Charter School Performance in New Mexico

2019

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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.

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1. Introduction

Since the enactment of New Mexico's charter school law in 1993, more than 100 public charter schools in New Mexico have offered parents and students choices in their education. There have been controversies over charter schools. Supporters praise the autonomy that charter schools enjoy in adapting school designs to meet the needs of students, especially those in communities with historically low school quality. Opponents complain that charter schools take students and resources from district schools and further strain existing public schools' ability to improve. However, only a fraction of the debate is grounded in well-researched evidence about charter schools' impact on student outcomes.

The need for evidence about charter school performance is especially strong in New Mexico. In February 2019, the House Education Committee passed a proposed moratorium on opening new charter schools in New Mexico until 2022, clearing the first legislative hurdle for the proposal.[1] Governor Michelle Lujan Grisham expressed support for the moratorium until state leaders review how charter schools in operation are performing. Earlier in 2017, two nonpartisan legislative committees issued a report indicating that the state's three online schools have "struggled to provide acceptable outcomes, demonstrate fiscal responsibility, and comply with state law."[2] In early 2019, a bill that intended to add "new application and reporting requirements, new charter contract terms, shorten[ed] the charter term length, and cap[ped] initial enrollment until a performance threshold was met" for virtual charter schools failed to reach a final vote before the legislative session closed.[3]

This report provides evidence for charter students' performance in New Mexico over four years of schooling, beginning with the 2013-2014 school year and ending in 2016-2017. This is an update to an earlier study released in 2009.[4] The 2009 study found that New Mexico charter school students make weaker growth in reading and math than identical peers in traditional public schools (TPS). This study updates the earlier analyses with recent data. Data-driven evidence will provide a solid foundation for informed evaluations and constructive discussion of New Mexico charter schools by stakeholders.

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[1] Susan Montoya Bryan, "Moratorium on New Charter Schools Passes First Hurdle," February 20, 2019, https://www.usnews.com/news/best-states/new-mexico/articles/2019-02-20/moratorium-on-new-charter-schools-passes-first-hurdle.

[2] Arianna Prothero, "New Mexico's Largest Cyber Charter School Loses Appeal to Stay Open," April 12, 2018, http://blogs.edweek.org/edweek/charterschoice/2018/04/new_mexicos_largest_cyber_charter_school_loses_appeal_to_state_ed_chief_to_stay_open.html.

[3] Jason Zwara, "Heat Wave or Cold Snap: Movement on the Virtual Schools Policy Front?" March 28, 2019, https://www.qualitycharters.org/2019/03/heat-wave-or-cold-snap-movement-on-the-virtual-policy-front/?utm_source=NACSA%27s+Master+List&utm_campaign=5f5a855736-EMAIL_CAMPAIGN_2018_07_17_12_58_COPY_01&utm_medium=email&utm_term=0_9db2bde88f-5f5a855736-102593309.

[4] *Charter School Performance in New Mexico*, CREDO (Center for Research on Education Outcomes), Stanford University, June 2009, http://credo.stanford.edu/reports/NM_CHARTER%20SCHOOL%20REPORT_CREDO_2009.pdf.

With the cooperation of the New Mexico Public Education Department of Education (NMPED), CREDO obtained the historical sets of student-level administrative records. The support of NMPED staff was critical to CREDO's understanding of the character and quality of the data we received. However, the entirety of interactions with the department dealt with technical issues related to the data. CREDO has developed the findings and presented conclusions here independently.

The study makes an in-depth examination of the academic outcomes for charter schools in New Mexico. This current report has two main benefits. First, it provides a rigorous and independent view of the performance of the state's charter schools. Second, the study design is consistent with CREDO's reports on charter school performance in other locations, making the results amenable to benchmarking both nationally and in other locations.

In this report, we present the results from three sets of analysis. We first report findings about the overall impact of charter schools on student academic performance for the period 2013-2014 to 2016-2017. These results are expressed in terms of the academic progress that a typical charter school student in New Mexico would realize from a year of enrollment in a charter school. To help the non-technical reader grasp the findings, we translate the scientific estimates into estimated days of learning based on the foundation of a 180-day school year.

The second set of analyses looks at the impact of charter school attendance by school attributes and for different student subgroups. The differences in the performance of students of various backgrounds have been important concerns among education policy makers and practitioners. Findings from these analyses show how charter schools compare to TPS in serving students with different characteristics and attending different types of schools.

Both legislation and public policy operate to influence school-level decisions. Accordingly, the third set of analyses looks at the performance of students by school and presents school average results. These findings are important to understand the range of performance at the school level.

The findings from our analyses show that in a year's time, the typical charter school student in New Mexico makes similar progress in both reading and math compared to the educational gains that the student would have made in a traditional public school. This result represents an improvement in the charter sector compared to earlier periods in which the performance of charter school students lagged behind that of their TPS peers. Further probing reveals that the aggregate results are strongly influenced by the performance of online charter school students. Enrollment in online charter schools is associated with substantially weaker learning gains in both reading and math and that the inferior performance of online charter schools offsets the positive impact of brick-and-mortar charter schools on student growth in reading. The learning gains of charter school students in various subgroups are comparable to the gains of their TPS peers in the same subgroup.

2. Study Approach

This study of charter schools in New Mexico focuses on the academic progress (growth) of students who are both enrolled and tested in New Mexico's charter schools. Whatever else charter schools may provide their students, their contributions to students' readiness for secondary education, high school graduation, and post-secondary life remain of paramount importance. If charter schools do not succeed in forging strong academic futures for their students, they have failed in their mission. Furthermore, current data limitations prevent the inclusion of non-academic outcomes in this analysis.

To study academic performance of charter students in New Mexico, we relied on scores students received on New Mexico state standardized achievement tests, including grades 3-8 and end-of-course (EOC) assessments. Achievement tests capture what a student knows at a point in time. These test results were fitted into a bell curve format that enabled us to see how students moved from year to year in terms of academic performance. Two successive test scores allow us to see how much progress a student makes over a one-year period; this is also known as a growth score or learning gain. Growth scores allow us to zero in on the contributions of schools separately from other things that affect point-in-time scores. The parsed effect of schools in turn gives us the chance to see how students' academic progress changes as the conditions of their education transform. This is the analytic foundation for our examination of the academic impact of enrollment in charter schools.

We employ the Virtual Control Record (VCR) method developed by CREDO in our analysis.[5] We strive to build a VCR for each charter school student. A VCR, or a "virtual twin," is a synthesis of the actual academic experiences of up to seven students who are identical to the charter school student, except for the fact that the VCR students attend a TPS that each charter school's students would have attended if not enrolled in the charter school. This synthesized record is then used as the counterfactual condition to the charter school student's performance.

Our approach is displayed in Figure 1. We identify all the traditional public schools whose students transfer to a given charter school; each of these schools is designated as a "feeder school." Using the records of the students in those schools in the year prior to the test year of interest (t_0), CREDO selects all of the available TPS students who match each charter school student.

Match factors include:

- Grade level
- Gender
- Race/ethnicity
- Poverty status
- English language learner status
- Special education status

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[5] Devora H. Davis and Margaret E. Raymond, "Choices for Studying Choice: Assessing Charter School Effectiveness Using Two Quasi-Experimental Methods," *Economics of Education Review* 31, no. 2 (April 2012): 225−236.

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- Prior test score on New Mexico state achievement tests

Figure 1: CREDO Virtual Control Record Methodology
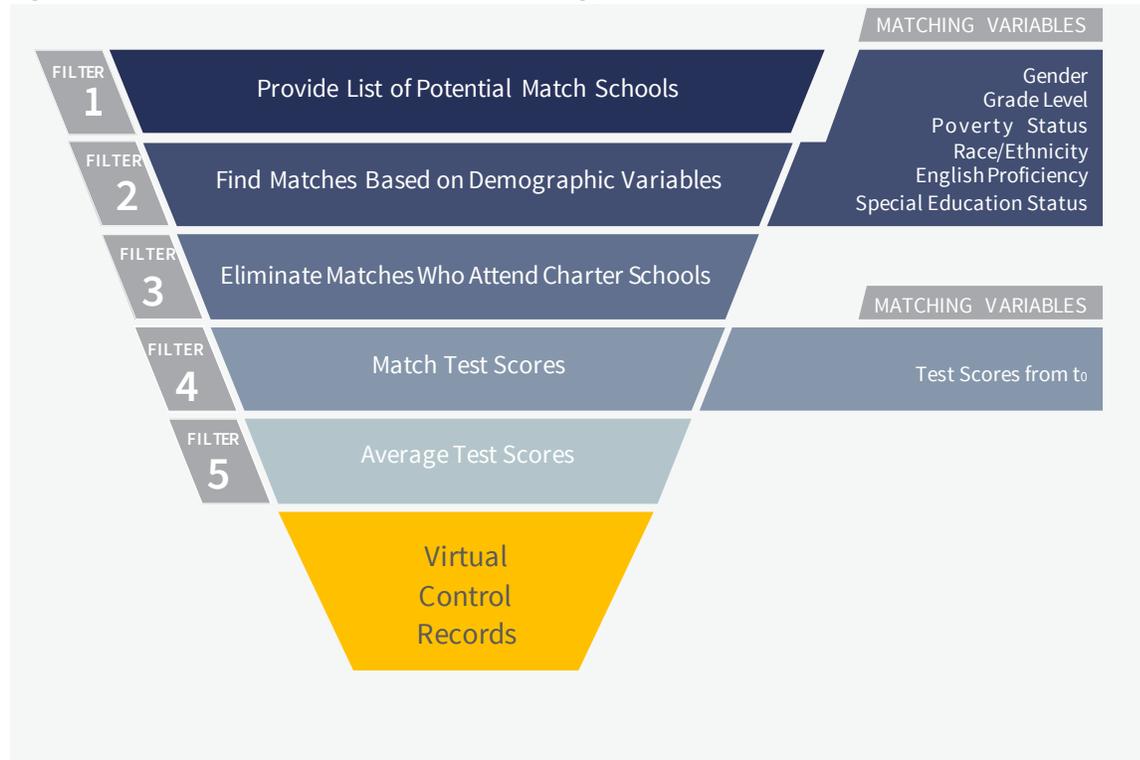
At the point of selection as a VCR-eligible TPS student, all candidates and the individual charter school student have identical traits and matching baseline test scores. The focus then moves to the subsequent year, t_1. The scores from this test year of interest (t_1) for as many as seven VCR-eligible TPS students are then averaged and a Virtual Control Record is produced. The VCR produces a score for the test year of interest that corresponds to the expected result a charter student would have realized had he or she attended one of the traditional public schools.

The above VCR method has been used in previous CREDO publications. We make two changes to the approach in this study. First, in our previous reports, if a charter student can be tracked for multiple periods in the study window, we matched the student for all the periods using the records in the year prior to the first growth period. In this study, we match the student period by period to conform to the new baseline equivalence criteria specified in *Procedures Handbook Version 4.0* of What Works Clearinghouse (WWC).[6] Altering the match in this way means that caution is advised when comparing findings in this study and previous reports. Second, the United States Department of Agriculture phased in the Community Eligibility Provision (CEP) in New Mexico and other states during the study period. The CEP allows schools and local education agencies with a minimum Identified Student Percentage

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[6] What Works Clearinghouse, "Procedures Handbook Version 4.0," 2017, https://ies.ed.gov/ncee/wwc/Docs/referenceresources/wwc_procedures_handbook_v4.pdf.

(40 percent or higher) to provide free breakfast and lunch to all students. To minimize over-identification of students living in poverty in the analysis, we drop from the list of feeder schools a very small number of TPS if their share of the students eligible for free and reduced-price lunch was 100 percent *and* represented a jump by 35 percentage points or more from the previous year. We were able to create virtual matches for 79 percent of observations of tested charter school students in reading and 62 percent in math.

Using statistical methods, we isolate the contributions of schools from other social or programmatic influences on a student's growth. Student growth data are analyzed in standard deviation units so that the results can be assessed for statistical differences. All the findings that follow are reported as the **average one-year growth** of charter school students relative to their VCR-based comparisons. With four years of student records in this study, it is possible to create three periods of academic growth.

To assist the reader in interpreting the meaning of growth, we include an estimate of the number of days of learning required to achieve growth of particular units of standard deviations. This estimate was calculated by Dr. Eric Hanushek and Dr. Margaret Raymond based on the 2017 National Assessment of Educational Progress (NAEP) test scores.[7] Using a standard 180-day school year, each change of one standard deviation (s.d.) in effect size is equivalent to 590 days of learning.

3. New Mexico Charter School Demographics

The number of charter schools in operation in New Mexico was relatively stable across the study period. Figure 2 notes the newly opened, continuing, and closed charter school campuses from the 2013-14 school year to the 2016-17 school year according to the National Center for Education Statistics (NCES).[8] About 100 charter schools serve New Mexico students during each of the four years. Newly opened or closed charter schools were very few throughout the period, standing at single-digit numbers.

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[7] Detailed information about the 2017 NAEP test scores can be accessed via the "NAEP Reading Report Card" at https://www.nationsreportcard.gov/reading_2017/?grade=4 and the "NAEP Mathematics Report Card" at https://www.nationsreportcard.gov/math_2017/?grade=4.

[8] The data were retrieved from "Public Elementary/Secondary School Universe Survey Data," National Center for Education Statistics, https://nces.ed.gov/ccd/pubschuniv.asp. "Opened schools" indicates schools opened as new schools in the fall of the displayed year. "Continuing schools" indicates schools that were opened prior to the fall of the displayed year and remain open into the next school year (i.e., a school listed as continuing in the 2014-15 column opened some time prior to 2014-15 and did not close in 2014-15). "Closed schools" indicates schools that ceased operation by the spring of the displayed year (i.e., a school listed as closed in the 2014-15 column had its last year of operation in 2014-15 and closed at the end of that school year).

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Figure 2: Opened, Continuing, and Closed Charter Campuses, 2013-14 to 2016-17
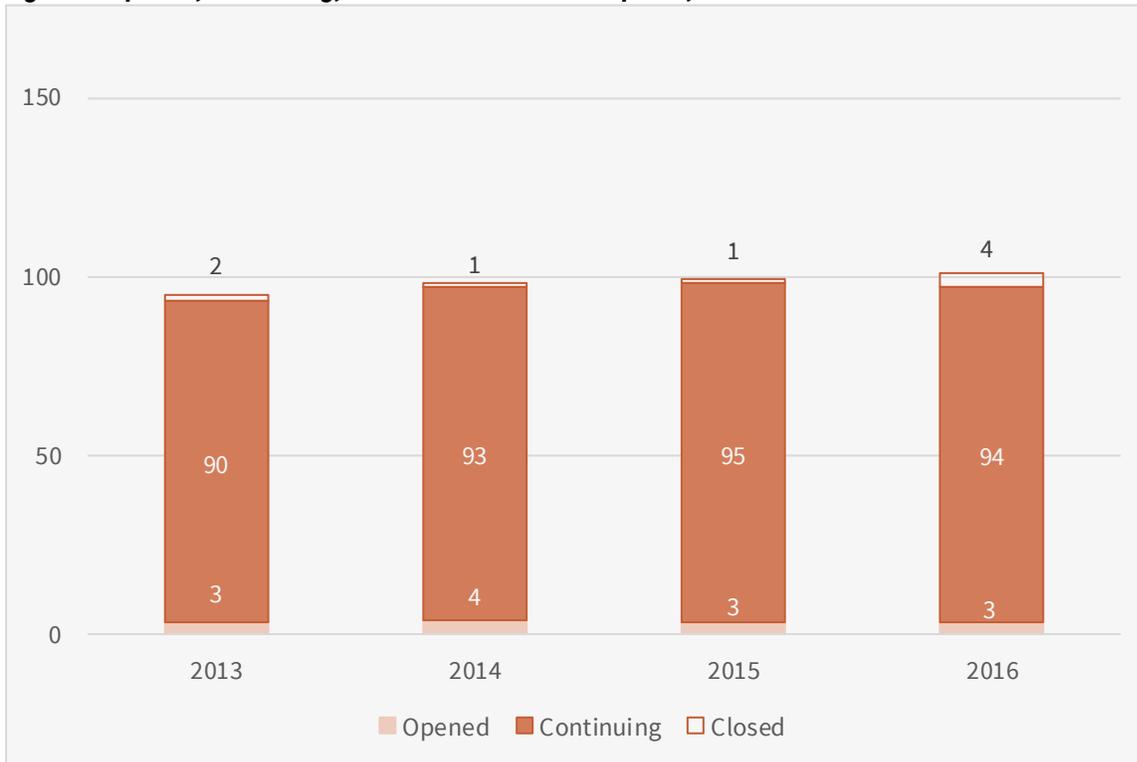
Because charter schools have different operating discretion than other public schools, the demographics of charter schools may not mirror those of the TPS of New Mexico as a whole. A number of factors account for this. Charter schools are able to choose their location. They may offer different academic programs and alternate school models which may disproportionately attract particular groups of students relative to TPS. In addition, parents and students choose to attend charter schools for a variety of reasons, such as location, school safety, small school size, academic focus, or special interest programs. The cumulative result of all these forces is that the student populations at charter schools and their TPS feeders may differ. Table 1 presents the characteristics of the student populations in all New Mexico traditional public schools (TPS), in those TPS that comprise the set of charter feeder schools (Feeders), and in the charter schools themselves in the 2015-2016 school year, the baseline year for the last growth period under study (Charters).

Table 1: Demographic Comparison of Students in TPS, Feeders, and Charters: 2015-16

	TPS	Feeders	Charters
Number of schools	826	493	99
Average enrollment per school	378	511	223
Total number of students enrolled	311,945	252,035	22,079
Students in Poverty	71%	69%	53%
English Language Learners	14%	14%	11%
Special Education Students	14%	14%	12%
White Students	23%	23%	30%
Black Students	2%	2%	2%
Hispanic Students	62%	63%	59%
Asian/Pacific Islander Students	1%	1%	2%
Native American Students	11%	9%	6%
Multi-Racial Students	2%	2%	1%

The data in Table 1 show that the demographic profile of charter schools is different from that of the public school population in New Mexico as a whole, while the demographics for the feeder schools are more similar to the TPS population than to the charter population. The charter school population in New Mexico differs from both the New Mexico TPS and feeder populations in specific ways: charter schools have a larger share of white students and Asian/Pacific Islander students than TPS and feeder schools. Charter schools serve smaller percentages of Hispanic students, Native American students, multi-racial students, students in poverty, and English Language Learners (ELLs). The proportion of black students in charter schools is equivalent to that in TPS and feeder schools; all are very small percentages of the entire student population in New Mexico.

The proportion of students in charter schools receiving special education services is a continuing topic of focus and debate. As seen in Table 1, 12 percent of students in New Mexico charter schools have a designated special education status, which is slightly lower than the distributions in TPS and the feeder schools. Unlike charter school special education enrollment patterns in our 2013 national report, the share of special education students in charter schools in New Mexico differs from that in TPS and feeders only by two percentage points.[9] These numbers suggest better equity in access to charter schools by special education students in New Mexico than in other parts of the country.

In short, the student profile for the entire charter school community as displayed in Table 1 indicates that charter schools have somewhat smaller percentages of educationally disadvantaged students.

Online charter schools have received increasing attention in the educational landscape nationally. With no physical or geographic barriers to enrollment, online charter schools can draw students from across

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[9] Edward Cremata, Devora Davis, Kathleen Dickey, Kristina Lawyer, Yohannes Negassi, Margaret E. Raymond, and James Woodworth, *National Charter School Study 2013*, Center for Research on Education Outcomes, Stanford University, https://credo.stanford.edu/documents/NCSS%202013%20Final%20Draft.pdf.

the state and use online instruction as the method of curriculum delivery. People often use the terms "online schools," "cyber schools," and "virtual schools" interchangeably. In this study, we identify two online charter schools in New Mexico in the school years 2014-15 and 2015-16 and three online schools in the 2016-17 school year.

As shown in a one-year snapshot in Table 2, online charter schools educate close to eight percent of all New Mexico charter students and serve different student populations than brick-and-mortar charters. Specifically, online charter schools have larger percentages of white students, slightly larger shares of black and multi-racial students, and smaller proportions of Hispanic, Native American, and Asian/Pacific Islander students. Online charter schools also serve fewer students living in poverty, English language learners, and students with special education needs. Overall, within-sector comparisons in Table 2 indicate that brick-and-mortar charter schools serve larger shares of students who are educationally disadvantaged on various dimensions than online charters.

Table 2: Demographic Composition of Overall, Brick-and-Mortar, and Online Charter Schools: 2015-16

	All Charters	Brick-and-Mortar Charters	Online Charters
Number of schools	99	97	2
Average enrollment per school	223	210	838
Total number of students enrolled	22,079	20,404	1,675
Students in Poverty	53%	58%	26%[10]
English Language Learners	11%	11%	1%
Special Education Students	12%	12%	11%
White Students	30%	29%	41%
Black Students	2%	2%	3%
Hispanic Students	59%	60%	48%
Asian/Pacific Islander Students	2%	2%	1%
Native American Students	6%	6%	3%
Multi-Racial Students	1%	1%	4%

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[10] The state school-level data report no student living in poverty (measured by eligibility for free and reduced-price lunch) in the two online charter schools for the school year 2015-16, while reporting 30 percent and 26 percent of students in poverty for 2014-15 and 2016-17 respectively. The percent for 2016-17 is presented in this cell.

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4. Analytic Findings of Charter School Impacts

Overall Charter School Impact on Student Progress

A foundational question of this study is whether charter schools differ overall from traditional public schools in how much their students learn. To answer this question, we estimate the one-year academic gains observed for all matched charter school students in all growth periods and compare their average learning gain with that of the VCR students.

Please refer to the sidebar titled Graphics Roadmap 1 where guidance is provided to help readers understand the charts that follow.

As described in the Study Approach section, student growth data are analyzed in units of standard deviations so that the results can be assessed for statistical differences. To help the reader interpret our analysis results, we transform standard deviation units of growth into days of learning based on a standard 180-day school year (Table 3).[11] Interested readers can refer to the Study Approach section and Appendix B for detailed explanations of the computation of days of learning.

Graphics Roadmap 1

The graphics in this section have a common format.

Each graph presents the average performance of charter students relative to their **pertinent comparison students**. The reference group differs depending on the specific comparison being made. Where a graph compares student subgroup performance, the pertinent comparison students are the same for both subgroups. Each graph is labeled with the pertinent comparison group for clarity.

We show two axes on the graphs to help the reader get a sense of learning gains. The **left axis** indicates standard deviation units of learning gains of charter students relative to their comparison students. The **right axis** displays the same learning gains in days of learning. The statistical tests are performed on the values as they are enumerated on the left axis.

The **height** of the bars in each graph reflects the difference in the performance between charter school students and the comparison student group.

Asterisks are used to reflect the level of statistical significance of the difference between the group represented in the bar and its comparison group of similar students in TPS. The absence of asterisks means that the schooling effect is not statistically different from zero.

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[11] The values in Table 3 are updated from past reports using the latest (2017) NAEP scores, which show slower absolute annual academic progress than earlier administrations. See Eric A. Hanushek, Paul E. Peterson, and Ludger Woessmann, "Achievement Growth: International and U.S. State Trends in Student Performance," *Education Next* 12 (July 2012): 1–35.

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Table 3: Transformation of Average Learning Gains to Days of Learning

Standard Deviations	Days of Learning
0.05	30
0.10	59
0.15	89
0.20	118
0.25	148
0.30	177
0.35	207
0.40	236

Figure 3 displays the overall charter school impact on student academic progress in New Mexico. The reference group, represented by the 0.00 baseline in the graph, is the average TPS VCRs in the state. Because the differences in the growth in both reading and math are statistically insignificant, New Mexico charter students make similar growth in both subjects in the 180-day period as they would have in a traditional school setting.

Figure 3: Average Learning Gains in New Mexico Charter Schools Compared to Average Gains for TPS VCRs
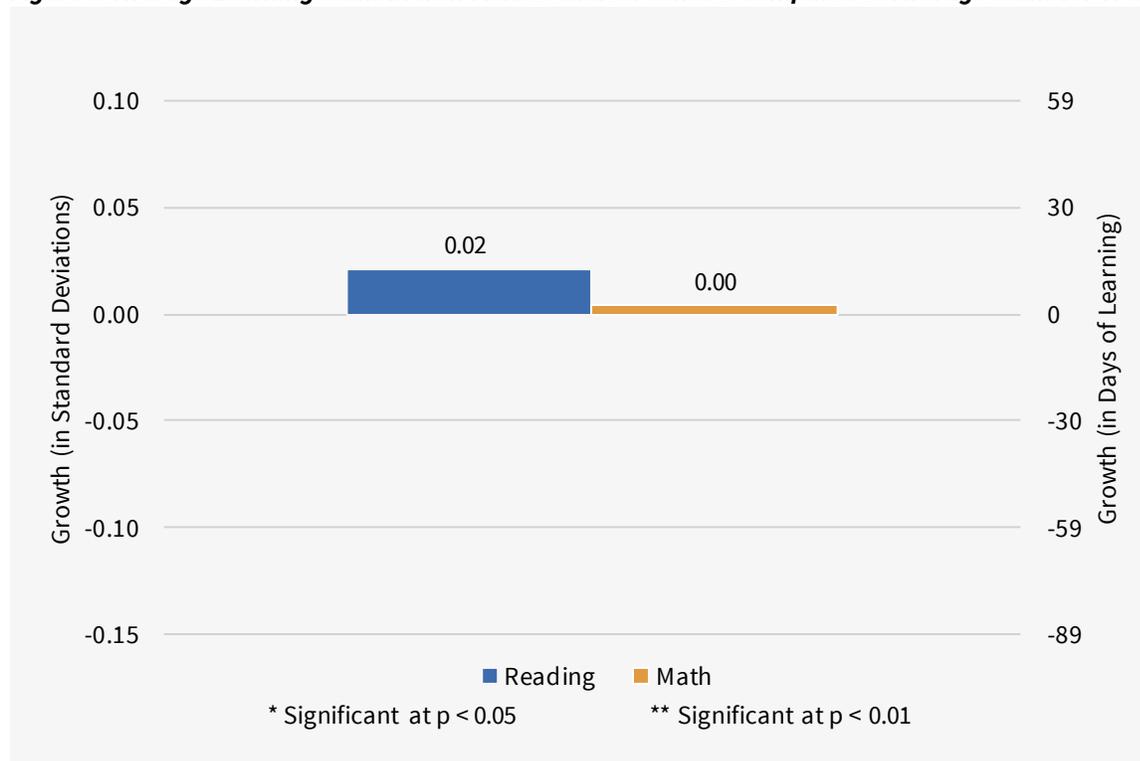
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Charter School Impact for the 2014-2017 Cohort

This section compares the performances of New Mexico charter schools across three of CREDO's studies: CREDO's 2009 study on New Mexico charter school performance,[12] CREDO's 2013 national charter school performance,[13] and this current 2019 study on New Mexico charter schools. Figure 4 depicts the academic growth of New Mexico's charter sector in the three reports. As pointed out in the previous section, transformation of growth units of standard deviations into days of learning in this study is updated from past reports, using the most recent NAEP scores. Therefore, only growth in standard deviations is shown in Figure 4. In addition, as explained in the Study Approach chapter, we slightly change our VCR method in this study by matching a charter student by period so as to meet the WWC Version 4.0 requirement for baseline equivalence. Therefore, the comparison of the overall charter effect across three reports is only suggestive.

Figure 4: Average Learning Gains in New Mexico Charter Schools Compared to Average Gains for TPS VCRs from the 2009 New Mexico Study, 2013 National Charter Study, and 2019 New Mexico Study

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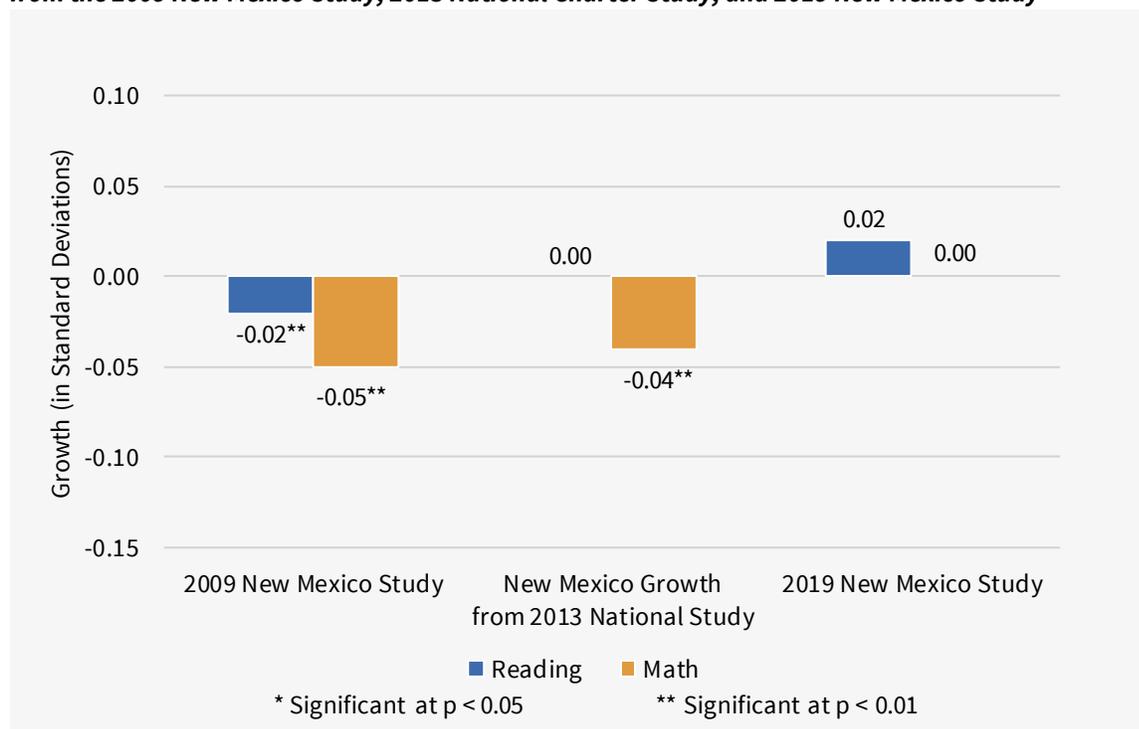
[12] CREDO, *Charter School Performance in New Mexico, 2009,*
https://credo.stanford.edu/reports/NM_CHARTER%20SCHOOL%20REPORT_CREDO_2009.pdf.
[13] Cremata et al., *National Charter School Study 2013*.

Figure 4 indicates a positive trajectory in the academic progress of New Mexico charter school students across three studies. In reading, charter students fell behind TPS peers slightly in the 2009 study and caught up in the 2014 report and this current study. In math, charter students made less progress than their TPS virtual twins in the 2009 and 2013 reports and register similar gains in the current study. Overall, this graph shows some improvement in performance on the part of New Mexico's charter sector across three studies.

Charter School Impact by Growth Period

To determine whether performance is consistent over the window of this study, the impact of attending a charter school on academic progress is examined separately for each of the three growth periods. Recall that a growth period is the measure of progress from one school year to the next. In the presentation of results in Figure 5, the denotation "2014-2015" covers academic growth that occurred between the end of the 2013-2014 school year and the end of the 2014-2015 school year. Similarly, the denotation "2016-2017" corresponds to the year of growth between the 2015-2016 and the 2016-2017 school years.

Figure 5: Learning Gains in New Mexico Charter Schools Compared to Gains for TPS VCRs by Growth Period: 2014-2015 to 2016-2017
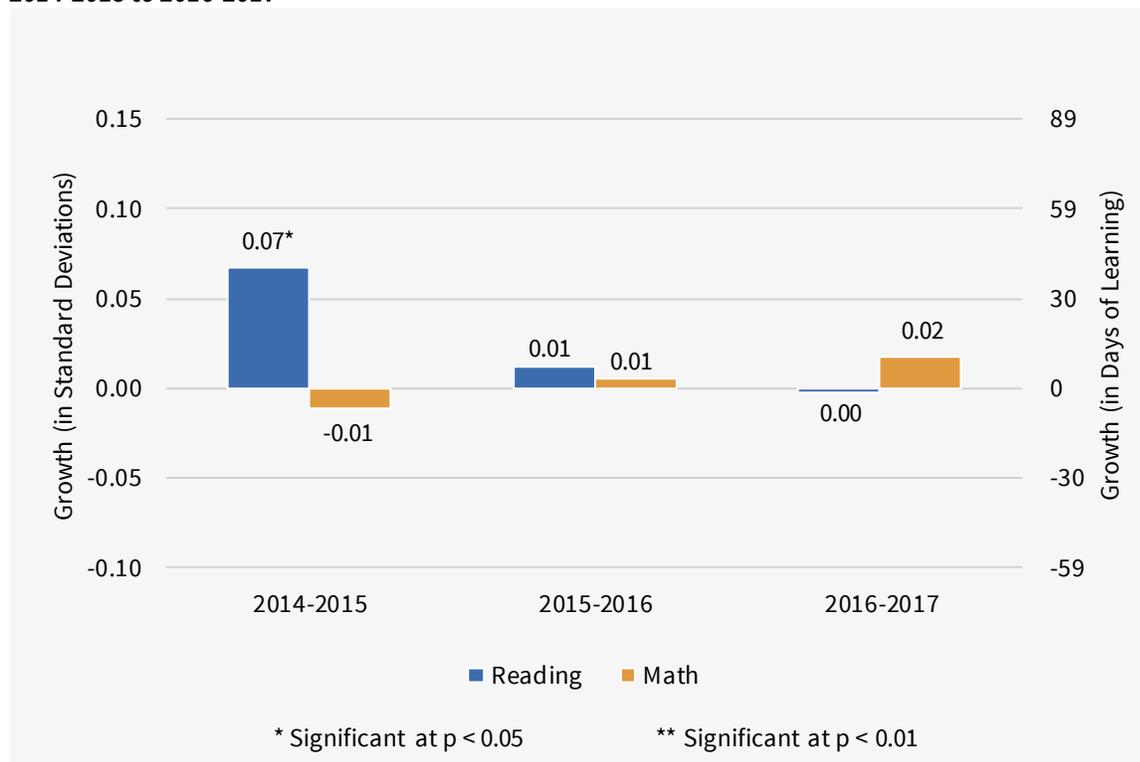
Figure 5 illustrates the trend in the impact of charter school enrollment across the study window. In the 2014-2015 growth period, students in New Mexico charter schools outperform their TPS VCRs in reading and charter students' advantage translates to 41 more days of learning. Charter school students grow similarly in math compared their peers in TPS in math in 2014-15. In the 2015-16 and 2016-17 growth periods, charter school students' growth in both reading and math is on par with that of their TPS peers.

Charter School Impact by Students' Years of Enrollment

Students' academic growth may differ depending on how many years they enroll in a charter school. To test the relationship between progress and the length of enrollment in a charter school, we group separately test scores from students in the first year of charter enrollment, scores from students in their second year of charter attendance, and scores of students in their third year in a charter school. In this scenario, the analysis is limited to the charter students who enroll for the first time in a charter school between the 2014-15 and 2016-17 school years and their TPS VCRs. Although this approach reduces the number of students included, it ensures an accurate measure of the effect of continued enrollment over time. The results for this subset of the full study sample should not be directly compared with other findings in this report.

Figure 6 shows that new charter school students in New Mexico do not differ significantly from the average VCRs in TPS in learning gains in reading during the first two years of enrollment in charter schools. Nevertheless, they outpace the average TPS VCRs in reading in the third year of charter enrollment and their advantage is equivalent to 124 extra days of learning. In math, the growth of new charter school students is not significantly different from that of average TPS VCRs throughout the first three years of charter school enrollment.

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Figure 6: Learning Gains of Charter Students Compared to Gains for Average TPS VCRs by Students' Years of Enrollment in Charter Schools
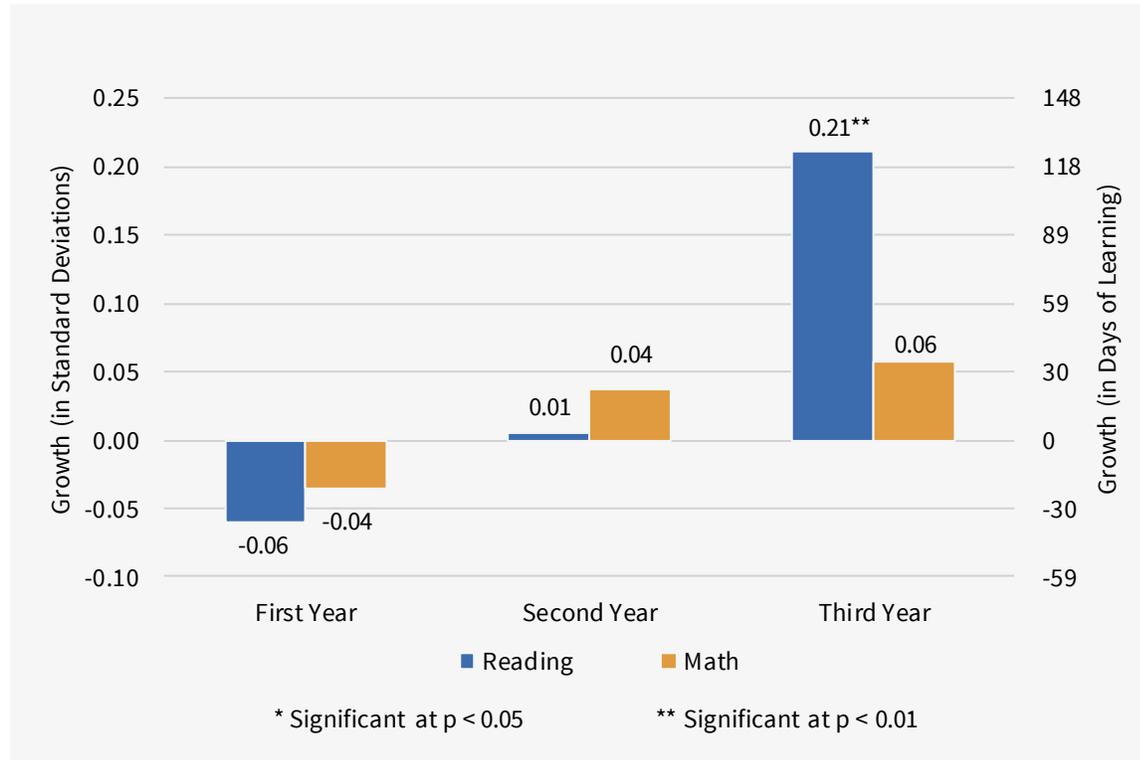
Overall, the patterns in this graph suggest that New Mexico charter schools benefit students' learning in reading over time, while the length of stay in a charter school is not significantly associated with math growth.

5. Charter School Analysis by School Attribute

Charter School Impact by Delivery System

There are both brick-and-mortar and online charters in New Mexico. Students from all over the state can attend online charter schools and receive instruction online. As Table 2 revealed, online charter schools enroll around eight percent of charter students in New Mexico and have different student compositions compared to brick-and-mortar charters. CREDO's earlier study on online charter schools

also found that online charter schools serve students with higher mobility rates and have significantly negative impacts on student academic progress.[14]

In this section, we break down the charter school impact on student performance by delivery system. There are 2,414 online charter school student observations in reading and 2,161 online charter students in math from three online charter schools in this analysis. We display two distinct comparisons in two graphs:

1. Figure 7 compares the performance of students in online charter schools and students in brick-and-mortar charters to the performance of the average TPS VCR.
2. Figure 7a compares the difference in the learning of students enrolled in online charter schools and those who attend brick-and-mortar charters.

Figure 7: Student Learning Gains for Students in New Mexico Online and Brick-and-Mortar Charter Schools Benchmarked against Learning Gains for Average TPS VCRs
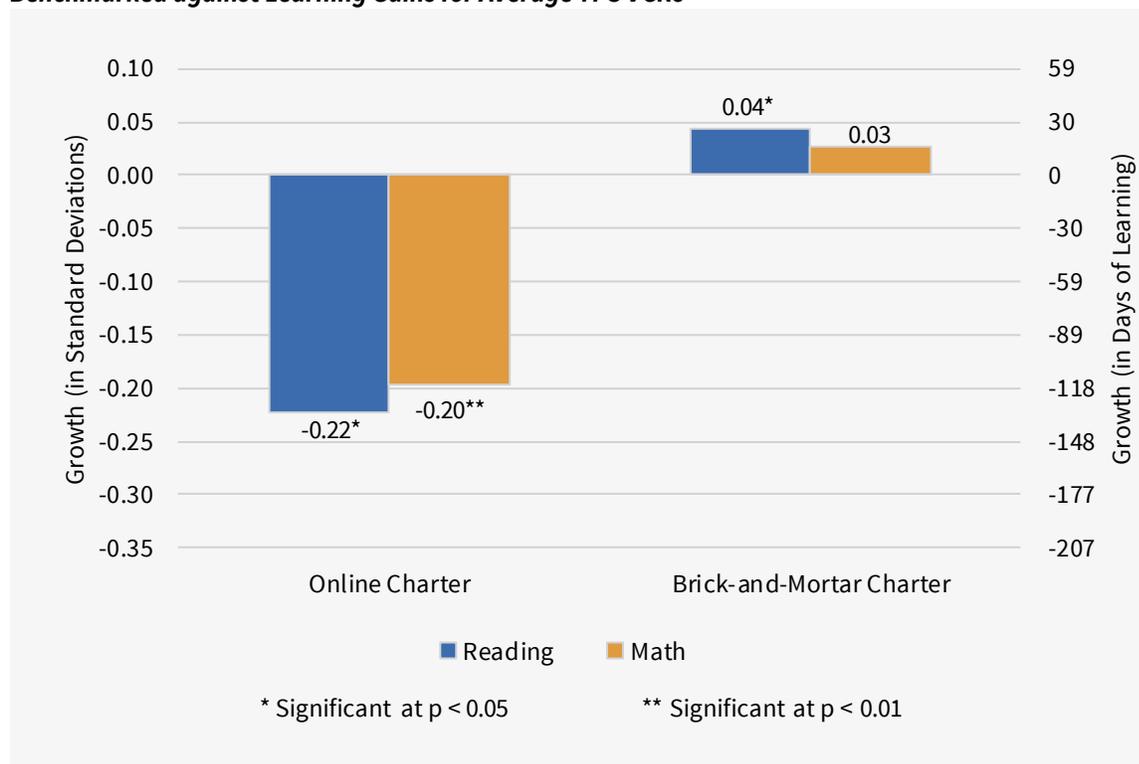
According to Figure 7, students attending online charter schools have substantially weaker growth in both reading and math than the average TPS VCRs. The gaps translate to 130 fewer days of learning in reading and 118 fewer days of learning in math for online charter students. In contrast, students in

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[14] James L. Woodworth, Margaret E. Raymond, Kurt Chirbas, Maribel Gonzalez, Yohannes Negassi, Will Snow, and Christine Van Donge, _Online Charter School Study 2015,_ CREDO (Center for Research on Education Outcomes), Stanford University, https://credo.stanford.edu/pdfs/Online%20Charter%20Study%20Final.pdf.

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brick-and-mortar charters exhibit stronger growth in reading (equivalent to 24 extra days of learning) and obtain similar learning gains in math as compared with the average TPS VCRs.

Figure 7a benchmarks the performance of students in online charter schools against that of students attending brick-and-mortar charters (whose performance is represented by the 0.00 line). Online charter school students gain significantly less in both subjects. To be specific, they are behind brick-and-mortar charter students by 159 days of learning in reading. In math, the academic deficit for online charter students relative to students in brick-and-mortar charters is equivalent to 130 days of learning.

Figure 7a: Student Learning Gains in New Mexico Online Charter Schools Benchmarked against Students in New Mexico Brick-and-Mortar Charter Schools
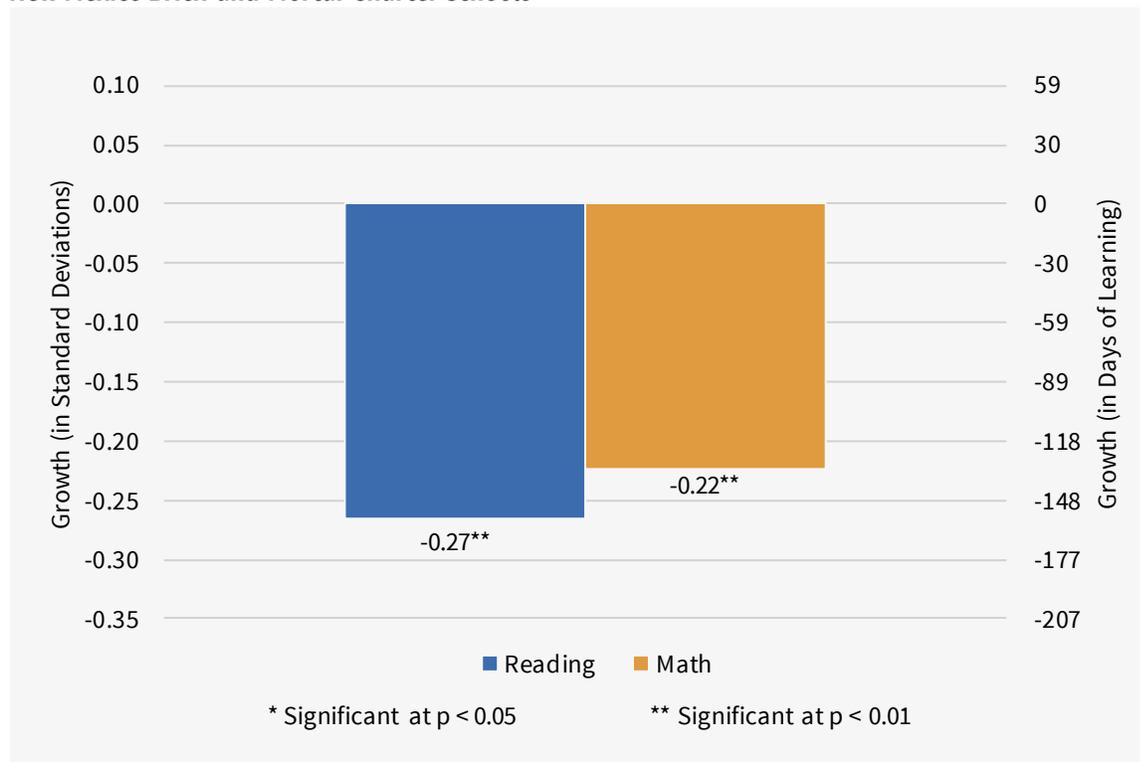
Figures 7 and 7a above demonstrate two important points. First, New Mexico online charter students fall behind in both reading and math compared to the average VCR in TPS or brick-and-mortar charter school students. Second, the negative relative growth of online charter students is sufficiently large as to wipe out the positive relative growth of brick-and-mortar charter students in reading, which leads to the lack of overall New Mexico charter school effects on reading growth in Figure 3.

Charter School Impact by School Locale

Depending on their locales, charter schools serve different student populations, face different levels of available human capital, or both. Though charter schools in urban areas receive the bulk of media attention, charter schools in other locales may produce different results. The analysis in Figure 8 looks at where the charter school is located and then estimates the relative growth of the students in that setting. Since online charter schools can serve students across the state, putting an online school in any of the categories can skew the results, so they are excluded from the analysis. The results in Figure 8 represent the disaggregated impacts of charter school enrollment for urban, suburban, town, and rural brick-and-mortar charter schools. In this breakdown, charter students in different locations are compared with their virtual twins in TPS.[15] The comparison is relative to whatever actual progress each group of VCRs realized. However, the reader should not assume that the transformation of each VCR group to 0.00 means that all the VCRs have equivalent academic growth.

Figure 8: Learning Gains in New Mexico Brick-and-Mortar Charter Schools Compared to Gains for TPS VCRs by School Locale
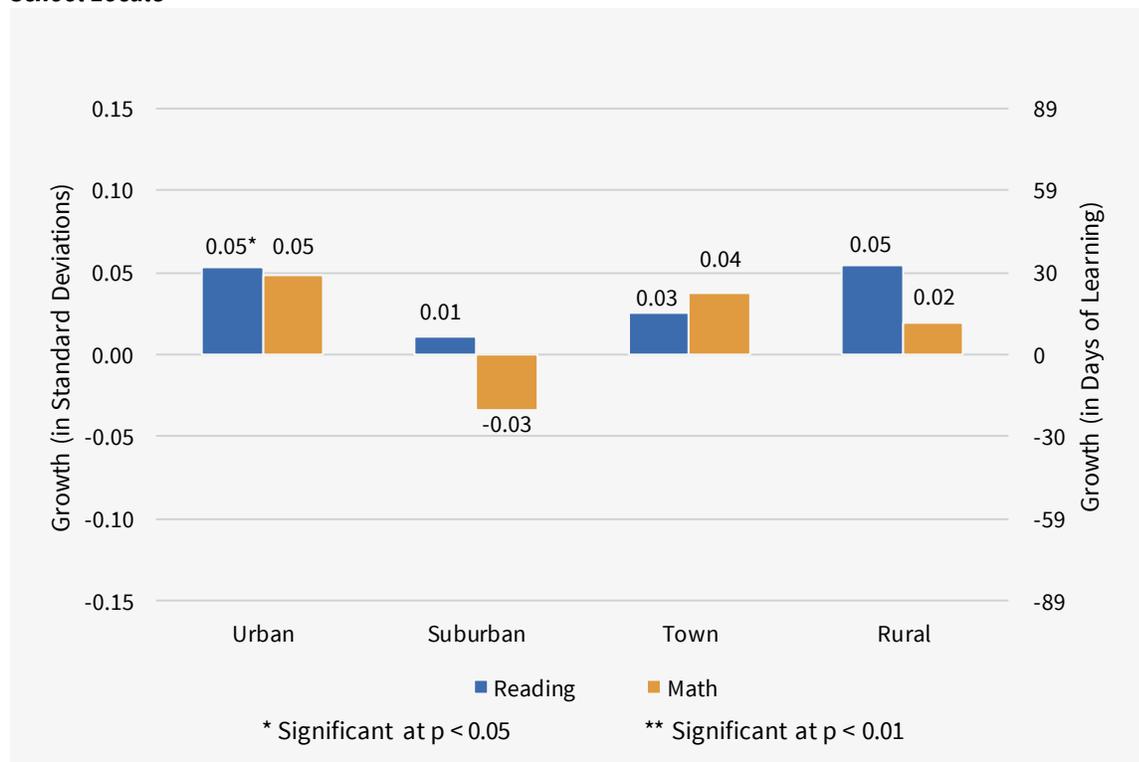
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Figure 8 illustrates differences in the academic growth of brick-and-mortar charter students across locales. Charter students in urban New Mexico post stronger learning gains in reading relative to their TPS VCRs, representing 30 extra days of learning. Urban charter school students do not perform differently from their peers in TPS in math. Students in suburban, town, and rural charter schools in New Mexico are on par with their respective TPS VCRs in growth in both reading and math. Notably, the salient positive impact of urban charter schools in New Mexico is similar to what we have observed for many other urban areas.

Charter School Impact by School Grade Configuration

All charter schools choose which grade levels to offer. Some charter operators focus on particular grades, some seek to serve a full range of grades, and others develop by adding one additional grade each year. The National Center for Education Statistics assigns schools the label of "elementary school," "middle school," "high school," or "multi-level school" based on their predominant grade pattern. The designation of "multi-level school" can apply to a school that serves elementary and middle grades, middle and high grades, or all K-12 grades.[16] Looking at performance by school grade configuration helps inform us whether specialization in a specific range of grades produces better results. The outcomes of students by the grade configuration of the charter school they attend are reported in Figure 9. Again, the comparison is relative to whatever actual progress each group of VCRs realized. The reader should not assume that the transformation of each VCR group to 0.00 means that all the VCRs have equivalent academic growth.

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[16] The National Center for Education Statistics (NCES) designates a school as an elementary, middle, high, or multi-level school. CREDO uses the designation by NCES. The sole exception is that CREDO considers a school to be a high school if the lowest grade served is ninth grade or above.

credo

Figure 9: Learning Gains in New Mexico Charter Schools Compared to Gains for TPS VCRs by School Grade Configuration
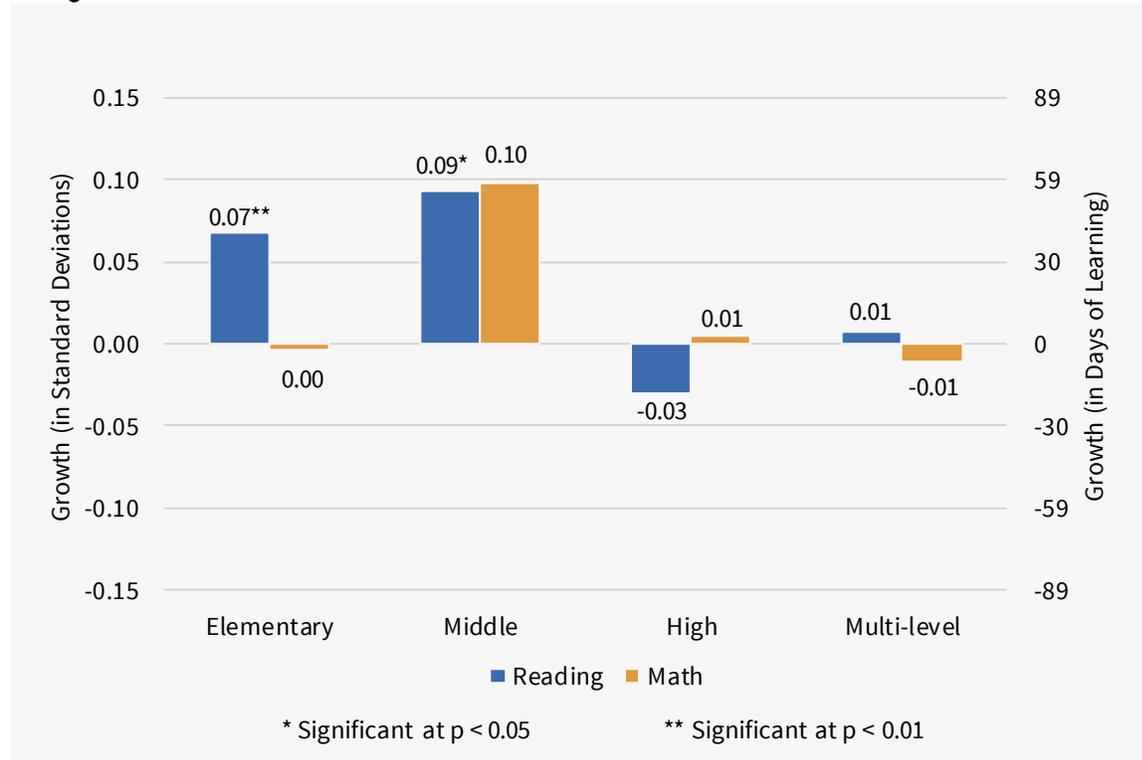
The results in Figure 9 show that, on average, charter elementary and charter middle school students exhibit stronger learning gains in reading. Compared to their TPS VCRs, charter elementary school students register learning surpluses in reading equivalent to 47 additional days of learning; charter middle school students outperform their TPS VCRs in reading by 53 extra days of learning. The math growth of students attending charter elementary and middle schools is not statistically different from that of their peers in TPS. Students in high and multi-level charter school grow similarly to their TPS VCRs in both reading and math.

6. Charter School Analysis by Student Characteristic

Charter School Impact by Race/Ethnicity

One of the enduring advances of the *No Child Left Behind Act* of 2001 and the subsequent *Every Student Succeeds Act* of 2015 is the recognition that performance results may not be evenly distributed across all students. Attention to the differences in the performance of students of various racial/ethnic backgrounds and other attributes has become standard practice in most assessments of school performance. As shown in Table 1, New Mexico charter schools serve a diverse student population. Their ability to support the progress of disadvantaged students is an important policy goal in the state and a strong focus of this study. The effectiveness of charter schools across ethnic and racial groups is especially important given the significant shares of historically underserved students that charter schools enroll.

The impacts of charter schools on the academic gains of white, black, Hispanic, Native American students are reported in Figures 10 through 13a. For black, Hispanic, and Native American students, we present two related graphs. Graphics Roadmap 2 in the sidebar provides guidance on how to interpret the graphs and their relation to each other. In short, the first graph depicts the growth of TPS students and charter students in the particular subgroup of interest as compared to the growth of the "average white TPS student." Graphs labeled "a" show whether the learning gains in the charter school student subgroup differ significantly from their VCRs in the same subgroup.

White students account for around 30 percent of the student population in charter schools in New Mexico (Table 1). Figure 10 compares the growth of white students enrolled in charter schools with that of white students enrolled in TPS. The 0.00

> **Graphics Roadmap 2**
>
> Figures 10 through 13a show two important contrasts for black, Hispanic, and Native American student groups. For each student subgroup, we present two related graphs:
>
> The **first graph** displays the growth of **TPS students and charter students in the particular subgroup** of interest compared to the growth of the "**average white VCR student**." In this comparison, the white TPS VCR student is male, does not live in poverty, does not qualify for special education services or English Language Learner support, and is not repeating his current grade. The graph sets the performance of the average white TPS student to **zero** and shows how learning of students in the subgroup compares.
>
> The **asterisks** indicate the level of statistical significance. Thus, if there are no asterisks, we interpret the difference in learning gains as similar to the white TPS comparison student. The size and direction of the **bars** in the graph show the direction and magnitude of learning differences. If there is no difference in the learning gains, the bar would be missing entirely. If the learning of the student group in question is not as great as the comparison baseline, the bar is negative. If the learning gains exceed the comparison, the bar is positive.
>
> **Graphs labeled "a"** display the results of a second comparison testing whether the learning gains in the **charter school student subgroup** differ significantly from **their VCRs in the same student subgroup**. In these graphs, the performance of the TPS peers in the subgroup is set to **zero** and the learning gains of the charter school students in the subgroup are measured against that baseline. As with the first graph, asterisks denote statistical significance.

credo

baseline reflects the average annual academic progress of white TPS VCRs in New Mexico. The growth of white charter school students is not significantly different from that of their white VCRs in TPS in either reading or math.

Figure10: Relative Learning Gains for White Charter School Students Benchmarked against Their White TPS Peers

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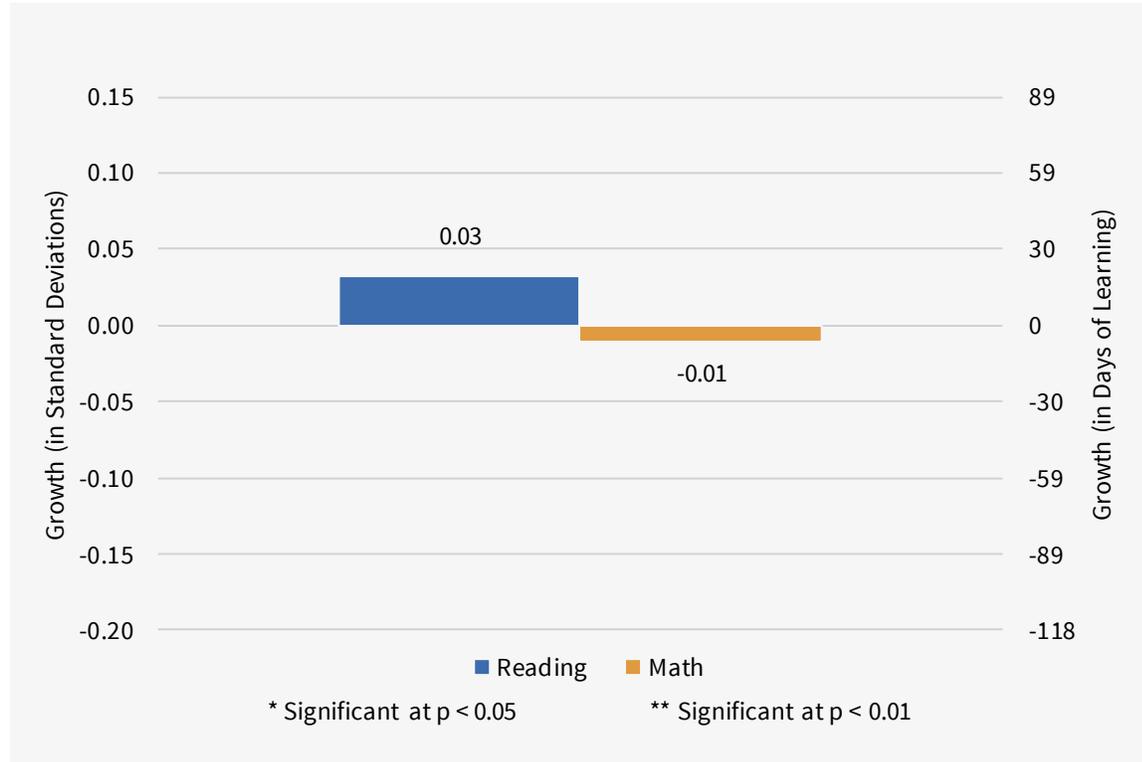
Black students account for about two percent of the charter school population in New Mexico. As shown in Figure 11, black TPS students in New Mexico have 65 fewer days of learning in reading and 94 fewer days of learning in math when compared to the average white TPS VCR student. Black charter school students perform similarly in reading compared to white VCR students, but display weaker growth in math which is equivalent to 89 fewer days of learning.

Figure 11: Learning Gains of Black Students in TPS and Charters Benchmarked against Learning Gains of White TPS Students
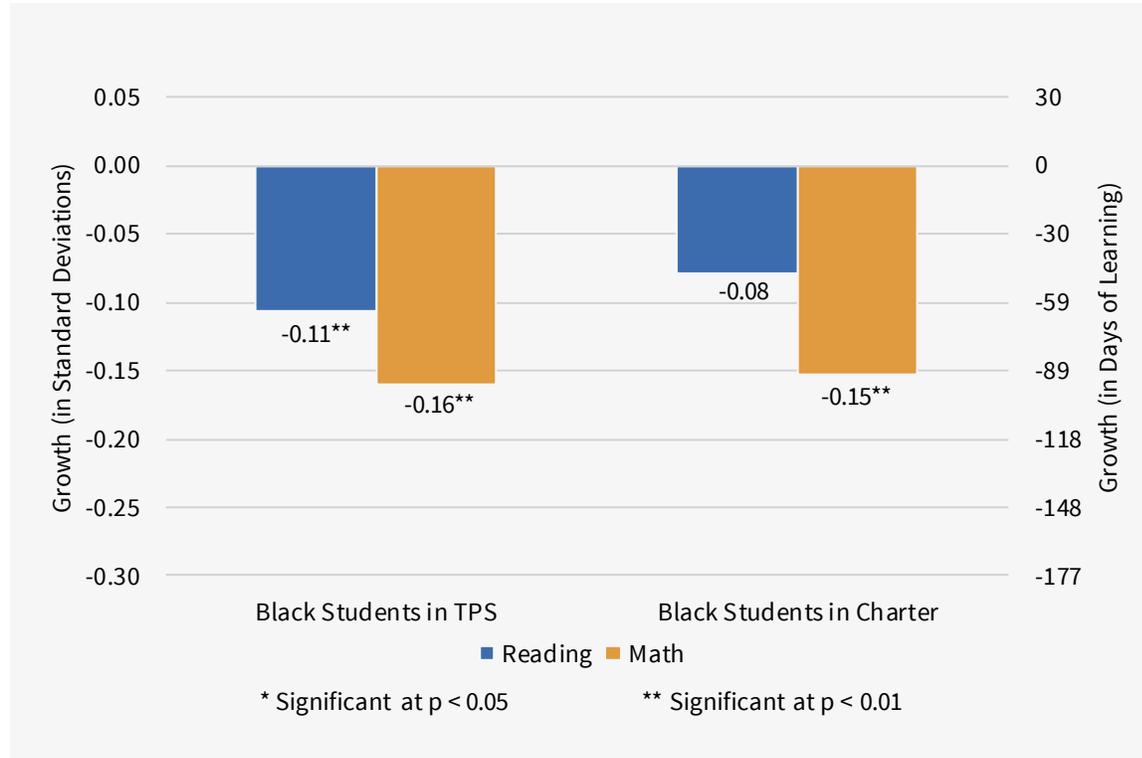
When the learning of black students enrolled in charter schools is compared to that of black students enrolled in TPS, the results reveal that New Mexico black charter students experience similar progress compared to their TPS peers in both reading and math (Figure 11a).

Figure11a: Relative Learning Gains for Black Charter School Students Benchmarked against Their Black TPS Peers
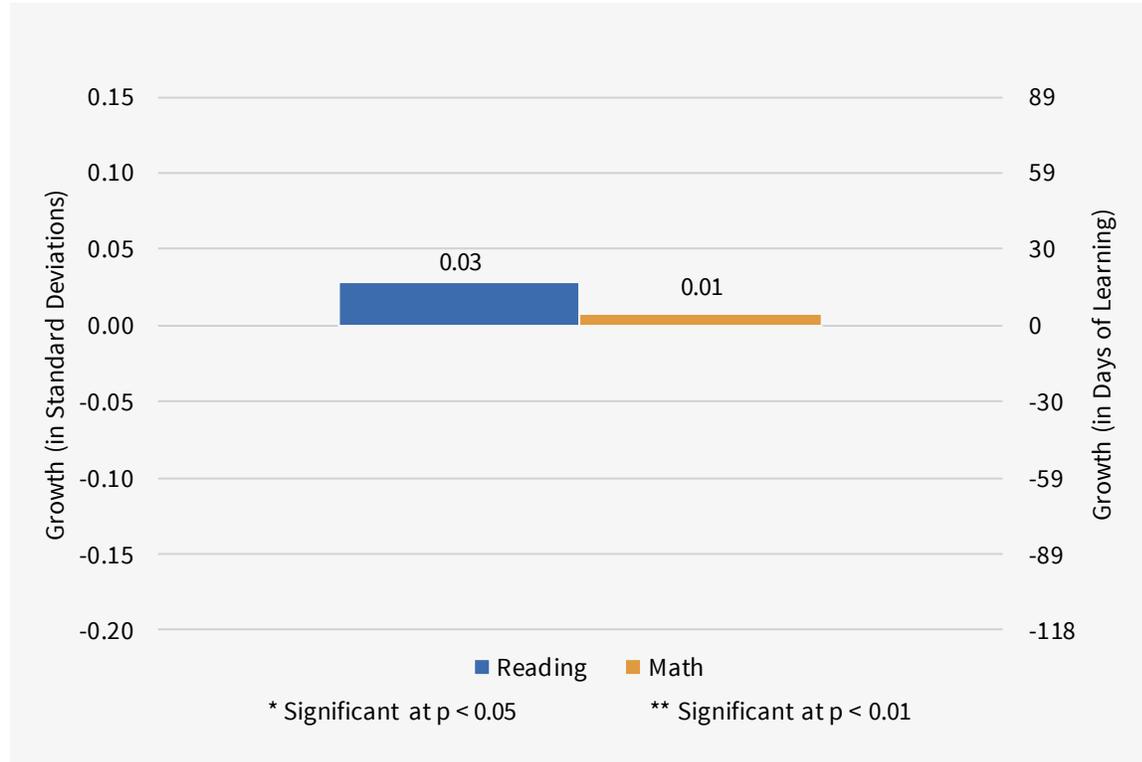
Hispanic students make up about 60% of the student population in New Mexico public schools (Table 1). Figure 12 compares the performance of TPS and charter Hispanic students relative to the average white TPS VCR. Hispanic students in both TPS and charter settings show significantly weaker annual academic growth in reading and math compared to the average white VCR. Hispanic students in TPS lag behind the average white TPS student by 65 days of learning in reading and by 53 days of learning in math in a year. Hispanic students in charter schools also gain less than the average white TPS VCR in both subjects and the gaps translate to 47 fewer days of learning in reading and 59 fewer days of learning in math.

Figure 12: Learning Gains of Hispanic Students in TPS and Charters Benchmarked against Learning Gains of White TPS Students
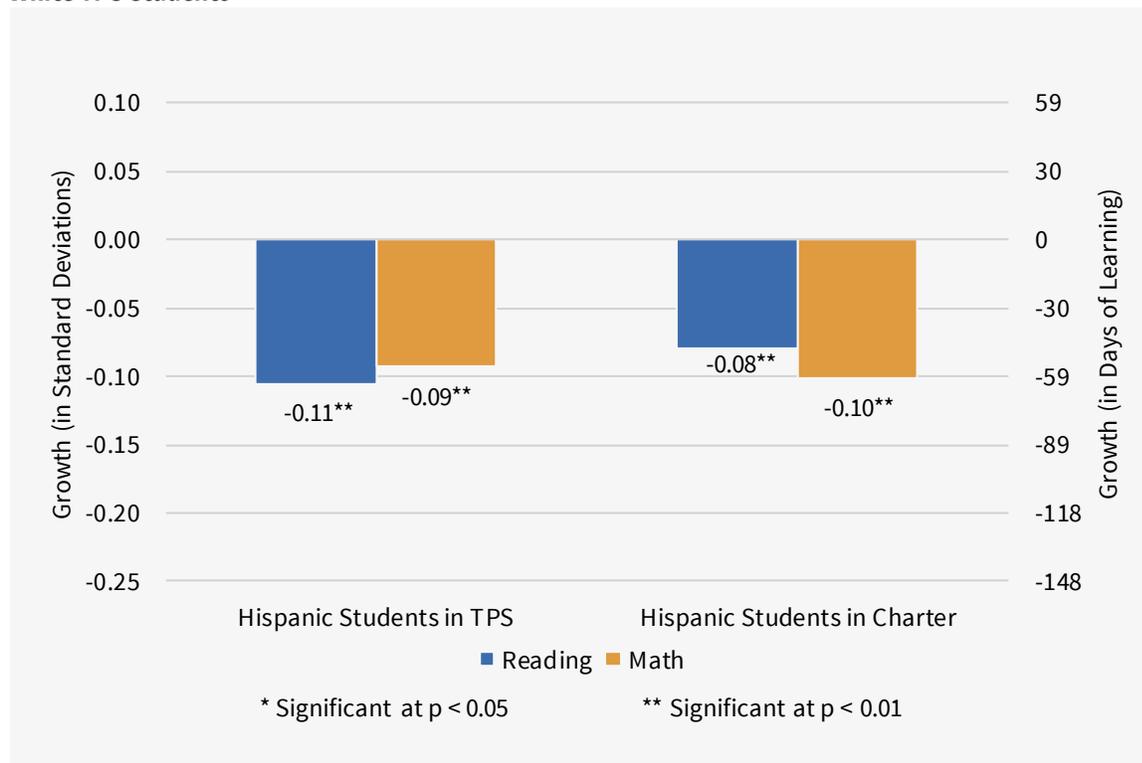
Figure 12a displays the differences in learning gains between Hispanic students enrolled in charter schools and Hispanic peers in TPS. In both subjects, the annual learning gains of Hispanic students in charter schools are not significantly different from those of their Hispanic peers in TPS. That being said, in our 2009 New Mexico state study, Hispanic students in charter schools fell behind Hispanic peers in TPS in both reading and math. The parity shown in Figure 12a implies that Hispanic charter students have caught up with their TPS peers since the period covered in the 2009 study.

Figure 12a: Relative Learning Gains for Hispanic Charter School Students Benchmarked against Their Hispanic TPS Peers
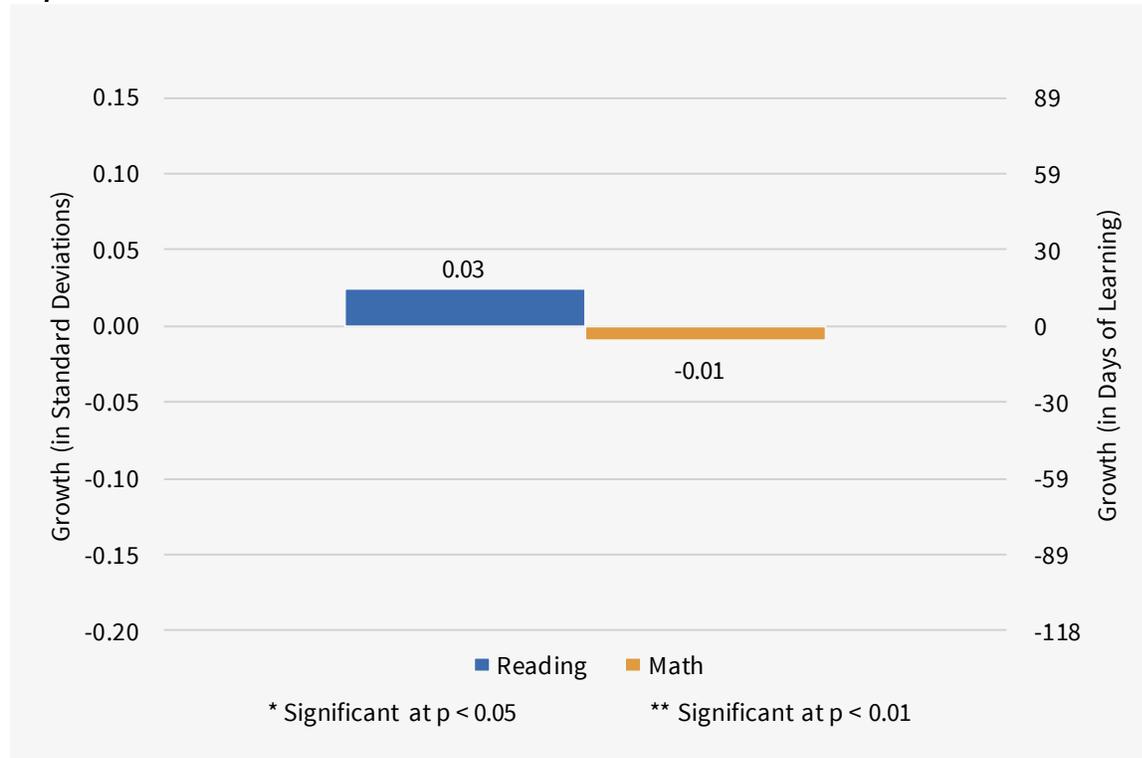
As shown in Table 1, Native American students represent the second largest minority group in public schools in New Mexico and constitute six percent of the charter school population in the state. Figure 13 demonstrates that Native American students in TPS make significantly smaller annual academic progress in reading and math when compared to the average white VCR student. The learning gaps for TPS Native American students are equivalent to 47 fewer days of learning in reading and 83 fewer days of learning in math. Native American charter school students exhibit progress in reading that is not significantly different than that of white VCR students, but lag in math by 77 days of learning.

Figure 13: Learning Gains of Native American Students in TPS and Charters Benchmarked against Learning Gains of White TPS Students
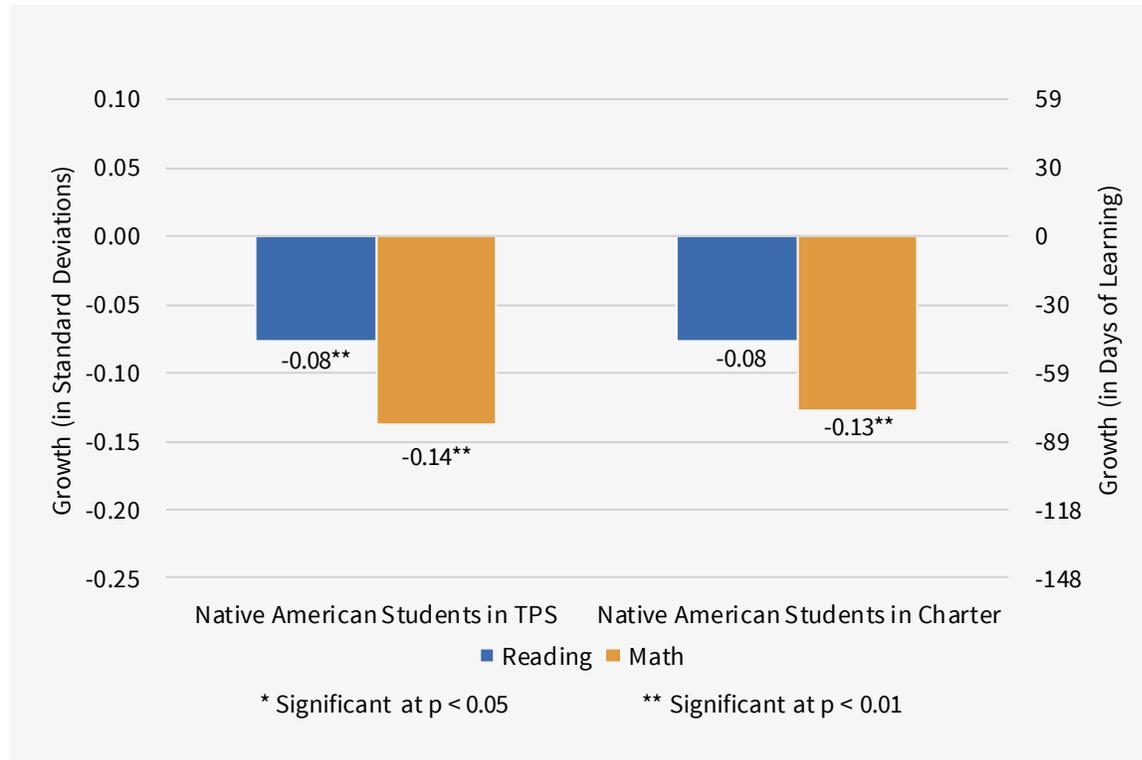
Figure 13a depicts whether the learning gains of Native American students differ by the sector of schools they attend. In both reading and math, Native American students in charter schools post growth similar to that for their Native American peers in TPS in both reading and math. It should be noted that similar to Hispanic students, Native Americans enrolled in charter schools significantly underperformed their VCRs in TPS in both subjects in our 2009 New Mexico state study. The equivalence in growth presented in Figure 13a suggests that charter schools have made improvements in serving the learning of Native American students in the time between the 2009 and current studies.

Figure 13a: Relative Learning Gains for Native American Charter School Students Benchmarked against Their Hispanic TPS Peers
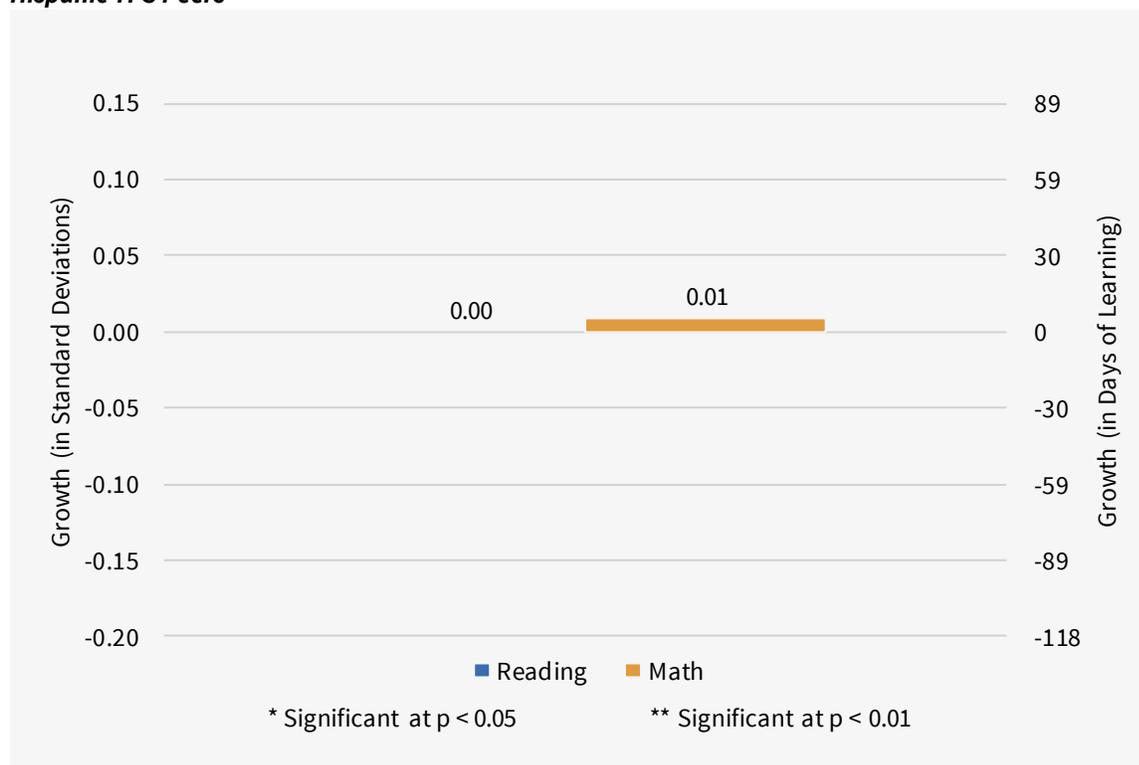
To summarize the race/ethnicity analyses, learning gaps exist between historically disadvantaged groups and average white TPS VCRs. Hispanic students in both charter schools and TPS make smaller annual academic progress than an average white TPS VCR in reading and math. Black and Native American students indicate similar patterns: TPS students in those two subgroups are behind average white TPS VCRs in both reading and math, while charter students in the two subgroups post similar learning gains in reading and weaker growth in math than the average white TPS student. When the focus shifts to comparing the outcomes of student subgroups to each other by sector, the growth of black, Hispanic, and Native American charter students in both subjects is on a par with their TPS peers in the same racial/ethnic subgroup. Comparison of the 2009 and 2019 studies indicates that New Mexico charter schools have caught up with TPS in serving Hispanic and Native American students.

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Charter School Impact with Students in Poverty

Many charter school operators expressly aim to improve educational outcomes for traditionally underserved students, especially for students in poverty. According to the latest data collected by the National Alliance for Public Charter Schools, students in poverty account for 55 percent of the national charter school population.[17] In New Mexico, 53 percent of charter school students live in poverty, compared to 71 percent of TPS students (Table 1).

Figure 14 presents the annual academic growth for students in poverty. It is important to note that in this graph, the baseline differs from the race/ethnicity graphs presented earlier: it is a TPS student who does not live in poverty. This analysis isolates the relationship between poverty and growth. This provides a picture of the difference in the impact of charter attendance on students in poverty compared to similar students in TPS who are not in poverty.

Figure 14: Overall Learning Gains for TPS and Charter Students in Poverty Compared to TPS Students Not in Poverty
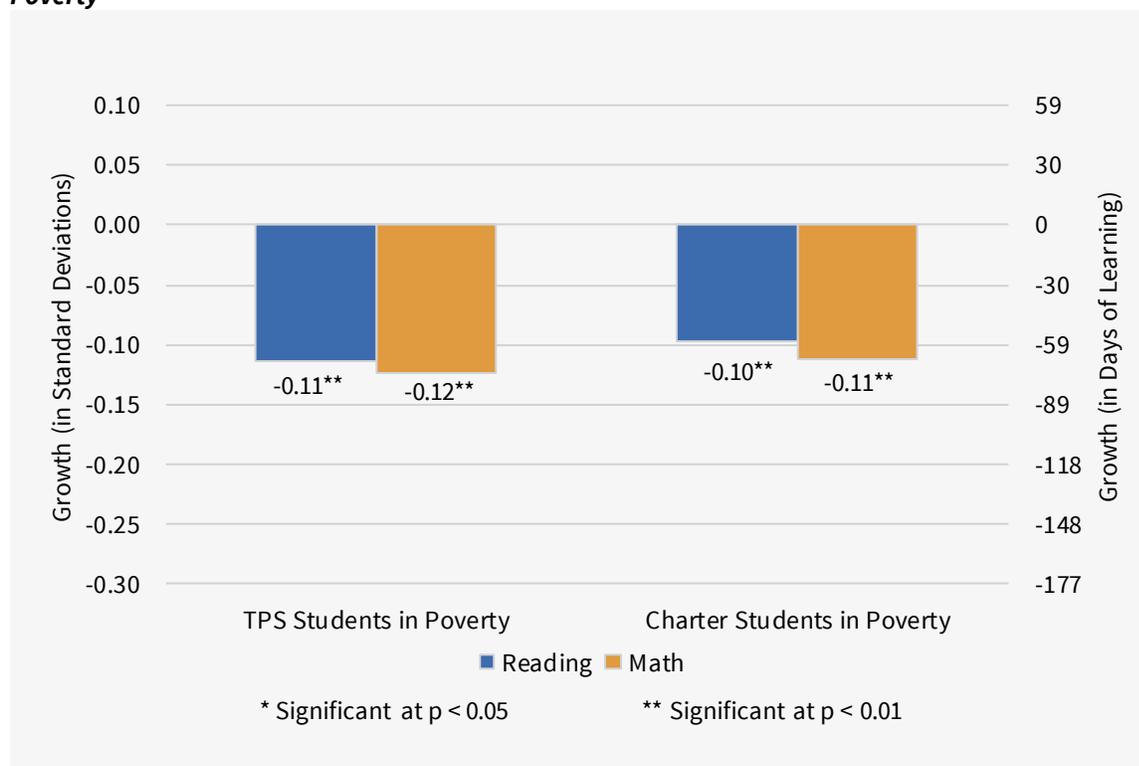
The results in Figure 14 suggest that students in poverty, regardless of whether they attend TPS or charter schools, significantly underperform TPS students not in poverty in both reading and math. TPS

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[17] The data were retrieved from "National Charter School Facts," National Alliance for Public Charter Schools, https://data.publiccharters.org/ when the report was produced.

students in poverty make less academic progress than non-poverty TPS students by 65 fewer days of learning in reading and 71 fewer days of learning in math. Charter school students in poverty post less academic growth in reading compared to non-poverty TPS students too, with the deficit amounting to 59 fewer days of learning in reading and 65 fewer days of learning in math. These results mean that learning gaps for charter and TPS students based on the socioeconomic status have persisted.

Figure 14a compares the growth of charter students in poverty versus their TPS peers. The two subgroups perform similarly in both reading and math.

Figure 14a: Relative Learning Gains for Charter School Students in Poverty Benchmarked against Their TPS Peers in Poverty
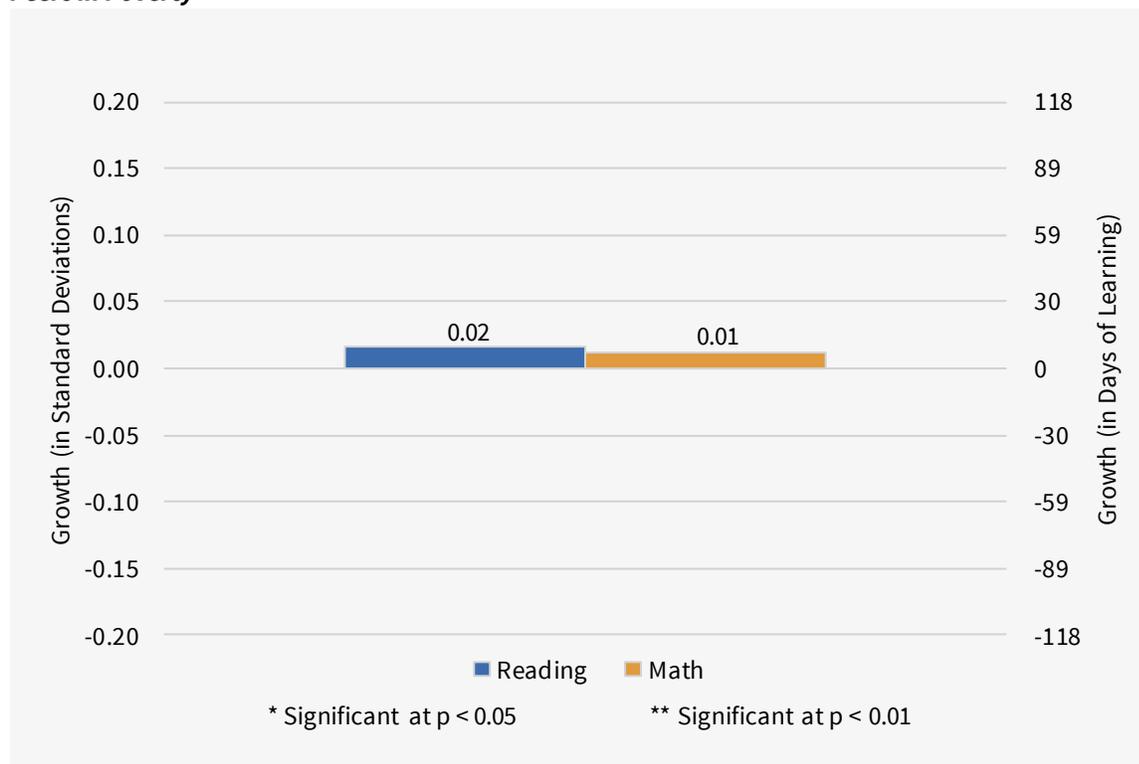
Charter School Impact with Combined Race/Ethnicity and Poverty

In public education, some of the most academically challenged students are those who are both living in poverty and are members of historically underserved racial or ethnic groups. These students represent a large subgroup. Within the national charter school community, these groups receive special attention. To examine the extent to which New Mexico is addressing these gaps, we further disaggregate the charter school impact on black, Hispanic, and Native American students in poverty.

The impact of New Mexico charter schools on the academic gains of black students living in poverty is presented in Figures 15 and 15a. Figure 15 compares black students living in poverty, enrolled in TPS or charter schools, with the average white TPS VCR who is not in poverty. The patterns show that black

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New Mexico students living in poverty, regardless of TPS or charter attendance, make less academic progress annually than white TPS students not living in poverty. Black TPS students in poverty exhibit approximately 118 fewer days of learning in reading and 165 fewer days of learning in math than white non-poverty TPS students. Black charter students in poverty experience 94 fewer days of learning in reading and 118 fewer days in math than white non-poverty TPS students. The magnitude of the differences is noteworthy. They show the aggravated negative effect of the dual disadvantage status of these students.

Figure 15: Learning Gains of Black TPS and Charter Students in Poverty Compared to Learning Gains of White TPS Students Not in Poverty

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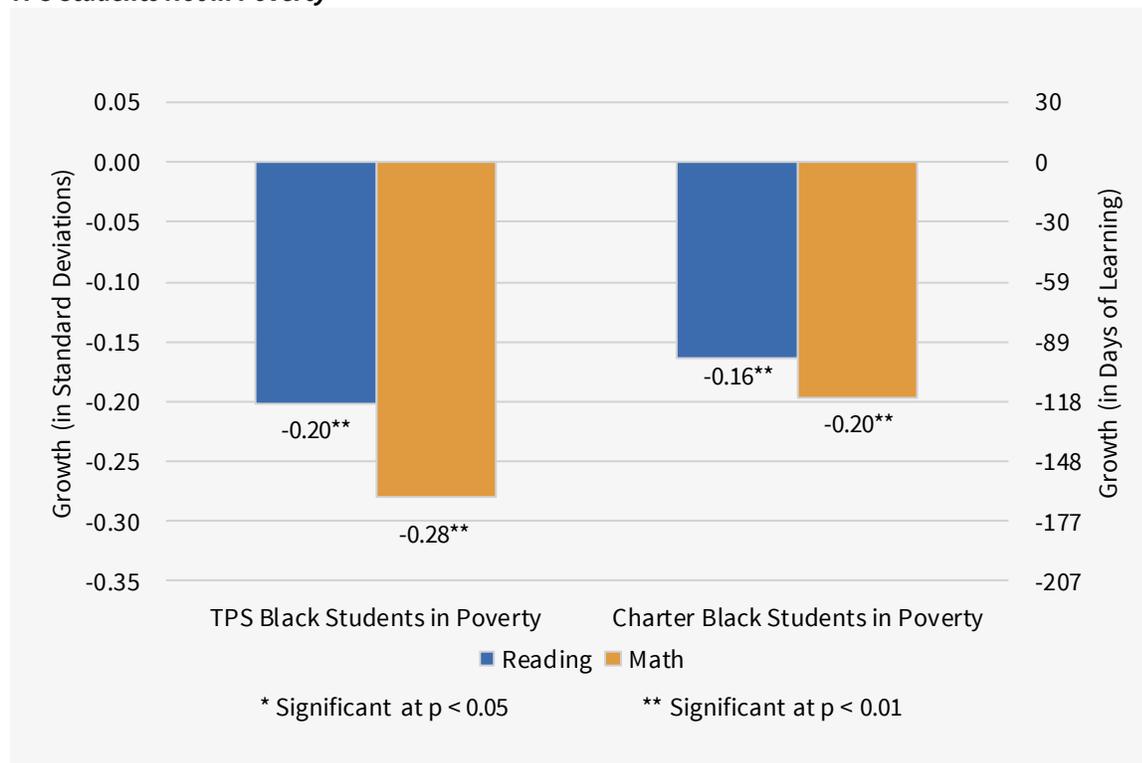
When focusing on peer comparison as displayed in Figure 15a, we find that the growth of black charter school students living in poverty is similar to that of their TPS peers in both subjects.

Figure 15a: Relative Learning Gains for Black Charter School Students in Poverty Benchmarked against Their Black TPS Peers in Poverty
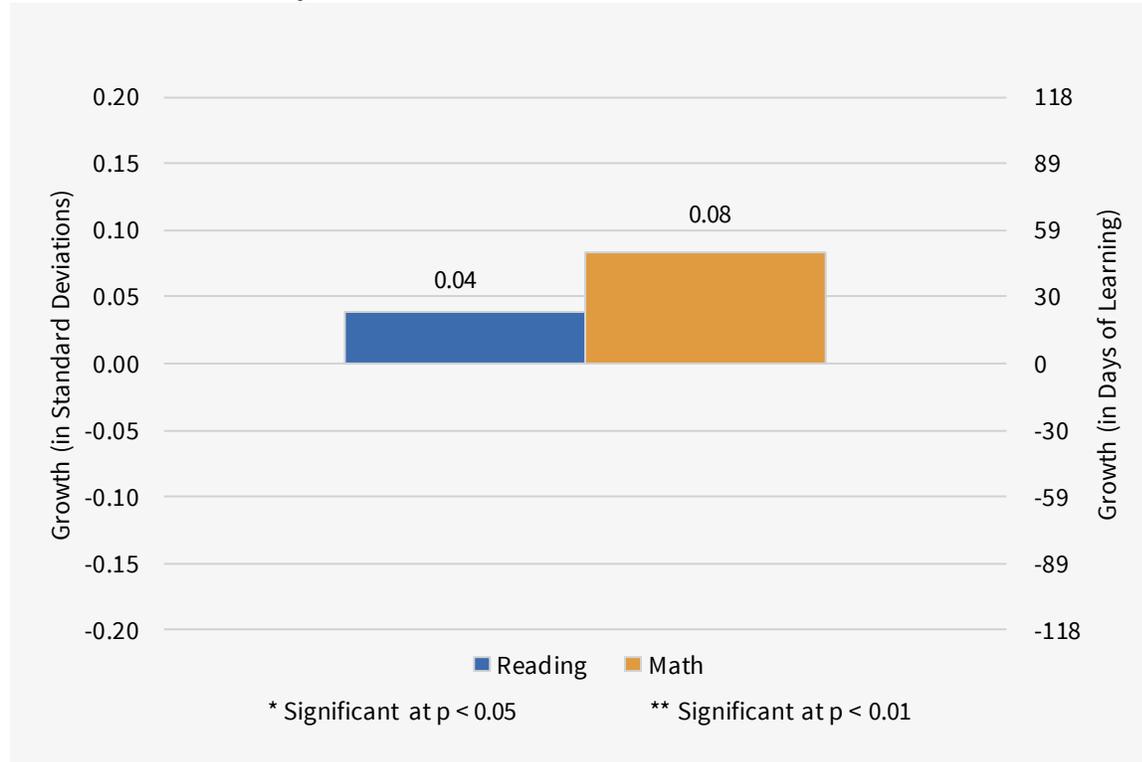
Hispanic students in poverty also exhibit weaker performance in both reading and math than white TPS students who are not in poverty. As shown in Figure 16, Hispanic TPS students living in poverty experience an average of 130 fewer days of learning in both reading and math than white non-poverty students in TPS. Hispanic students in poverty attending charter schools, on average, make weaker progress by 124 fewer days of learning in reading and 130 fewer days of learning in math compared to TPS white students not living in poverty.

Figure 16: Learning Gains of Hispanic TPS and Charter Students in Poverty Compared to Learning Gains of White TPS Students Not in Poverty
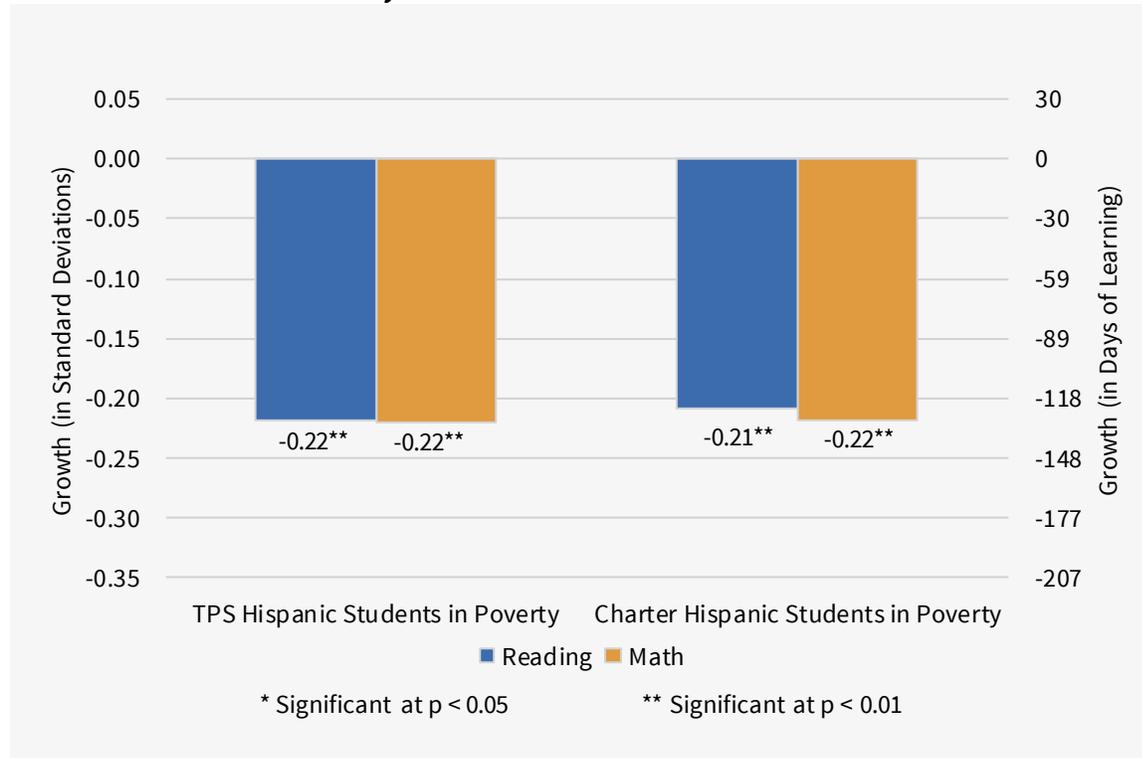
Figure 16a indicates that attendance in TPS or charter schools does not make a significant difference in the learning gains in either reading or math for Hispanic students living in poverty.

Figure 16a: Relative Learning Gains for Hispanic Charter School Students in Poverty Benchmarked against Their Hispanic TPS Peers in Poverty
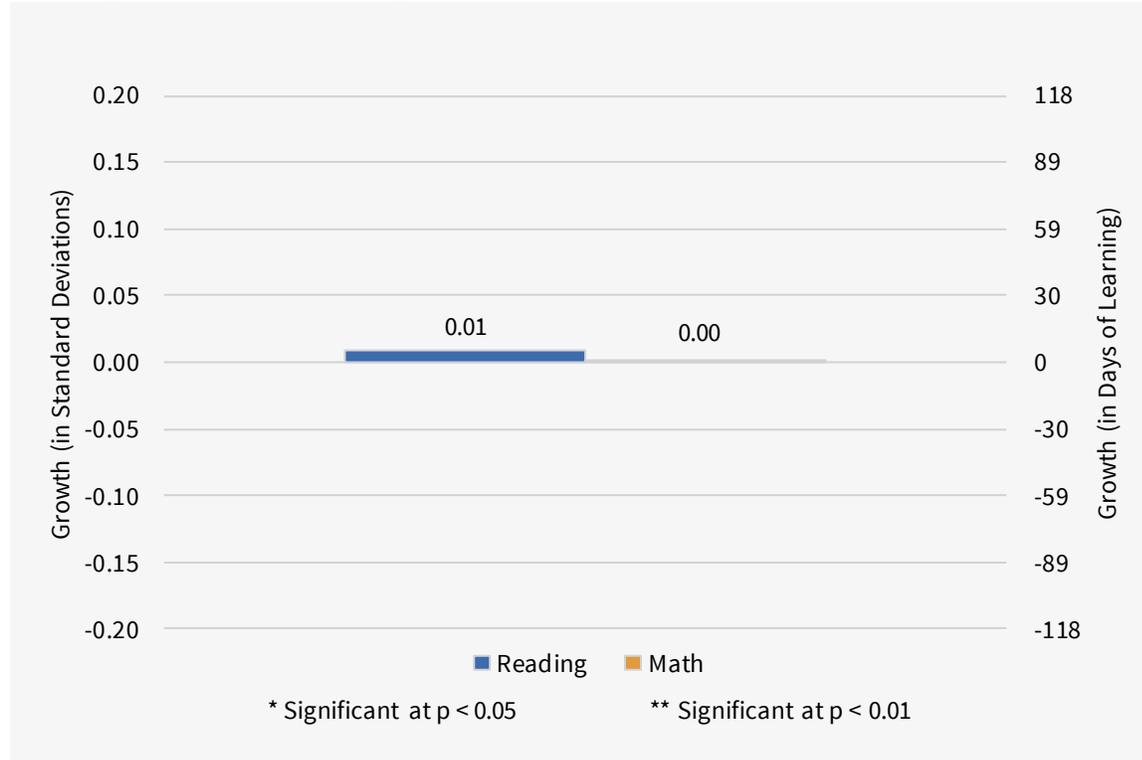
A growth gap is also found between Native American students in poverty and white TPS VCRs who are not in poverty in both reading and math. As shown in Figure 17, Native American TPS students living in poverty fall behind white non-poverty VCRs in by 118 days of learning in reading and 148 days of learning in math. Native American students in poverty enrolled in charter schools also exhibit weaker learning gains compared to TPS white students not living in poverty, and the gaps translate to 118 fewer days of learning in reading and 136 fewer days in math. Figure 17a indicates that the progress of Native American students in poverty in neither reading nor math is associated with the school sector they attend.

Figure 17: Learning Gains of Native American TPS and Charter Students in Poverty Compared to Learning Gains of White TPS Students Not in Poverty

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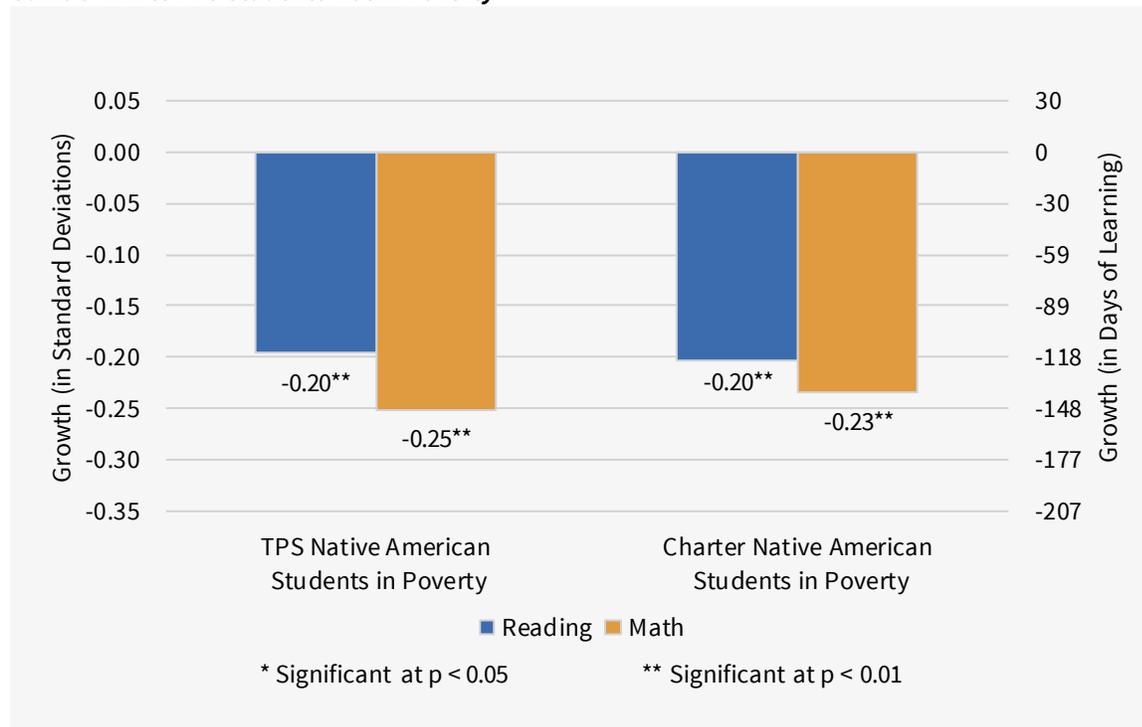
Figure 17a: Relative Learning Gains for Native American Charter School Students in Poverty Benchmarked against Their Hispanic TPS Peers in Poverty
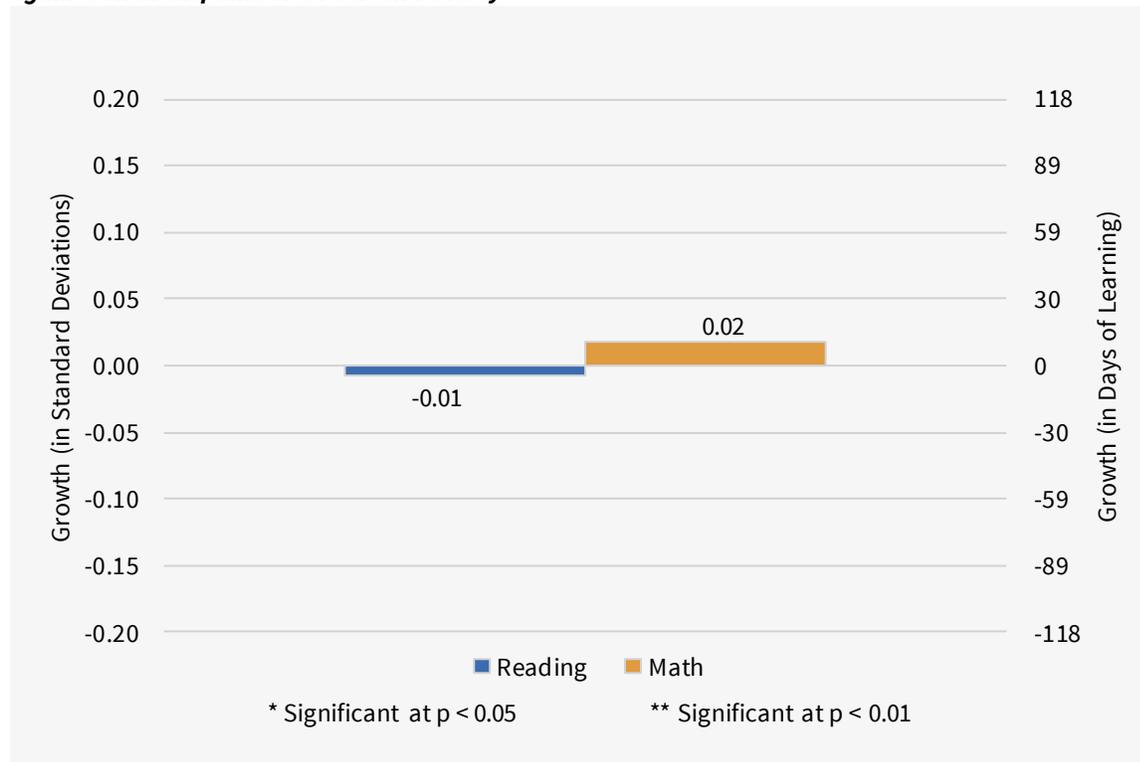

To summarize the findings illustrated in Figures 15 through 17a, there are still huge performance gaps in both reading and math between black, Hispanic, and Native American students living in poverty (no matter where they study) and white non-poverty students in TPS. Charter schools and TPS produce similar learning gains for black, Hispanic, and Native American students in poverty in both subjects.

Charter School Impact with Special Education Students

Because of the differences in individual needs, comparing the outcomes of special education students is difficult, regardless of where they enroll. In the ideal world, we would only compare students with the same Individual Education Program (IEP) designation, matching for the specific designation along with the rest of the matching variables. That approach faces real challenges, however, because of the large number of designations. The finer distinction leads to very small numbers of matches between charter schools and their feeder schools, which hinders the analysis. To obtain any estimates of charter school impacts for students with special education needs, it is necessary to aggregate across all IEP categories. It is important to consider this when viewing the results in Figure 18 and Figure 18a.

Figure 18: Learning Gains for TPS and Charter Students in Special Education Compared to TPS Students Not in Special Education
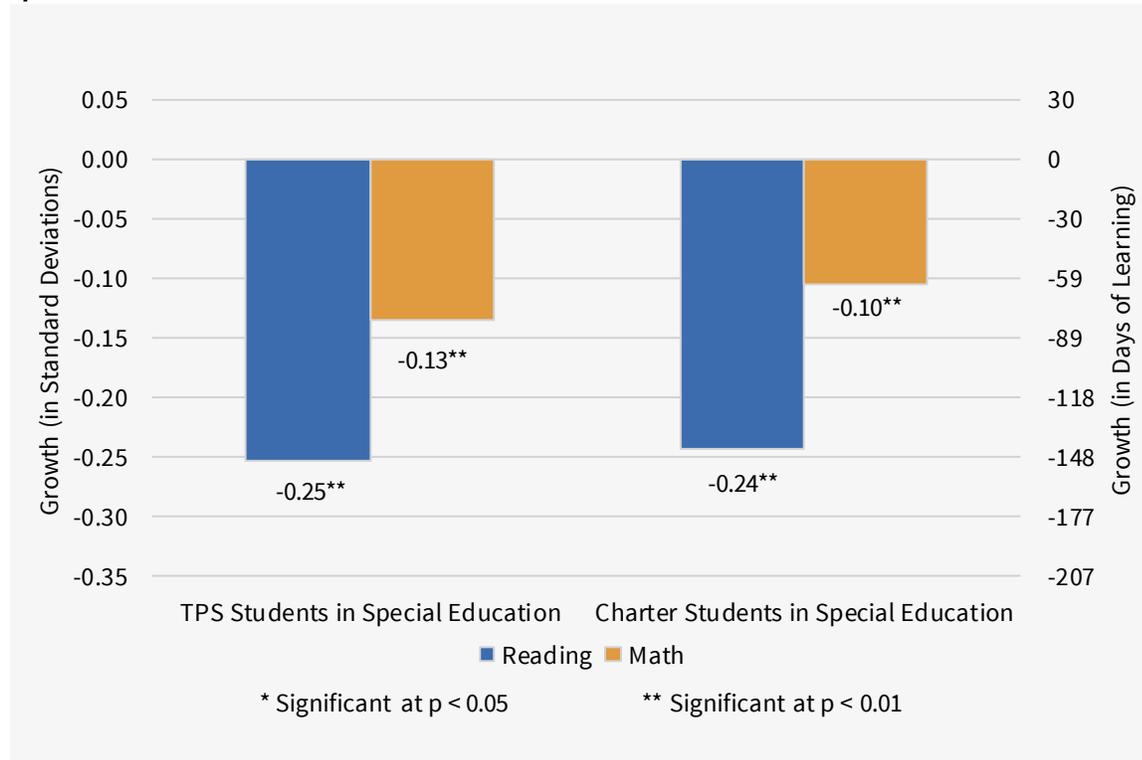
In Figure 18, the baseline for comparison is the TPS student who is not receiving special education services. New Mexico special education students in both TPS and charter schools have significantly weaker academic growth than students in TPS who do not receive special education services. Figure 18 shows that TPS students in special education programs experience 148 fewer days of learning in reading and 77 fewer days of learning in math when compared to TPS students not receiving special education services. A special education student in charter schools also makes less progress than a non-special-education student in TPS and the gaps reach 142 fewer days of learning in reading and 59 fewer days in math.

credo

Figure 18a benchmarks the growth of special education students attending charter schools against their peers in TPS. Our analysis finds no statistically significant difference by school sector among special education students in either reading or math.

Figure 18a: Relative Learning Gains for Charter Students in Special Education Benchmarked against Their TPS Peers in Special Education
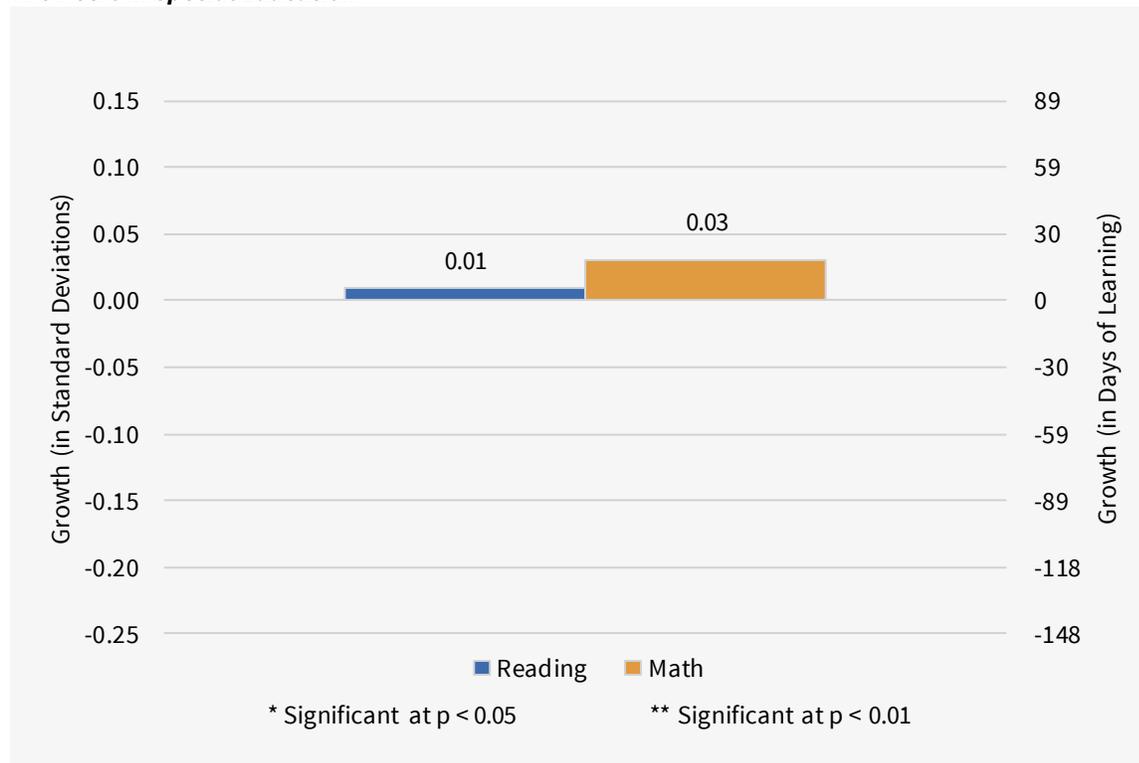
Charter School Impact with English Language Learners

There is a growing population of students enrolled in the public school system with a primary language other than English. Their present success in school will influence their progress in the future once they exit the school system. The 2017 National Assessment of Education Progress (NAEP) documented the performance gap between English language learners (ELLs) and their English-proficient peers, with ELL students having weaker performance.[18] The share of charter school students who are English Language Learners in New Mexico is 11 percent, and demographic trends in the country point to larger shares over time. The analyses in Figure 19 and Figure 19a can provide important baselines for comparisons over time.

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[18] "National Student Group Scores and Score Gaps," NAEP Mathematics Report Card, https://www.nationsreportcard.gov/math_2017/nation/gaps/?grade=4#?grade=4.

Figure 19: Learning Gains for TPS and Charter ELL Students Compared to TPS Non-ELL Students
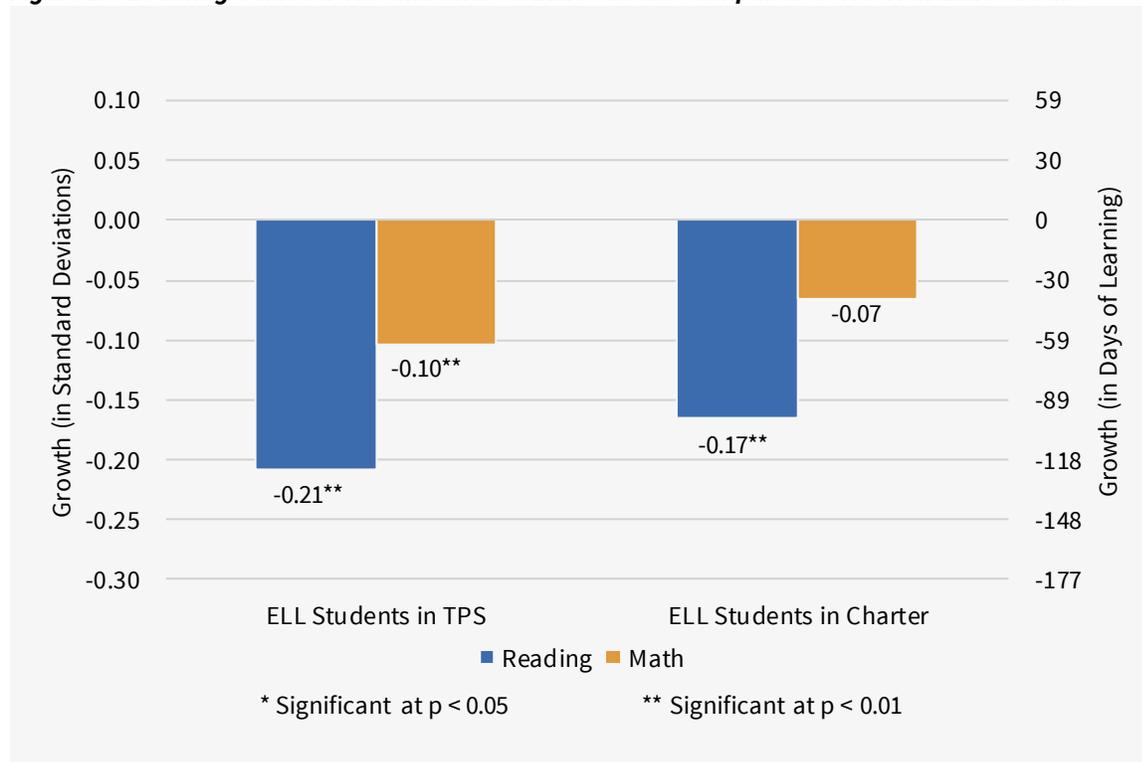
The comparison student for Figure 19 is a TPS student who is English-proficient. English language learners in TPS schools post weaker learning gains in both reading and math relative to non-ELL TPS students, with the disadvantage for TPS ELLs equivalent to 124 fewer days of learning in reading and 59 fewer days of learning in math. Charter school students with ELL designation show 100 fewer days of learning in reading and no significant difference in math gains compared to non-ELL TPS students. When the progress in ELL students is compared across school settings, as displayed in Figure 19a, charter ELL students receive no significant benefit or loss as a result of charter school attendance relative to their TPS ELL peers in either reading or math.

Figure 19a: Relative Learning Gains for Charter ELL Students Benchmarked against Their TPS ELL Peers
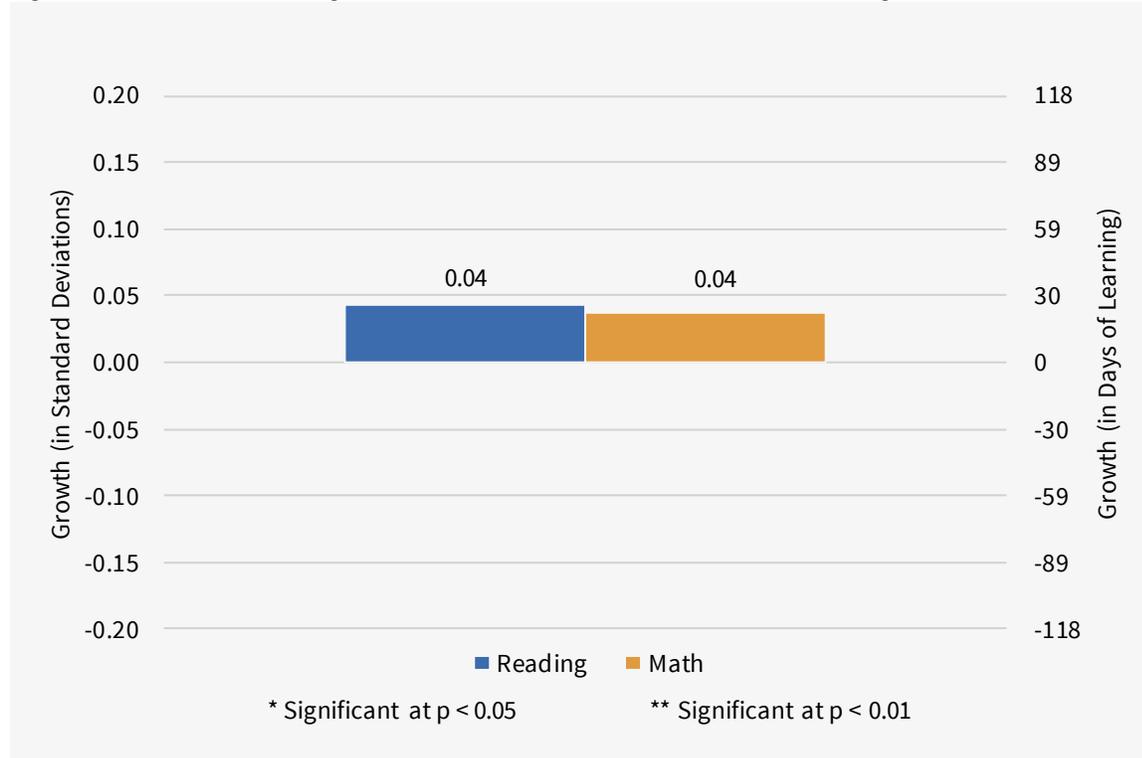
7. School–level Analysis

The numbers reported in the previous sections represent the typical learning gains at the student level across the state; they reveal what would be the likely result if a typical student were enrolled in any of the New Mexico charter schools. The prior results do not let us discern whether some charter schools are better than others. Since school-level results are of interest to policymakers, parents, and the general public, we aggregate charter student performance to the school level for each charter school in the state. This view is necessarily limited to charter schools with sufficient numbers of tested students to make a reliable inference on performance.

Comparative School-Level Quality

It is important to understand the counterfactual used in this section. As shown in Table 1 earlier in the report, the student populations within the typical charter school and their feeder schools differ, making whole-school to whole-school comparisons unhelpful. Here instead, we pool each school's VCRs to simulate "apples to apples" TPS and to serve as the control condition for testing the performance of charter schools. This simulated TPS reflects a precise estimate of the alternative local option for the students actually enrolled in each charter school.

To determine the range of charter school performance, we estimate the annual learning impact of each charter school over the two most recent growth periods (2015-2016 and 2016-2017).[19] The estimated learning impact for each charter school can be positive (statistically different from zero with a positive sign), negative (statistically different from zero with a negative sign), or zero. We use it to infer how the academic quality of a charter school compares to the quality of traditional public schools which students in that charter school would have potentially attended if they had not attended a charter school.

A statistically positive learning impact for a charter school suggests that the charter school has stronger learning growth than the alternative TPS options for its students. A statistically negative learning impact for a charter school implies the school makes less progress than the traditional schools its students would have attended. A zero learning impact means that the charter school and the TPS alternatives for its students have similar performance.

Our total sample consists of 77 schools with reading scores and 62 schools with math scores in the 2015-2016 and 2016-2017 growth periods.[20] Table 4 below shows the breakout of the performance for the included New Mexico charter schools.

Table 4: Performance of Charter Schools Compared to TPS Alternatives in New Mexico

Subject	Significantly Worse		Not Significantly Different		Significantly Better	
	Number	Percent	Number	Percent	Number	Percent
Reading	21	27%	28	36%	28	36%
Math	19	31%	27	44%	16	26%

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[19] We chose to include only the two most recent growth periods in this analysis in consideration of the dynamic growth within some charter schools and to provide the most contemporary picture of performance possible.
[20] As noted in Table 1, charter schools are smaller on average than their corresponding feeder schools. Furthermore, some charter schools elect to open with a single grade and mature one grade at a time. Consequently, care is needed when making school-level comparisons to ensure that the number of tested students in a school is sufficient to provide a fair representation of the school's impact. Our criterion for inclusion is at least 60 matched charter student records over the two growth periods or at least 30 matched charter records for schools with only one growth period.

In reading, 36 percent of New Mexico charter schools perform significantly better than the traditional schooling environments the charter students would have otherwise attended. In math, 26 percent of charter schools perform significantly better than TPS alternatives. The result for reading is superior to the national average in our 2013 national study, where 25 percent of charter schools outperform their TPS counterparts, while the result for math is worse than the national average (29 percent).[21] When looking at weaker performance, 27 percent of New Mexico charter schools have significantly weaker reading results than the local TPS option and 31 percent do so in math. Based on our 2013 national analysis, 19 percent of charter schools pale against the local TPS alternatives in reading and 31 percent do so in math. In reading, 36 percent of New Mexico charter schools have results that do not differ significantly from TPS options in their communities. In math, 44 percent of charter schools have growth performance that is indistinguishable from their TPS alternatives.

Growth and Achievement

While the impacts of charter schools on academic growth relative to their local competitors are informative, we are also interested in how well students perform in absolute terms. Since many of the students served by charter schools start at low levels of achievement, the combination of absolute achievement and relative growth is vital to understanding student success overall.

For each school, the tested achievement of its students over the same two periods covered by the academic growth analysis (2015-2016 and 2016-2017) is averaged and transformed to a percentile within the statewide distribution of achievement.[22] The 50th percentile indicates statewide average performance for all public school students (traditional and charter). A school achievement level above the 50th percentile indicates that the school's overall achievement exceeds the statewide average. We use standard

Graphics Roadmap 3

How to interpret the results in Tables 5 and 6:

There are four quadrants in each table. We have expanded on the usual quadrant analysis by dividing each quadrant into four sections. The value in each box is the percentage of charter schools with the corresponding combination of growth and achievement. The value in the center of each quadrant is the sum of the four sections in that quadrant. These percentages are generated from the 2015-2016 and 2016-2017 growth periods.

The uppermost box on the left denotes the percentage of charters with very low average growth but high average achievement. The box in the bottom left corner depicts low-growth, low-achieving schools.

Similarly, the uppermost box on the right contains the percentage of charters with high average growth and high average achievement. The bottom right corner contains high-growth, low-achieving schools.

The major quadrants were delineated using national charter school data. We would expect the majority of schools to have an effect size between -0.15 and 0.15 standard deviations of growth (the two middle columns). Similarly, we would expect about 40 percent of schools to achieve between the 30th and 70th percentiles. These expectations are based on how we view a normal distribution with the majority of the sample falling within one standard deviation of the mean.

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[21] Cremata et al., *National Charter School Study 2013*.

[22] Average achievement was computed using students' z-scores from the end of the growth period (e.g., spring 2016 and spring 2017). The resulting school-level mean was then converted into a percentile.

deviations discussed above to measure growth. We display each school's achievement and growth in a two-dimensional plot, displayed in Tables 5 and 6.

Table 5: School-Level Reading Growth and Achievement in New Mexico Charter Schools

	Low Growth, High Achievement		High Growth, High Achievement		
	-0.15	0	0.15		
Achievement	0.0%	0.0%	5.2%	5.2%	
		13.0%		42.9%	70th Percentile
	0.0%	13.0%	24.7%	7.8%	
					50th Percentile
	9.1%	13.0%	3.9%	3.9%	
		36.4%		7.8%	30th Percentile
	11.7%	2.6%	0.0%	0.0%	

Growth (in Standard Deviations)

Low Growth,
Low Achievement

High Growth,
Low Achievement
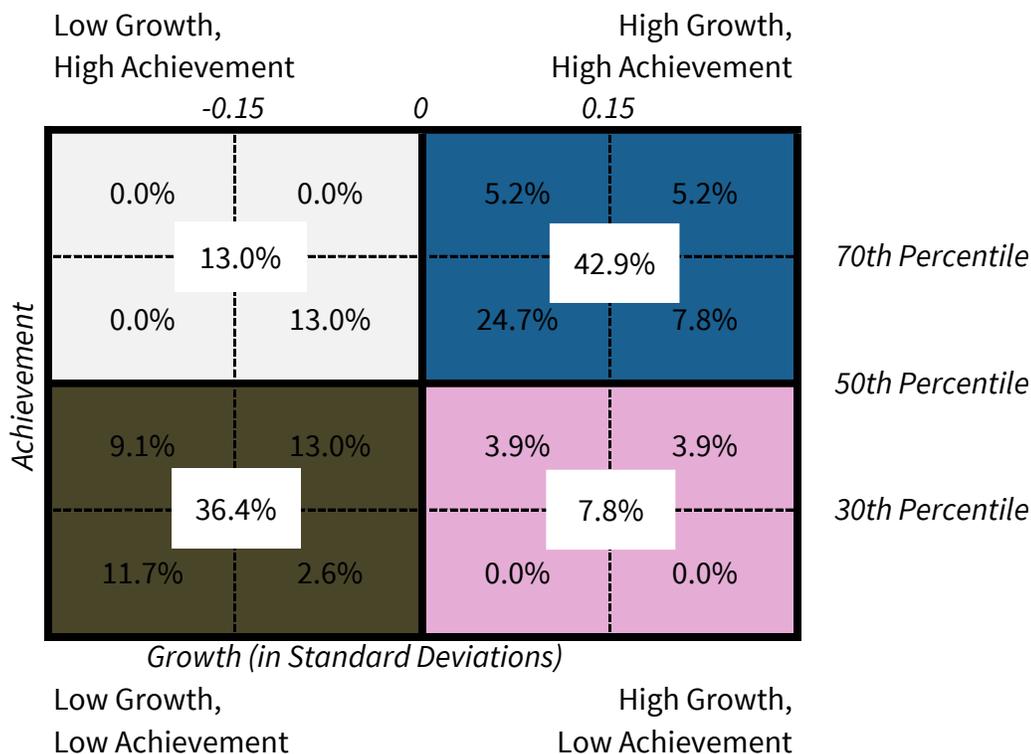
Table 5 presents the reading achievement and growth results for the New Mexico charter schools included in this analysis. In the table, 39 of the 77 New Mexico charter schools (51 percent) have positive average growth compared to their peer schools. (This percentage is the sum of the eight squares in the blue and pink quadrants in the right half of the table.) About 43% percent of charters have positive growth and average achievement above the 50th percentile of the state (i.e., the total for the blue quadrant on the top right). A total of eight percent of charter schools (i.e., the pink box on the bottom right) post above-average gains but remain below the state average in absolute achievement. Over time, if the eight percent of charter schools (i.e., the pink box) maintain or improve their average growth, their achievement would increase, eventually moving them into the blue box.

Nearly half of the schools post smaller learning gains than their peer TPS (the sum of gray and brown quadrants on the left half of the table). If their growth remains steady or worsens, they will fall in the overall distribution of achievement as other schools pull away. Around 44 percent of charters perform below the 50th percentile of achievement (the sum of the brown and pink cells in the lower portion of the table). The area of the greatest concern is the 36 percent of schools (28 schools) that fall into the

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lower left quadrant of the table. These schools are characterized by both low achievement and low growth.

Table 6: School-Level Math Growth and Achievement in New Mexico Charter Schools

	Low Growth, High Achievement		High Growth, High Achievement		
	-0.15	0	0.15		
	0.0%	0.0%	3.2%	11.3%	
	12.9%		**35.5%**		70th Percentile
	1.6%	11.3%	12.9%	8.1%	
					50th Percentile
	11.3%	9.7%	12.9%	0.0%	
	37.2%		**14.5%**		30th Percentile
	9.7%	6.5%	1.6%	0.0%	

Achievement (vertical axis label)

Growth (in Standard Deviations)

Low Growth, Low Achievement   High Growth, Low Achievement
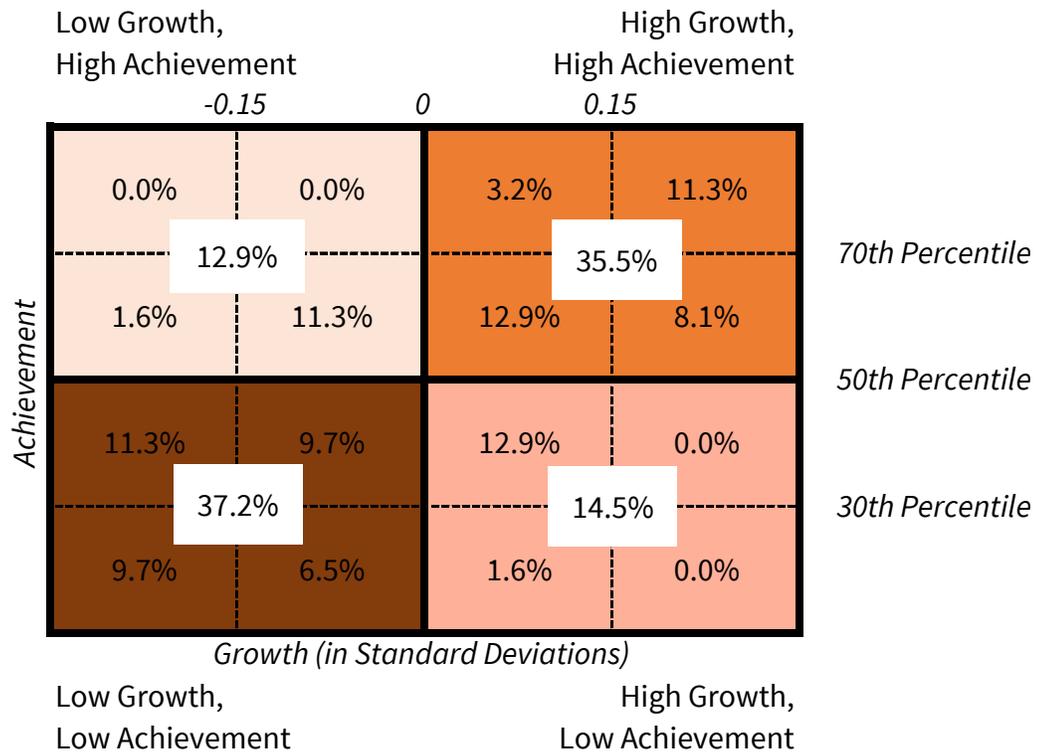
In math, 31 of the 62 New Mexico charter schools (50 percent) have positive average growth in math, as seen in the combined orange and pink quadrants in the right half of Table 6. Approximately 36 percent of charters have positive growth and average achievement above the 50th percentile (the orange quadrant in the upper right of the table). Slightly over half of charters post achievement results below the 50th percentile of the state for math (the sum of cells in the lower half of the table); these percentages are larger than those presented in Table 5 for reading. In the pink quadrant in the lower right of the table, the nearly 15 percent of the schools (9 schools) classified as having low achievement have high growth and appear to be on an upward trajectory. As in the previous table, the schools of the greatest concern are those in the lower left (brown) quadrant that have both low achievement and low growth; they account for 37 percent (23 schools) of the charter schools in New Mexico.

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8. Synthesis and Conclusions

Summary of Major Findings

In this study, we examine the one-year academic progress of students in New Mexico charter schools compared to the gains of identical students in the traditional public schools the students otherwise would have attended. The study employs four years of annual data ending in the 2016-2017 school year, which are used to create three year-to-year measures of progress. The year-to-year measure is referred to as growth or gains. Table 7 presents a summary of the results from the various analyses in this report.

Table 7: Summary of Analysis Findings for New Mexico Charter School Students Benchmarked against Comparable TPS Students

	Reading	Math
New Mexico Charter Students	Similar	Similar
Students in Charters in 2014-2015	Positive	Similar
Students in Charters in 2015-2016	Similar	Similar
Students in Charters in 2016-2017	Similar	Similar
Students in First Year Enrolled in Charter School	Similar	Similar
Students in Second Year Enrolled in Charter School	Similar	Similar
Students in Third Year Enrolled in Charter School	Positive	Similar
Students in Brick-and-Mortar Charter Schools	Positive	Similar
Students in Online Charter Schools	Negative	Negative
Students in Urban Brick-and-Mortar Charter Schools	Positive	Similar
Students in Suburban Brick-and-Mortar Charter Schools	Similar	Similar
Students in Town Brick-and-Mortar Charter Schools	Similar	Similar
Students in Rural Brick-and-Mortar Charter Schools	Similar	Similar
Students in Elementary Charter Schools	Positive	Similar
Students in Middle School Charter Schools	Positive	Similar
Students in High School Charter Schools	Similar	Similar
Students in Multi-level School Charter Schools	Similar	Similar
White Charter School Students	Similar	Similar
Black Charter School Students	Similar	Similar
Hispanic Charter School Students	Similar	Similar
Native American Charter School Students	Similar	Similar
Charter School Students in Poverty	Similar	Similar
Black Charter School Students in Poverty	Similar	Similar
Hispanic Charter School Students in Poverty	Similar	Similar
Native American Charter School Students in Poverty	Similar	Similar
Special Education Charter School Students	Similar	Similar
English Language Learner Charter School Students	Similar	Similar

On average, students in New Mexico charter schools experience similar learning gains in reading and math in a year than their TPS peers during the study window. In reading, charter schools outperform

TPS in the growth period 2014-15 and grow similarly in 2015-16 and 2016-17. In math, the parity in growth between charter schools and TPS persists over the three growth periods.

Comparison of charter school performance in New Mexico across studies demonstrates a trajectory of improvement for the New Mexico charter sector. In our 2009 New Mexico report, charter schools lagged behind TPS in both reading and math. Our 2013 national study showed that charter schools in New Mexico caught up to TPS in reading, while they still underperformed TPS in math. The learning gains of charter schools are comparable to those of TPS in both subjects in the current study.

Beyond the overall results, the analysis probed the consistency of charter school performance in New Mexico over many dimensions. Online and brick-and-mortar charters have distinct physical or geographic boundaries, student profiles, and means of curriculum delivery. Our investigation reveals remarkably weaker growth in both reading and math among online charter students relative to the average TPS VCRs and brick-and-mortar charter students. In fact, the poor performance of online charter schools wipes out the positive impact of brick-and-mortar charter schools in reading.

Within the brick-and-mortar subsector, urban charter school students post stronger growth in reading and similar growth in math compared to their TPS VCRs. Attendance in charter schools or TPS is not significantly associated with learning gains in either subject for suburban, town, and rural students.

Comparison of charter performance by school grade configuration found that students in New Mexico charter elementary and middle schools exhibit stronger growth in reading and similar growth in math as compared to their TPS VCRs. Students in charter high and multi-level schools make comparable progress relative to their TPS peers in both subjects.

The results for demographic subgroups reveal that New Mexico charter schools and TPS exert similar effects on academic learning of students with different characteristics. Breakdown analyses by race/ethnicity indicate that black, Hispanic, and Native American students enrolled in charter schools make similar progress in both reading and math compared to their TPS peers in the same racial/ethnic subgroup. Charter students living in poverty, students with special education designations, and English language learners, also show comparable learning gains relative to their TPS virtual twins in both subjects. It is noteworthy, nevertheless, that parity of New Mexico charter schools and TPS in serving Hispanic and Native American students in this study represents an improvement on the part of the charter sector, as charter school attendance was associated with weaker growth of the two subgroups in both reading and math in our 2009 New Mexico study.

The student-to-student and school-to-school results show variations in the academic impact of charter schools as compared to comparable TPS. The complementary question of whether charter schools are helping students achieve at high levels is also important. Around half of charter schools in New Mexico fall below the 50th percentile in achievement in both reading and math. These outcomes are of course influenced by locational decisions and the starting points of the students they serve. In addition, about 50 percent of charter schools have positive academic growth in both reading and math irrespective of achievement. Some schools below the 50th percentile of achievement have positive growth in reading

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and math. With positive and sustained growth, these schools will likely post achievement gains over time. However, the outlook for a large proportion of charter schools with below-average growth *and* low achievement (36 percent for reading and 37 percent for math) is a source of great concern in New Mexico. Students in these schools will fall further behind their TPS peers in the state academically over time if their negative growth persists.

Implications

Several implications for charter school policies in New Mexico emerge from this study.

There are important positive findings for New Mexico charter schools, which hold considerable learning potential for policy and practice. Over the span of one decade, charter schools have improved academically and caught up with TPS in serving the learning of students, particularly Hispanic and Native American students, the two largest disadvantaged racial/ethnic groups in New Mexico. Also notable is strong reading growth of brick-and-mortar charter schools, especially those located in the urban area. Therefore, there are many schools that can serve as strong examples of academic progress and provide valuable models for all New Mexico schools to emulate. Of special interest are significant shares of schools that show high growth and high achievement. Knowledge transfer and supported replication of these school models could rapidly increase the number of high quality seats in New Mexico.

At the other end of the performance spectrum, greater focus is needed to address charter schools that produce substantially inferior results, such as online charter schools. Urgent attention should be also accorded to the schools that post smaller academic gains than TPS alternatives and below-the-state-average achievement. It takes only a few years of poor academic progress to hinder a student for the rest of the K-12 experience. Rigorous and consistent accountability policies need to be adopted and executed to hold schools accountable for the academic outcomes of their students.

The findings of this study provide rigorous evidence to inform the ongoing debate and decision making about charter schools in New Mexico, especially the balance of autonomy for accountability. At the same time, the current dynamic policy landscape of New Mexico charter sector and public education overall calls for continuous tracking of student learning outcomes in the midst of the changes.

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Appendix A. Number of Observations for All Results

The numbers in the table below represent the number of charter observations associated with the corresponding results in the report. An equal number of VCRs were included in each analysis.

Appendix Table 1: Number of Observations for All Results

Student Group	Matched Charter Student Records	
	Reading	Math
New Mexico Charter Students Tested & Matched	28,528	21,826
Students in Charters in 2014-2015	7,589	6,786
Students in Charters in 2015-2016	9,779	7,042
Students in Charters in 2016-2017	11,160	7,998
Students in First Year Enrolled in Charter School	8,367	6,911
Students in Second Year Enrolled in Charter School	3,048	2,264
Students in Third Year Enrolled in Charter School	1,125	768
Students in Brick-and-Mortar Charter Schools	26,111	19,665
Students in Online Charter Schools	2,414	2,161
Students in Urban Brick-and-Mortar Charter Schools	14,668	11,526
Students in Suburban Brick-and-Mortar Charter Schools	5,392	3,963
Students in Town Brick-and-Mortar Charter Schools	2,497	1,666
Students in Rural Brick-and-Mortar Charter Schools	3,557	2,510
Students in Elementary Charter Schools	5,283	4,536
Students in Middle School Charter Schools	2,513	2,365
Students in High School Charter Schools	4,226	2,450
Students in Multi-level School Charter Schools	16,506	12,475
White Charter School Students	8,686	6,444
Black Charter School Students	366	222
Hispanic Charter School Students	17,916	14,125
Native American Charter School Students	1,208	874
Charter School Students in Poverty	17,297	13,500
Black Charter School Students in Poverty	224	137
Hispanic Charter School Students in Poverty	13,048	10,433
Native American Charter School Students in Poverty	1,009	741
Special Education Charter School Students	2,772	1,931
English Language Learner Charter School Students	3,555	2,759
Grade Repeating Charter School Students	197	173

Appendix B. Technical Appendix

Demographic Composition of Charter Students in the Study

This study examines the performance of students in charter schools who participated in annual accountability testing in New Mexico, occurring in grades 3-8 and in whatever grade the end-of-course (EOC) assessments were taken. The test scores allow us to use a common measure of performance across schools and over time. However, in each growth period of the study, students who are enrolled in non-tested grades are not included in the analysis of performance. This partially accounts for the differences in school and student counts in our analysis data compared to other published figures about the charter school population in New Mexico.

As discussed in the Study Approach chapter, we match tested charter students by period if they can be tracked for two or three periods in the study so as to conform to the new baseline equivalence requirement in the *Procedures Handbook Version 4.0* of What Works Clearinghouse. Appendix Tables 2 to 4 present the student profiles of all and matched New Mexico charter students tested in math in each matching period.

Appendix Table 2: Demographic Composition of Charter Students in the Study: Period 1

Student Group	All Charter Students Tested		Matched Charter Students	
	Number	Percent	Number	Percent
New Mexico Charter Students	20,967		13,754	
% Matched	66%			
Black Students	442	2%	148	1%
Hispanic Students	12,644	60%	8,795	64%
Native American Students	1,141	5%	573	4%
White Students	6,364	30%	4,127	30%
Students in Poverty	12,977	62%	8,596	62%
Special Education Students	2,829	13%	1,334	10%
English Language Learners	2,942	14%	1,761	13%
Grade Repeating Students	1,274	6%	165	1%

Appendix Table 3: Demographic Composition of Charter Students in the Study: Period 2

Student Group	All Charter Students Tested		Matched Charter Students	
	Number	Percent	Number	Percent
New Mexico Charter Students	9,658		5,626	
% Matched	58%			
Black Students	206	2%	53	1%
Hispanic Students	5,762	60%	3,667	65%
Native American Students	481	5%	223	4%
White Students	3,027	31%	1,643	29%
Students in Poverty	5,704	59%	3,417	61%
Special Education Students	1,337	14%	351	6%
English Language Learners	1,345	14%	692	12%
Grade Repeating Students	218	2%	7	0%

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Appendix Table 4: Demographic Composition of Charter Students in the Study: Period 3

Student Group	All Charter Students Tested		Matched Charter Students	
	Number	Percent	Number	Percent
New Mexico Charter Students	4,447		2,446	
% Matched	55%			
Black Students	92	2%	21	1%
Hispanic Students	2,669	60%	1,663	68%
Native American Students	217	5%	78	3%
White Students	1,406	32%	674	28%
Students in Poverty	2,522	57%	1,487	61%
Special Education Students	638	14%	246	10%
English Language Learners	588	13%	306	13%
Grade Repeating Students	31	1%	1	0%

Comparison of Starting Scores of Matched Students and VCRs

The VCR method used in this study of New Mexico provided matches for 79 percent of tested charter students with growth scores in reading and matches for 62 percent of tested charter students with growth scores in math. To assess the quality of the matches, we compare the starting scores of matched charter students and the Virtual Control Records obtained from the matches in both reading and math. The statistical tests of equality of means are shown in Appendix Figures 1 and 2 for math and reading, respectively. We find that the starting scores of matched students and the virtual twins used as points of comparison are almost identical. As matched students and their virtual twins have identical starting points in terms of learning in the beginning of a growth period, we can be confident that any difference in their final scores and therefore their learning growth can be attributed to charter school attendance, as the only observed way in which matched students and VCRs differ is that the former attend a charter school while the latter consist of students attending a traditional public school.

Appendix Figure 1: Comparison of Starting Math Scores of Matched Charter Students and VCRs

```
Two-sample t test with unequal variances
----------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.    Std. Dev.   [95% Conf. Interval]
---------+------------------------------------------------------------------
 Matched |   21,826     .094755    .0062641    .9254276     .082477     .107033
     VCR |   21,826    .0950146    .0062532    .9238189    .0827579    .1072712|
---------+------------------------------------------------------------------
combined |   43,652    .0948848    .0044255     .924613    .0862108    .1035588
---------+------------------------------------------------------------------
    diff |             -.0002596     .008851                -.0176077    .0170886
----------------------------------------------------------------------------
    diff = mean(Matched) - mean(VCR)                              t =  -0.0293
Ho: diff = 0                        Welch's degrees of freedom =  43651.9

    Ha: diff < 0                 Ha: diff != 0                    Ha: diff > 0
 Pr(T < t) = 0.4883       Pr(|T| > |t|) = 0.9766          Pr(T > t) = 0.5117
```

Appendix Figure 2: Comparison of Starting Reading Scores of Matched Charter Students and VCRs

```
Two-sample t test with unequal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
 Matched |  28,528    .1701286    .0035149    .5936803    .1632392    .1770181
     VCR |  28,528     .16989     .003496     .5904818    .1630377    .1767423
---------+--------------------------------------------------------------------
combined |  57,056    .1700093    .0024787    .5920781     .165151    .1748676
---------+--------------------------------------------------------------------
    diff |            .0002386    .0049575               -.0094781    .0099554
------------------------------------------------------------------------------
    diff = mean(Matched) - mean(VCR)                             t =   0.0481
Ho: diff = 0                            Welch's degrees of freedom =  57054.3

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5192       Pr(|T| > |t|) = 0.9616        Pr(T > t) = 0.4808
```

Measuring Academic Growth

With four years of data, each subject-grade-year group of scores has slightly different mid-point averages and distributions. For end-of-course assessments (EOCs) there are only subject-year groups because EOCs are not grade-specific. This means a student takes this assessment after completing the course, no matter what grade he or she is in. In our study, scores for all these separate tests are transformed to a common scale. All test scores have been converted to standardized scores to fit a bell curve in order to allow for year-to-year computations of growth.[23]

When scores are standardized, every student is placed relative to their peers in the entire state of New Mexico. A student scoring in the 50th percentile in New Mexico receives a standardized score of zero, while a standardized score of one would place a student in the 84th percentile. Students who maintain their relative place from year to year would have a growth score of zero, while students who make larger gains relative to their peers will have positive growth scores. Conversely, students who make smaller academic gains than their peers will have negative growth scores in that year.

Models for Analysis of the Charter School Impact

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.[24] 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

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[23] For each subject-grade-year set of scores, scores are centered around a standardized midpoint of zero, which corresponds to the actual average score of the test before transformation. Then each score of the original test is recast as a measure of variation around that new score of zero, so that scores that fall below the original average score are expressed as negative numbers and those that are higher receive positive values.

[24] Julian Betts and Paul Hill, "Key Issues in Studying Charter Schools and Achievement: A Review and Suggestions for National Guidelines," National Charter School Research Project, White Paper Series No. 2, May 2006.

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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, poverty status, special education status, English language learner status, and whether the student was held back the previous year. The literature on measuring educational interventions found that the best estimation techniques must also include controls for the baseline test.[25] Each student's prior year test score is controlled for in our baseline model. Additional controls are also included for year and period (first year in charter, second year in charter, etc.). The study's baseline model is presented below.

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

where the dependent variable is

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

and $A_{i,t}$ is the state-by-test z-score for student i in period t, $A_{i,t-1}$ 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, $C_{i,t}$ is a vector of variables for whether student i attended a charter school and what type of charter school in period t, and $\varepsilon_{i,t}$ 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 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 live in poverty ("charter_black_poverty") and those who do not ("charter_black_nonpoverty").

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.

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[25] Julian Betts and Y. Emily Tang, "The Effect of Charter Schools on Student Achievement: A Meta-Analysis of the Literature," National Charter School Research Project, October 2011.

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 whether 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 was calculated by Dr. Eric Hanushek and Dr. Margaret Raymond based on the latest (2017) 4th and 8th grade test scores from the National Assessment of Educational Progress (NAEP). Using a standard 180-day school year, each one standard deviation (s.d.) change in effect size was equivalent to 590 days of learning in this study. The values in Table 3 are updated from past reports using more recent NAEP scores, which show slower absolute annual academic progress than earlier administrations.[26]

In order to understand "days of learning," consider a student whose academic achievement is at the 50th percentile in one grade and also at the 50th percentile in the following grade the next year. The progress from one year to the next equals the average learning gains for a student between the two grades. That growth is fixed as 180 days of effective learning based on the typical 180-day school year.

We then translate the standard deviations of growth from our models based on that 180-day average year of learning, so that students with positive effect sizes have additional growth beyond the expected 180 days of annual academic progress while those with negative effect sizes have fewer days of academic progress in that same 180-day period.

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[26] Hanushek, Peterson, and Woessmann, "Achievement Growth: International and U.S. State Trends in Student Performance."