average charter effect estimates are statistically significantly different from the baseline 0.00, we conducted a series of weighted Wald tests. The weighted Wald test takes into account the average charter effects from race/ethnicity, the other special statuses, and the special status of interest. Equation 3 provides the weighted Wald test used to test the significance of coefficients for charter students in poverty compared to the 0.00 baseline (white TPS non-poverty, non-ELL, non-SPED, non-retained) in the models.

$$(\theta_{White}*\beta_{Ch\_White} + \theta_{Black}*\beta_{Ch\_Black} + \theta_{Hispanic}*\beta_{Ch\_Hispanic} + \theta_{Asian}*\beta_{Ch\_Asian} + \theta_{NativeAm}*\beta_{Ch\_NativeAm} + \theta_{Multiracial}*\beta_{Ch\_Multiracial} + \theta_{ELL}*\beta_{Ch\_ELL} + \theta_{SPED}*\beta_{Ch\_SPED} + \theta_{Retained}*\beta_{Ch\_Retained}) + \beta_{Ch\_Poverty} = 0 \quad (3)$$

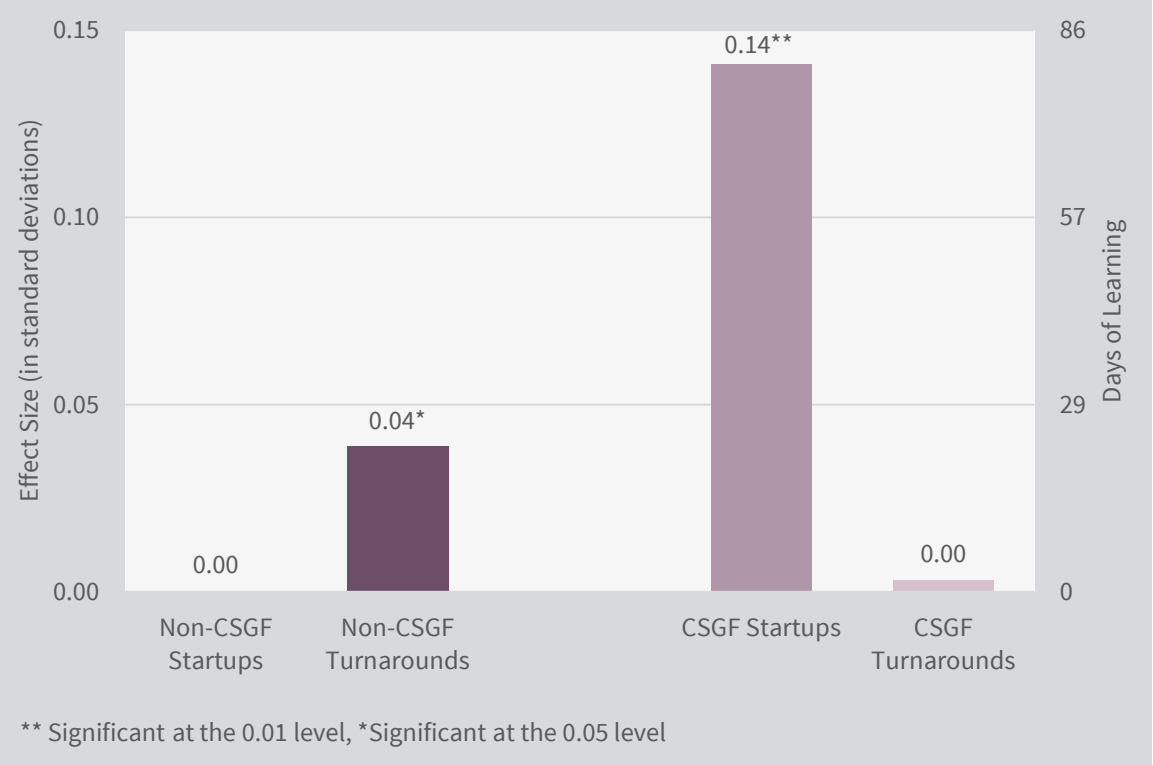
where Θ represents the probability of a student belonging to a specific racial/ethnic group or special status group and β is the regression coefficient for each interaction term. The Wald test produces an F-statistic with degrees of freedom of (1, N-1) where N is the number of school clusters. If the p-value is less than .05, then the coefficient is considered to be significantly different from 0.00.

Appendix C: DATA APPENDIX

The first breakout is to determine if the overall results are the result of Charter School Growth Fund networks opening new charter schools, called start-ups, or of Charter School Growth Fund members taking over failed schools in what is known as a turn-around model. As with the overall Charter School Growth Fund analysis, we use non-Charter School Growth Fund charter schools to establish the performance we would expect in the charter sector absent the Charter School Growth Fund schools.

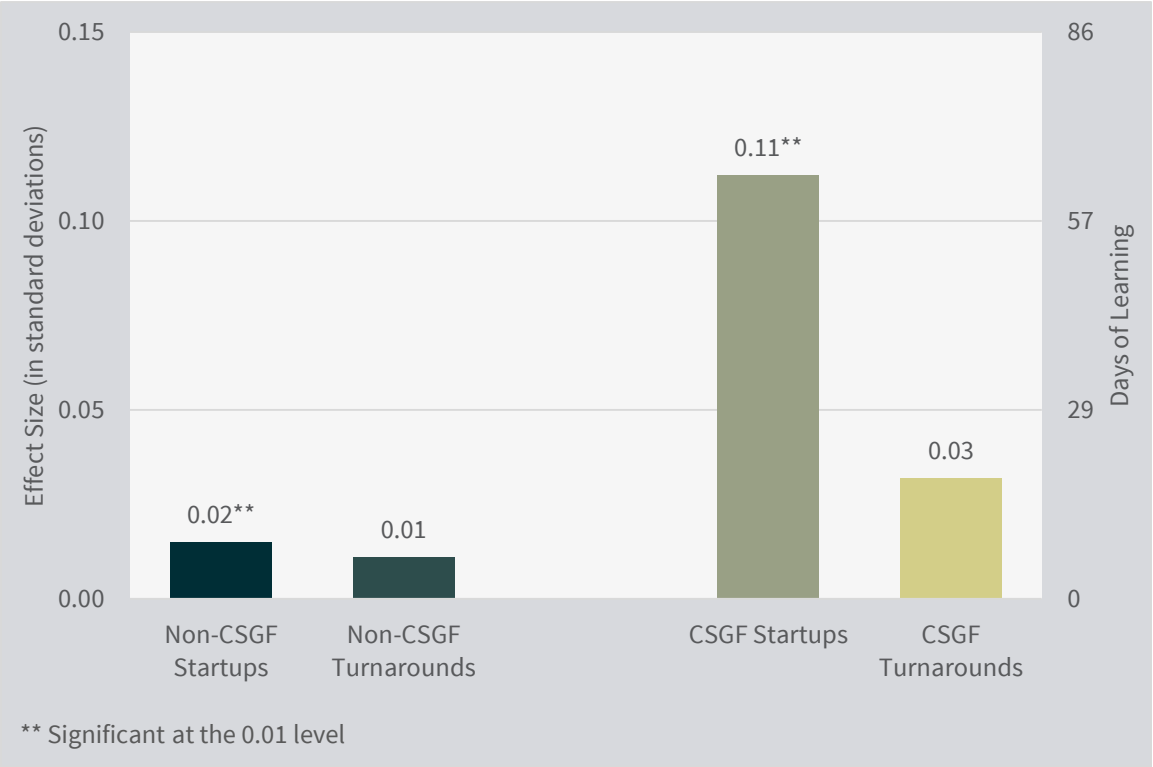
Figure 62 shows the math effect sizes for the four groups of schools. Charter School Growth Fund organizations have larger effect sizes with start-up model schools (i.e., new schools) than with turning around previously failed schools. Non-Charter School Growth Fund charter schools have a significant positive effect size for turn-around schools.

Figure 62: Effect Size for Start-up and Turn-around Schools by Charter School Growth Fund Status, Math



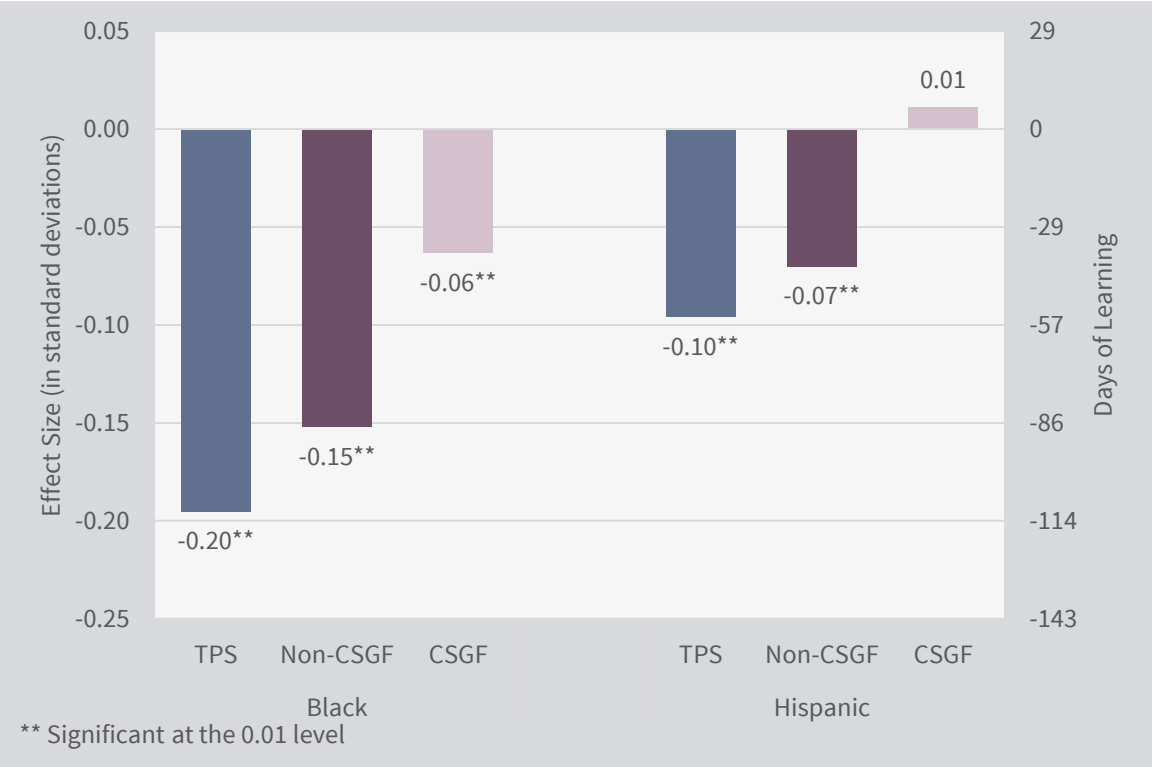
In reading, neither the Charter School Growth Fund nor non-Charter School Growth Fund charter schools have a significant effect with turn-around schools. Both Charter School Growth Fund schools and non-Charter School Growth Fund charter schools have significant positive effect sizes for start-up schools. The difference between Charter School Growth Fund start-up and non-Charter School Growth Fund charter start-up schools is 0.09 or about 51 days of learning.

Figure 63: Effect Size for Start-up and Turn-around Schools by Charter School Growth Fund Status, Reading



The next set of analyses examines Charter School Growth Fund's outcomes with populations which are historically underserved by the TPS sector. These are black students, Hispanic students, students in poverty, English language learners and students receiving special education services. Figures 64 and 65 display the results in math for these groups based on their enrollment in TPS, non-Charter School Growth Fund charters or Charter School Growth Fund schools. The results for black students and Hispanic students, Figure 64, show that for both groups students have significantly stronger growth when they attend a Charter School Growth Fund school. In fact, Hispanic students attending a Charter School Growth Fund school have growth which is not significantly different from that of white TPS students. For black students, the benefit of attending a Charter School Growth Fund school instead of a TPS is 0.14, which is equivalent to 80 days of additional learning per year.

Figure 64: Average Growth for Black and Hispanic Students by Charter School Growth Fund Affiliation, Math



Charter schools which are part of a Charter School Growth Fund network have positive impacts on other underserved populations as well. While students in poverty attending a Charter School Growth Fund school have weaker growth than their non-poverty peers in a Charter School Growth Fund school, the positive results of Charter School Growth Fund attendance more than offset the impact of being in poverty. Figure 65 shows the strong positive effect of 0.10 for Charter School Growth Fund students in poverty compared to non-poverty TPS students at 0.00. This means every year in a Charter School Growth Fund school, students in poverty close the poverty gap by 57 days in math. While the results are not as robust for ELL and SPED students, attending a Charter School Growth Fund school does still provide those students with the best opportunity for growth.

Figure 65: Average Growth for Students in Poverty, ELL Students, and SPED Students by Charter School Growth Fund Affiliation, Math

Outcomes in reading for underserved populations attending Charter School Growth Fund schools are impressively large as well. As shown in Figure 66, Hispanic students attending a Charter School Growth Fund school have average growth which is stronger than white TPS students. Again, the positive overall effect size indicates that Charter School Growth Fund charter schools are producing growth effects which will help to reverse the achievement gap between their Hispanic students and white TPS students. The effect for Hispanic students is equivalent to around 17 days of learning. While black students attending a Charter School Growth Fund school do not close the achievement gap, they minimize it when compared to the other two options: TPS or non-Charter School Growth Fund charter schools.

While the reading results for students in poverty, English language learners and special education students are not as strong as the math results, they follow a similar pattern (see Figure 67). Students in poverty have a net positive effect size which means they are closing the gap with their non-poverty TPS peers. ELL and SPED students do not close the gap, but Charter School Growth Fund affiliated schools produce the least negative results out of the three options. These findings along with the math results show a strong positive benefit for students from underserved populations who attend a Charter School Growth Fund school.

Figure 66: Average Growth for Black and Hispanic Students by Charter School Growth Fund Affiliation, Reading

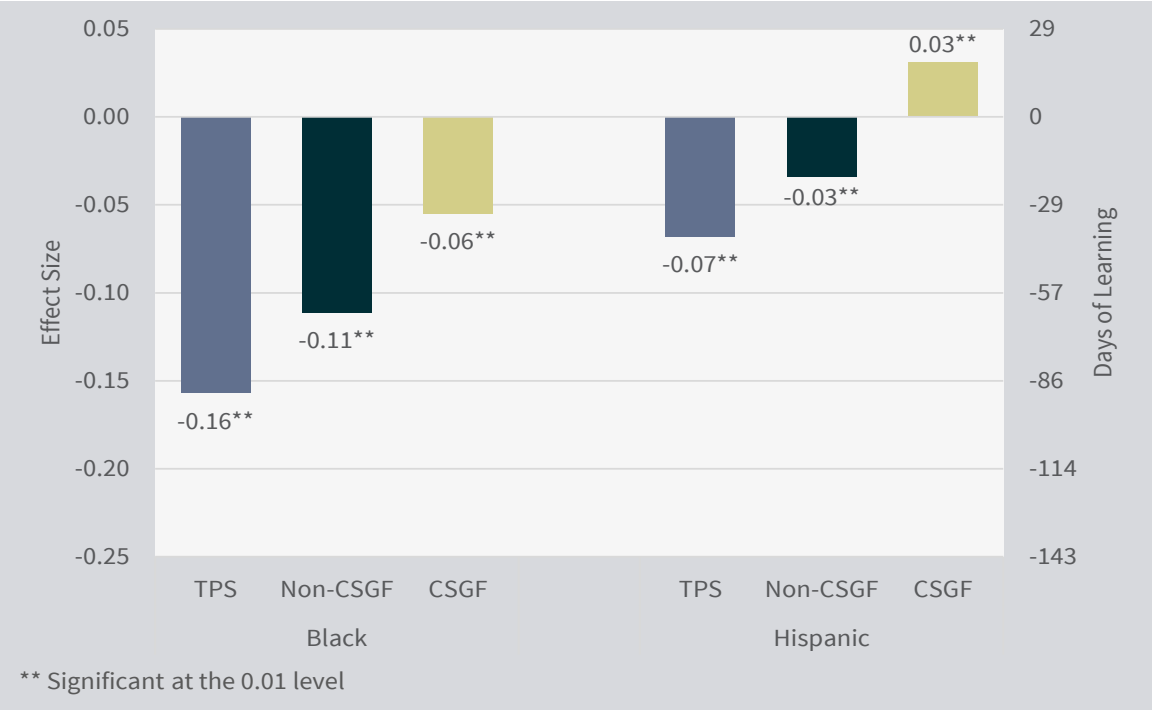
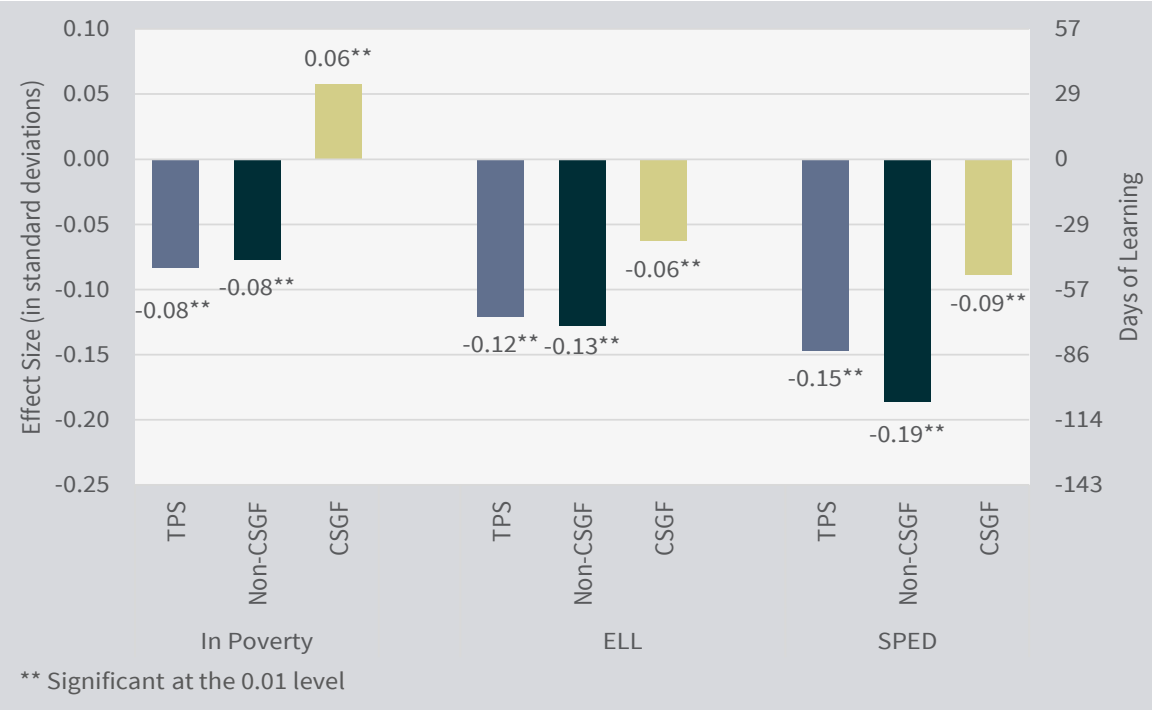


Figure 67: Average Growth for Students in Poverty, ELL Students, and SPED Students by Charter School Growth Fund Affiliation, Reading



Figures 10 through 13 have three different groups of students listed. Sector indicates students belonging to a particular group in the given sector: CMO, VOS or Hybrid. Non-sector students are those enrolled in a charter school which is not part of the listed sector. For example, non-sector for CMO would include students in independent charter schools and those in VOSs which are not also CMOs. The TPS group contains all the VCRs for all charter students.

Table 11: Charter Sector x Subpopulation, Math

	CMO			VOS		
Variable	Coefficient	Std. Err.	P-Value>	Coefficient	Std. Err.	P-Value>
sector_asianpi	0.19	0.02	0.000	0.11	0.04	0.004
sector_black	-0.13	0.01	0.000	-0.16	0.01	0.000
sector_ell	-0.11	0.01	0.000	-0.11	0.01	0.000
sector_hisp	-0.04	0.01	0.000	-0.06	0.02	0.000
sector_lunch	-0.07	0.01	0.000	-0.08	0.01	0.000
sector_multi	-0.07	0.02	0.000	-0.10	0.02	0.000
sector_nativam	-0.18	0.02	0.000	-0.19	0.03	0.000
sector_retained	0.13	0.02	0.000	0.13	0.02	0.000
sector_sped	-0.19	0.01	0.000	-0.18	0.01	0.000
sector_white	-0.07	0.02	0.000	-0.04	0.02	0.006
nonsector_asianpi	0.13	0.01	0.000	0.15	0.01	0.000
nonsector_black	-0.15	0.01	0.000	-0.14	0.01	0.000
nonsector_ell	-0.10	0.01	0.000	-0.10	0.01	0.000
nonsector_hisp	-0.08	0.01	0.000	-0.07	0.01	0.000
nonsector_lunch	-0.09	0.00	0.000	-0.09	0.00	0.000
nonsector_multi	-0.07	0.01	0.000	-0.06	0.01	0.000
nonsector_nativam	-0.13	0.02	0.000	-0.14	0.01	0.000
nonsector_retained	0.11	0.02	0.000	0.12	0.02	0.000
nonsector_sped	-0.19	0.01	0.000	-0.20	0.01	0.000
nonsector_white	-0.03	0.01	0.000	-0.03	0.01	0.000
tps_asianpi	0.15	0.01	0.000	0.14	0.01	0.000
tps_black	-0.19	0.01	0.000	-0.20	0.01	0.000
tps_ell	-0.09	0.01	0.000	-0.09	0.01	0.000
tps_hisp	-0.10	0.00	0.000	-0.10	0.00	0.000
tps_lunch	-0.09	0.00	0.000	-0.09	0.00	0.000
tps_multi	-0.04	0.00	0.000	-0.04	0.00	0.000
tps_nativam	-0.12	0.01	0.000	-0.12	0.01	0.000
tps_retained	0.16	0.01	0.000	0.16	0.01	0.000
tps_sped	-0.15	0.01	0.000	-0.15	0.01	0.000

Table 12: Charter Sector x Subpopulation Hybrid, Math

	Hybrid		
Variable	Coefficient	Std. Err.	P-Value>
sector_asianpi	0.19	0.04	0.000
sector_black	-0.15	0.03	0.000
sector_ell	-0.13	0.02	0.000
sector_hisp	0.03	0.02	0.131
sector_lunch	-0.07	0.01	0.000
sector_multi	-0.02	0.03	0.576
sector_nativam	-0.04	0.11	0.729
sector_retained	0.24	0.06	0.000
sector_sped	-0.19	0.02	0.000
sector_white	0.04	0.02	0.071
nonsector_asianpi	0.14	0.01	0.000
nonsector_black	-0.14	0.01	0.000
nonsector_ell	-0.10	0.01	0.000
nonsector_hisp	-0.07	0.01	0.000
nonsector_lunch	-0.09	0.00	0.000
nonsector_multi	-0.07	0.01	0.000
nonsector_nativam	-0.14	0.01	0.000
nonsector_retained	0.12	0.02	0.000
nonsector_sped	-0.19	0.01	0.000
nonsector_white	-0.04	0.01	0.000
tps_asianpi	0.14	0.01	0.000
tps_black	-0.20	0.01	0.000
tps_ell	-0.09	0.01	0.000
tps_hisp	-0.10	0.00	0.000
tps_lunch	-0.09	0.00	0.000
tps_multi	-0.04	0.00	0.000
tps_nativam	-0.12	0.01	0.000
tps_retained	0.16	0.01	0.000
tps_sped	-0.15	0.01	0.000

Table 13: Charter Sector x Subpopulation, Reading

	CMO			VOS		
Variable	Coefficient	Std. Err.	P-Value>	Coefficient	Std. Err.	P-Value>
sector_asianpi	0.14	0.01	0.000	0.12	0.03	0.000
sector_black	-0.11	0.01	0.000	-0.11	0.01	0.000
sector_ell	-0.15	0.01	0.000	-0.11	0.01	0.000
sector_hisp	-0.02	0.01	0.006	0.00	0.01	0.612
sector_lunch	-0.07	0.00	0.000	-0.08	0.01	0.000
sector_multi	-0.03	0.01	0.005	-0.04	0.01	0.002
sector_nativam	-0.12	0.02	0.000	-0.10	0.03	0.001
sector_retained	0.05	0.02	0.007	0.14	0.04	0.000
sector_sped	-0.21	0.01	0.000	-0.20	0.01	0.000
sector_white	-0.03	0.01	0.005	0.00	0.01	0.694
nonsector_asianpi	0.09	0.01	0.000	0.10	0.01	0.000
nonsector_black	-0.11	0.01	0.000	-0.11	0.01	0.000
nonsector_ell	-0.13	0.01	0.000	-0.14	0.01	0.000
nonsector_hisp	-0.04	0.00	0.000	-0.03	0.00	0.000
nonsector_lunch	-0.09	0.00	0.000	-0.08	0.00	0.000
nonsector_multi	-0.01	0.01	0.091	-0.01	0.01	0.054
nonsector_nativam	-0.09	0.02	0.000	-0.10	0.01	0.000
nonsector_retained	0.09	0.02	0.000	0.06	0.02	0.000
nonsector_sped	-0.19	0.01	0.000	-0.20	0.00	0.000
nonsector_white	0.00	0.00	0.963	-0.01	0.00	0.116
tps_asianpi	0.09	0.01	0.000	0.09	0.01	0.000
tps_black	-0.16	0.00	0.000	-0.16	0.00	0.000
tps_ell	-0.12	0.00	0.000	-0.12	0.00	0.000
tps_hisp	-0.07	0.00	0.000	-0.07	0.00	0.000
tps_lunch	-0.08	0.00	0.000	-0.08	0.00	0.000
tps_multi	-0.02	0.00	0.000	-0.02	0.00	0.000
tps_nativam	-0.10	0.01	0.000	-0.10	0.01	0.000
tps_retained	0.09	0.01	0.000	0.09	0.01	0.000
tps_sped	-0.15	0.00	0.000	-0.15	0.00	0.000

Table 14: Charter Sector x Subpopulation Hybrid, Reading

	Hybrid		
Variable	Coefficient	Std. Err.	P-Value>
sector_asianpi	0.14	0.03	0.000
sector_black	-0.12	0.02	0.000
sector_ell	-0.11	0.02	0.000
sector_hisp	0.04	0.01	0.000
sector_lunch	-0.06	0.01	0.000
sector_multi	-0.02	0.03	0.483
sector_nativam	-0.03	0.08	0.703
sector_retained	0.37	0.04	0.000
sector_sped	-0.20	0.02	0.000
sector_white	0.02	0.01	0.244
nonsector_asianpi	0.11	0.01	0.000
nonsector_black	-0.11	0.00	0.000
nonsector_ell	-0.14	0.01	0.000
nonsector_hisp	-0.03	0.00	0.000
nonsector_lunch	-0.08	0.00	0.000
nonsector_multi	-0.02	0.01	0.004
nonsector_nativam	-0.10	0.01	0.000
nonsector_retained	0.07	0.01	0.000
nonsector_sped	-0.20	0.00	0.000
nonsector_white	-0.01	0.00	0.120
tps_asianpi	0.09	0.01	0.000
tps_black	-0.16	0.00	0.000
tps_ell	-0.12	0.00	0.000
tps_hisp	-0.07	0.00	0.000
tps_lunch	-0.08	0.00	0.000
tps_multi	-0.02	0.00	0.000
tps_nativam	-0.11	0.01	0.000
tps_retained	0.09	0.01	0.000
tps_sped	-0.15	0.00	0.000

Table 15: Matched Charter Record Race/Ethnicity by State

State	Percent White	Percent Black	Percent Hispanic	Percent Asian	Percent Native American	Percent Multi-racial	N
AR	46.3%	46.0%	6.0%	0.7%	0.2%	0.8%	18,580
AZ	52.5%	4.4%	36.3%	3.6%	1.5%	1.7%	170,233
CA	34.0%	8.1%	49.5%	6.5%	0.3%	1.6%	213,485
CO	54.7%	5.1%	34.8%	2.8%	0.2%	2.4%	113,031
DC	4.1%	85.9%	8.8%	0.3%	0.1%	0.8%	22,273
FL	35.4%	19.6%	40.3%	2.6%	0.1%	1.9%	251,923
IL	4.1%	56.1%	37.8%	1.0%	0.1%	0.9%	46,132
LA	17.5%	79.3%	2.1%	0.4%	0.1%	0.5%	56,673
MA	42.9%	25.3%	25.6%	4.2%	0.2%	1.9%	37,240
MI	33.0%	56.3%	6.4%	2.4%	0.4%	1.6%	85,017
MN	48.9%	24.8%	8.5%	16.5%	1.2%	0.0%	36,824
MO	8.4%	76.9%	13.5%	0.5%	0.0%	0.7%	15,940
NC	65.1%	25.6%	4.7%	2.1%	0.5%	1.9%	53,459
NJ	9.3%	58.3%	27.9%	4.1%	0.0%	0.4%	31,871
NM	33.3%	1.4%	60.8%	0.9%	3.7%	0.0%	20,680
NV	56.0%	12.7%	21.6%	6.2%	0.6%	2.9%	13,738
NY	15.9%	68.0%	13.2%	0.8%	0.2%	1.9%	21,980
NYC	2.8%	57.2%	37.7%	2.0%	0.3%	0.1%	74,014
OH	37.1%	55.0%	3.2%	0.3%	0.1%	4.2%	50,255
OR	83.2%	1.6%	8.7%	1.4%	1.1%	4.0%	29,046
PA	34.1%	46.6%	14.7%	2.0%	0.1%	2.5%	122,988
RI	22.5%	14.7%	60.1%	0.7%	0.2%	1.8%	2,915
TN	4.7%	83.7%	11.2%	0.4%	0.0%	0.0%	24,485
TX	14.4%	17.5%	63.3%	3.7%	0.2%	0.9%	248,782
UT	81.5%	0.7%	13.2%	2.7%	0.2%	1.7%	56,266
WI	53.2%	28.1%	14.6%	3.9%	0.2%	0.0%	21,081

Table 16: Matched Charter Record Characteristics by State

State	Percent in Poverty	Percent ELL	Percent SPED	N
AR	64.1%	2.7%	6.9%	18,580
AZ	37.6%	1.9%	4.8%	170,233
CA	57.2%	11.6%	3.1%	213,485
CO	34.8%	9.7%	5.8%	113,031
DC	80.2%	2.3%	13.0%	22,273
FL	52.0%	4.4%	6.9%	251,923
IL	87.7%	6.1%	11.6%	46,132
LA	76.0%	0.5%	5.2%	56,673
MA	39.9%	4.7%	12.7%	37,240
MI	71.5%	5.6%	6.4%	85,017
MN	54.4%	17.9%	9.0%	36,824
MO	92.4%	9.3%	7.1%	15,940
NC	28.9%	0.3%	0.6%	53,459
NJ	74.2%	1.0%	7.9%	31,871
NM	56.4%	9.8%	9.3%	20,680
NV	33.9%	3.6%	8.4%	13,738
NY	81.8%	1.3%	7.2%	21,980
NYC	79.9%	3.4%	13.8%	74,014
OH	78.3%	0.3%	1.8%	50,255
OR	40.1%	1.0%	10.7%	29,046
PA	67.5%	2.2%	15.2%	122,988
RI	73.7%	7.3%	10.6%	2,915
TN	80.9%	2.5%	6.3%	24,485
TX	69.6%	15.2%	3.6%	248,782
UT	29.3%	1.9%	9.5%	56,266
WI	53.4%	4.6%	8.2%	21,081

The notation charter-nonsector in Tables 17 and 18 includes all students attending a charter school not in the given sector. For example, in the CMO column charter-nonsector would include non-network charters and VOS charters.

Table 17: Average Growth by Sector by Year

	CMO		VOS		Hybrid	
Sector_Year	Math	Reading	Math	Reading	Math	Reading
tps_2011	0.00	0.00	0.00	0.00	0.00	0.00
tps_2012	-0.01*	-0.02**	-0.01*	-0.02**	-0.01*	-0.02**
tps_2013	-0.02*	-0.03**	-0.02*	-0.03**	-0.02*	-0.03**
charter_nonsector_2011	-0.01	0.01**	0.00	0.01**	0.00	0.01**
charter_nonsector_2012	-0.01*	-0.01*	0.00	-0.01	0.00	-0.01
charter_nonsector_2013	-0.01*	-0.01	0.00	0.00	0.00	0.00
sector_2011	0.02	0.03**	0.01	0.03**	0.10**	0.08**
sector_2012	0.03*	0.00	0.00	0.00	0.10**	0.05**
sector_2013	0.03**	0.02*	-0.02	0.01	0.04**	0.06**

**Significant at the 0.01 level. *Significant at the 0.05 level.

Table 18: Average Growth by Years in Charter by Sector

	CMO		VOS		Hybrid	
Sector_Year	Math	Reading	Math	Reading	Math	Reading
charter_nonsector_1yr in charter	-0.09**	-0.07**	-0.08**	-0.07**	-0.08**	-0.07**
charter_nonsector_2yrs in charter	-0.01	0.00	0.02**	0.01	0.01*	0.01
charter_nonsector_3yrs in charter	0.04**	0.00	0.06**	0.03**	0.05**	0.02**
sector_1yr in charter	-0.05*	-0.06**	-0.10**	-0.06**	0.06*	0.04*
sector_2yrs in charter	0.06**	0.02**	-0.01	0.02	0.07**	0.08**
sector_3yrs in charter	0.08**	0.07**	0.03	0.01	0.12**	0.09**

**Significant at the 0.01 level. *Significant at the 0.05 level.

Figure 68: Interaction of Race/Ethnicity and Poverty on Growth for CMO Students, Reading

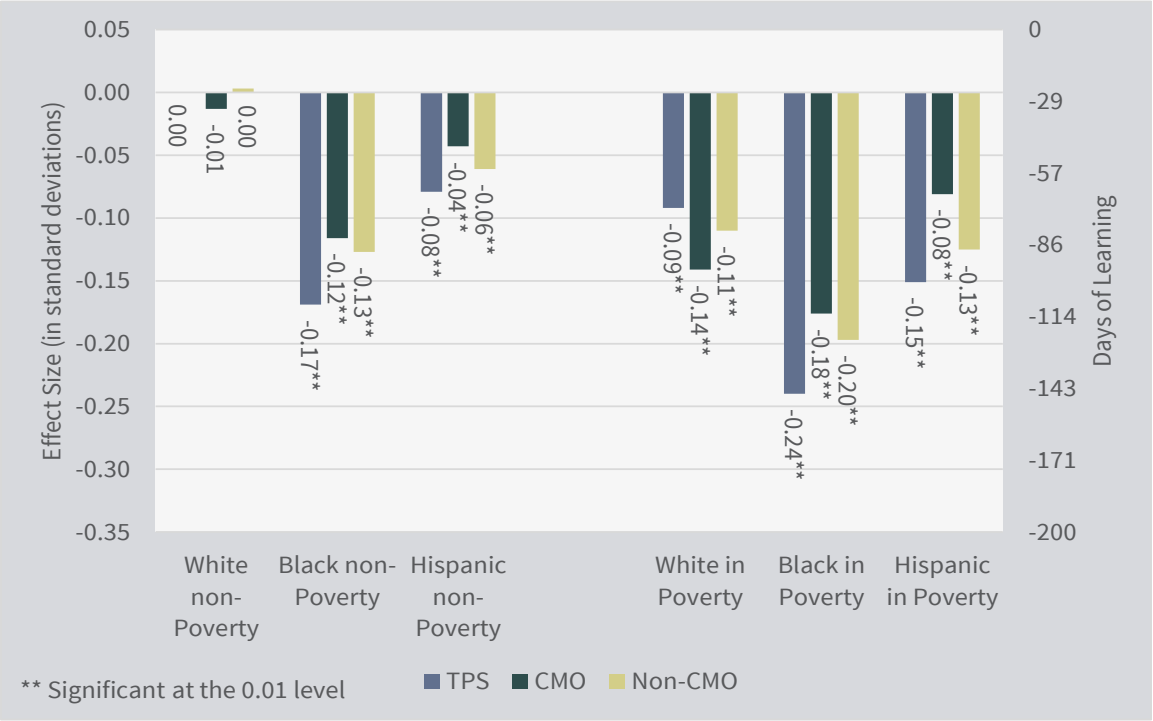


Figure 69: Interaction of Race/Ethnicity and Poverty on Growth for VOS Students, Reading

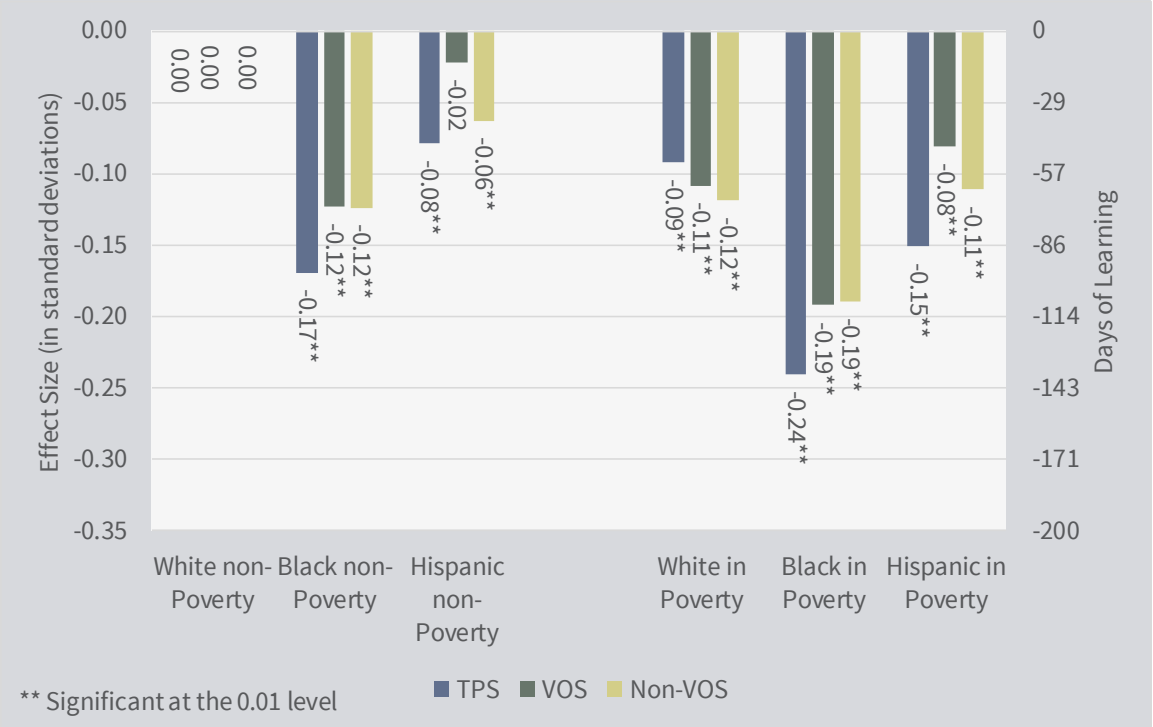


Figure 70: Interaction of Race/Ethnicity and Poverty on Growth for Hybrid Students, Reading

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