

# Tennessee Charter School Performance During and After the COVID-19 Pandemic

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<https://bit.ly/charter-covid>

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## INTRODUCTION

Traditionally, across the United States, most students enroll in their neighborhood school. However, in recent decades, more students are pursuing alternative options including charter schools as school choice continues to expand (Smith et al., 2024; Tong et al., 2023; Zimmer et al., 2021). This trend was accelerated by the COVID-19 pandemic. According to the National Alliance for Public Charter Schools (Veney & Jacobs, 2021), during the 2020-21 school year, charter school enrollment grew by seven percent, the largest increase recorded in the last decade. Tennessee's charter school landscape is emblematic of this growth. The state started with a handful of schools in the early 2000s and has grown to a total of over 100 charter schools statewide for the 2022-23 academic year serving approximately 4.44% of the state's public school student population. Most of Tennessee's charter schools reside in two large geographical urban areas with over 30 and over 70 charter schools, respectively. Approximately 20% of students in both urban areas attended a charter school in 2022-23.

While the number of students attending charter schools in Tennessee has substantially increased, it is unknown how students in charter schools performed academically during the COVID-19 pandemic. Charter schools generally have more autonomy instructionally and structurally and therefore, theoretically, they may have been better positioned to pivot during the pandemic to serve students. While the evidence is clear that students generally experienced learning loss during

## KEY FINDINGS

1. During the pandemic (in 2020-21) the performance of the charter school students was generally on par with traditional public school (TPS) students. During this period, the only detectable difference was the slightly higher English performance of charter school students in the broader geographical Nashville region.
2. Post-pandemic (in 2021-22 and 2022-23), charter school students consistently outperformed TPS students both statewide and in the broader Nashville region. In the broader geographic Memphis region, the charter school student performance was largely on par with comparable TPS students.
3. For elementary and middle school students, charter schools performed on par with TPS students in the pandemic year of 2020-21. For the post-pandemic academic years, elementary and middle school students at charter schools outperformed TPS students by a statistically significant margin. However, charter high school students performed on par with TPS students in all years considered.

the pandemic (Fahle et al., 2023; Goldhaber et al., 2023; Relyea et al., 2022; Sass & Ali, 2022), it is important to understand how this differed for students across various school types, including charter schools. In this research brief, we examine the extent to which student achievement in charter schools changed during and after the pandemic relative to traditional public schools (TPSs). In future research briefs, we will examine whether enrollment patterns changed across charter schools and TPSs as well as the various strategies these schools used to address learning loss and how these strategies relate to student achievement.

## DATA

We use longitudinal student-level data from 2017-18 through 2022-23 school year provided by the Tennessee Department of Education. The dataset includes a unique student identifier with the school(s) students attend, the respective grades, and math and English test scores from the state's standardized assessments.<sup>1</sup> The test scores are converted into standardized units by subject, grades, and years, which allows us to have a common metric across years and grades. In addition, we have student gender, race/ethnicity, special education, English as a second language, and economic disadvantage status.

## RESEARCH APPROACH

For our analysis, we estimate the performance of students attending charter schools relative to students attending TPSs for the three academic years of 2020-21, 2021-22, and 2022-23. For this study, we refer to the 2020-21 year as “during the pandemic” and the 2021-22 and 2022-23 years as “post-pandemic.” For all analyses, we estimate the effect both statewide and separately for schools in the two urban areas

containing the largest number of charter schools – the broader geographical Nashville and Memphis regions. Each of these regions encompass charter schools from multiple districts and authorizers, inclusive of the Tennessee Public Charter School Commission, the Achievement School District, Metro Nashville Public Schools, and Memphis-Shelby County Schools.<sup>2</sup>

To account for differences in student populations attending charter schools relative to TPSs, we use regression models in combination with inverse probability weighting based on propensity score matching estimates of the likelihood of TPS students attending charter schools. In doing so, the analysis gives greater weight to students in the comparison group who most closely resemble charter school students based on student demographic characteristics and baseline test scores. In addition, we compare charter students to TPS students in the same region and same grade to improve the comparability within the analysis.

Important to this approach is a strong control for baseline performance. In our case, we include individual students' baseline test scores and their respective schools' average test score in the baseline year. In estimating for the 2020-21 school year, we use 2018-19 math and English test scores as the baseline test scores. For the 2021-22 and 2022-23 school years, we use math and English test scores in the 2020-21 school year as the baseline test scores. Given these lags, we ultimately include students in grades 5-12 in the 2020-21 and 2022-23 analyses and students in grades 4-12 in the 2021-22 analyses. More details of the analytical approach can be found in the technical appendix.

<sup>1</sup>Like other states, Tennessee did not administer a statewide test in the 2019-20 academic year because of pandemic-related school closures in the spring of 2020.

<sup>2</sup> We refer to urban areas and regions synonymously, based on the geographical location of the school.

## RESULTS

In Figure 1, we display the results of the math and English achievement analysis both for charter school students statewide and separately for the broader Nashville and Memphis regions. The first set of bars shows the performance of students in charter schools relative to similar TPS students for the 2020-21 school year, which we define as during the pandemic. The second and third set of bars shows the same comparisons for the 2021-22 and 2022-23 school years, which we define as post-pandemic.

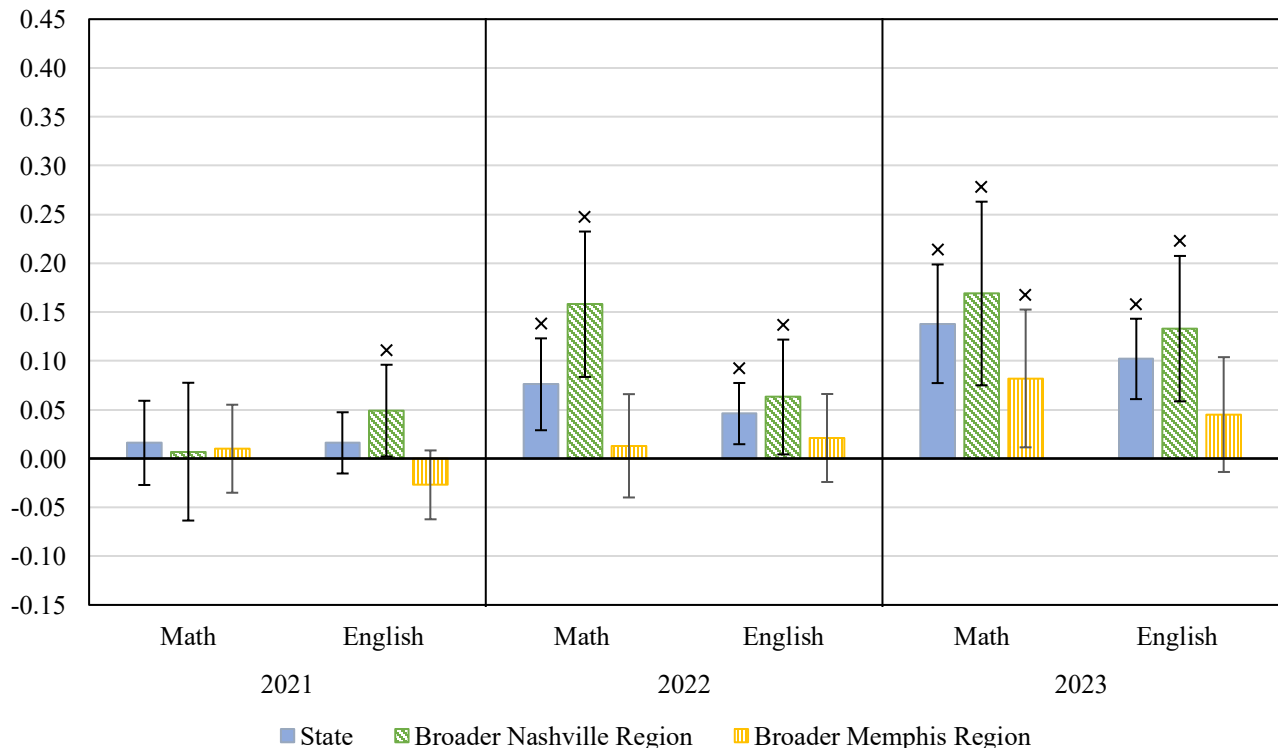
During the pandemic (in 2020-21), the performance of charter school students was generally on par with TPS students. During this period, charter school students in the broader Nashville region demonstrated a slight, statistically significant, positive effect in English. No other estimate statewide or in either region was statistically distinguishable from the performance of comparable TPS students. Overall, these results do not

imply that students were not experiencing learning loss in charter schools. Rather, it means that the learning loss of charter school students was similar to the learning loss of TPS students.

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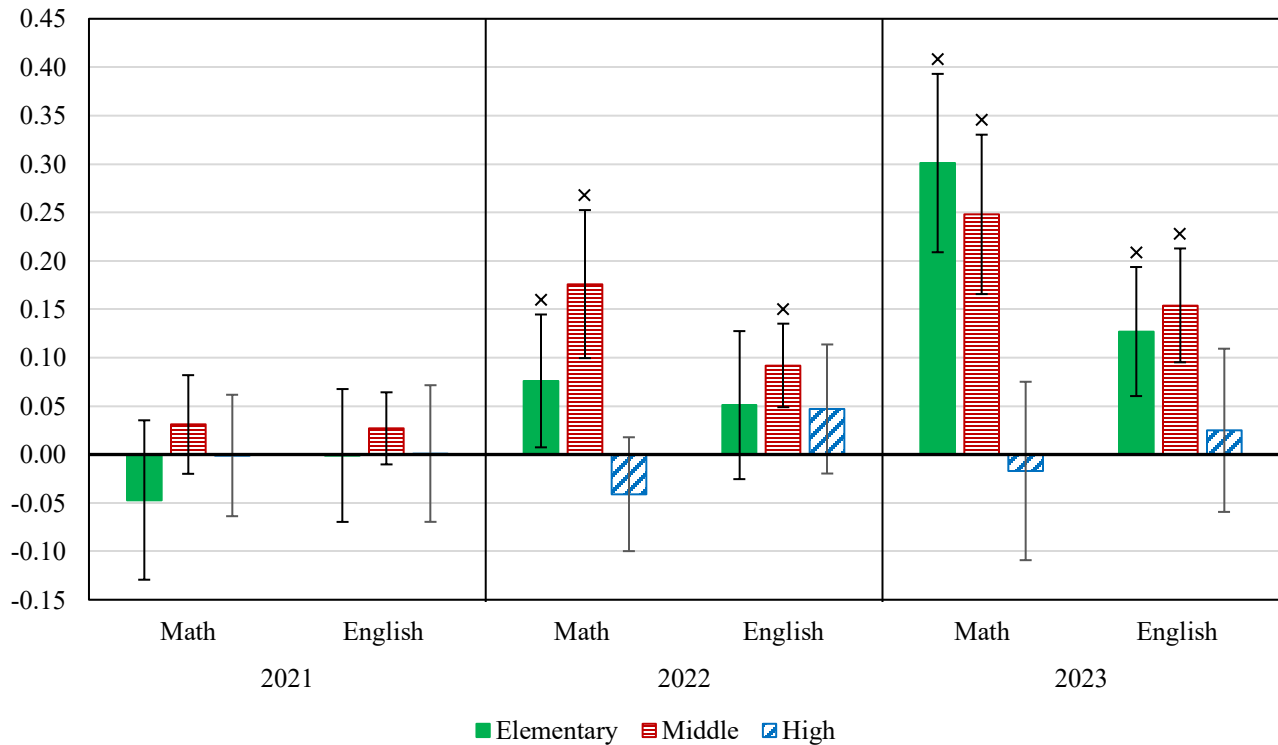
Post-pandemic (in 2021-22 and 2022-23), charter school students consistently outperformed TPS students both statewide and in the broader Nashville region. The statewide effect estimates range from 0.05 to 0.14 standard deviations. The broader Nashville region estimates ranged from 0.06 to 0.17 standard deviations. In the broader Memphis region, charter school student performance was largely on par with comparable TPS students; only the estimate for math

Figure 1. Performance of Charter School Students Relative to Traditional Public School Students During and Post-Pandemic



Notes: 95% confidence intervals are displayed for each estimate. We indicate a statistically significant effect with an X

Figure 2. Performance of Charter School Students by School Level



Notes: 95% confidence intervals are displayed for each estimate. We indicate a statistically significant effect with an X

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in the 2022-23 school year was statistically different from TPS students by 0.08 standard deviations. To put these effect estimates in context, an increase of 0.10 standard deviation units is roughly equivalent to increasing student performance from the 50<sup>th</sup> to the 54<sup>th</sup> percentile.

In Figure 2, we further break down the statewide trends to show the results for elementary, middle, and high school students. For elementary and middle school students, the results are largely consistent with the overall statewide results that highlight students at charter schools performed on par with TPS students in the pandemic year of 2020-21. For the post-pandemic academic years, elementary and middle

charter school students outperformed TPS students by a statistically significant margin. However, charter high school students performed on par with TPS students in all years considered.

Overall, at the state level, the results generally suggest that charter students are on par with TPS students during the pandemic period but outperform comparable TPS students post-pandemic. The positive results during the post-pandemic years are at least partially driven by the strong performance in the broader Nashville region, as charter students in this region outperformed TPS students in both subjects in both years. Similarly, the overall positive achievement effects for charter students are primarily driven by strong elementary and middle school performance.

For the post-pandemic academic years, elementary and middle school students at charter schools outperformed TPS students... charter high school students performed on par...

## CONCLUSION

While prior studies of student achievement have drawn mixed conclusions on the effects of charter schools (Zimmer et al., 2021), nearly all of this research was conducted pre-pandemic. At present, little is known about how charter schools performed during or post-pandemic. In this research brief, we examined the performance of charter school students in Tennessee both statewide and in the two regions where the majority of charter schools reside, separately. While the performance of charter school students statewide was on par with TPS students during the pandemic, charter school students outperformed TPS students in post-pandemic periods. This trend was driven by the strong performance of charter schools in the broader Nashville region and elementary and middle school students.

Given that students generally experienced learning loss during the pandemic, these results suggest that lessons can be learned from Tennessee's charter sector on how to best approach recovery. Our results suggest that it is important to conduct additional research to explore the operation of charter schools, especially those in the broader Nashville region and elementary and middle charter schools, to understand schools' practices that drove these results. In doing so, hopefully, all schools can learn from charter school practices that are helping to address pandemic learning loss.

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## TECHNICAL APPENDIX

For our analysis, we compare charter school students to TPS students within the four urban areas of Tennessee that have charter schools – Nashville, Memphis, Chattanooga, and Knoxville. In addition to charter schools authorized by the primary school districts in these areas (Metro Nashville Public Schools, Memphis-Shelby County Schools, Hamilton County Schools, and Knox County Schools), charter schools authorized by the state’s Achievement School District and the Tennessee Public Charter School Commission that also reside in these regions were included in the analysis based on these geographical locations. To ensure that results were not skewed by the performance of opening or closing schools, our sample only includes schools that were open for all academic years included in the analysis (2017-18<sup>4</sup> through 2022-23). At the student-level, we also understand that some students made enrollment decisions during and after the pandemic based on school performance or policies as a result of the pandemic. To avoid confounding the performance of charter schools with effects of the pandemic (through student transfer decisions), we excluded all students who made non-structural changes between schools (i.e., switching schools when the switch is not required as a result of completing the highest grade in the school) or switched between the charter and TPS sector after the start of the pandemic. Students in magnet, virtual, alternative, and optional enrollment schools were also excluded.<sup>5</sup>

Amongst the students included in our sample, we calculated propensity scores for attending a charter school and applied inverse probability weighting to increase the comparability of TPS and charter students (Imbens & Woolridge, 2009; McEachin et al., 2020; Willet & Murnane, 2011). Specifically, we assigned weights to students based on their probability of attending a charter school as opposed to a TPS.

These probabilities were obtained through the estimation of the following logistic regression:

$$Charter_{it} = \beta_0 + \beta_1 math_{it-n} + \beta_2 English_{it-n} + \beta_3 X_i + \varepsilon_i$$

This model includes the treatment as the outcome (i.e., a student attending a charter school) and student characteristics that predict attending a charter school as covariates. The covariates include students’ baseline standardized test scores in math and English. In estimating for the 2020-21 school year, we use 2018-19 math and English test scores as the baseline test scores. For the 2021-22 and 2022-23 school years, we use math and English test scores in the 2020-21 school year as the baseline test scores. In addition to prior achievement, the model includes a vector of student characteristics ( $X_i$ ) including a student’s gender, race/ethnicity, economic disadvantage, special education status, English as a second language status, grade, and region.

Propensity scores were estimated for each analytic sample (across all four regions, the broader Nashville region only, the broader Memphis region only, elementary schools, middle schools, and high schools) separately. This separation supported the best balance of covariates between TPS and charter school students for each analysis. Propensity score estimation was limited to students who had complete data on all covariates, including baseline test scores. Given that mandated standardized testing begins in third grade, the 2020-21 and 2022-23 analyses were restricted to 5<sup>th</sup> graders and up due to a two-year lapse from the baseline to analytic year. For the 2021-22 analysis, there was only a one-year lapse between the baseline and analytic year which allowed the inclusion of 4<sup>th</sup> graders as well.

<sup>4</sup> While our main analyses do not include outcomes from 2017-18, we use this sample criteria to ensure that we are not capturing charter school effects within their first year, in which lower performance is expected.

<sup>5</sup> Results are robust to the inclusion of these students and schools.

For students in each sample, the predicted values from the model returned propensity scores that indicated the probability that a student would attend a charter school. These propensity scores ( $P(X_i)$ ) were used in the following equation to estimate inverse probability weights for TPS students:

$$w_i = \frac{P(X_i)}{1 - P(X_i)}$$

This estimation procedure gives more weight to TPS students who have larger propensity scores, or in other words, look more like charter school students. Along with the weights for TPS students, all charter school students were assigned a weight equal to 1.

To ensure reliability of our estimates, we employed a trimming procedure that excludes students, both TPS and charter, who have an estimated propensity score greater than 0.9. This cut-off is consistent with the upper bound from Crump et al.'s (2009) rule of thumb for trimming. We additionally tested our analysis with trimming at the recommended lower-bound of 0.1 and found that the results were not sensitive to the specification change.

Through the weighting of included students, the samples of charter school and TPS students become more similar based on demographics and baseline achievement. While propensity score approaches assume that weighting on these observable characteristics makes the outcomes independent of treatment status, it is notable that unobservable characteristics may exist that correlate with both student outcomes and charter school enrollment. To the extent that these unobservable characteristics differentiate charter and TPS students, the effect estimates based on propensity scores will be biased. While it is not possible to assess for differences among unobservable characteristics, we conducted balance checks to ensure that the treatment group and the comparison group are similar on observable

characteristics. Appendix Table 1 shows student characteristics before and after weighting for analyses conducted with all of Tennessee's students.<sup>6</sup> As designed, the weighting approach significantly reduces observable differences in student characteristics among charter school and TPS samples.

We utilized a doubly robust approach by then estimating the average treatment effect on the treated with the following ordinary least squares linear regression integrating the inverse probability weights and controlling for student characteristics:

$$Y_{igrt} = \beta_0 + \beta_1 T_{is} + \beta_2 Y_{igt-n} + \beta_3 Z_{st-n} + \beta_4 X_i + l_g + d_r + \varepsilon$$

The outcome  $Y_{igrt}$  represents the standardized test score for student  $i$  in grade  $g$  in school  $s$  in region  $r$  in year  $t$ . We examine performance in math and English separately for academic years 2020-21, 2021-22, and 2022-23. For each analysis, the corresponding baseline test score ( $Y_{igt-n}$ ) is included as a predictor along with an indicator for a school's average standardized test score in the given subject in the baseline year ( $Z_{st-n}$ ). School baseline achievement is added as a predictor to account for the educational setting that students are situated in, which can affect subsequent achievement. Additionally, the estimation procedure includes the same vector of student characteristics used in the estimation of propensity scores. Fixed effects for grade ( $l_g$ ) and region ( $d_r$ ) are utilized in the estimation procedure to ensure that treatment effects reflect a comparison amongst students in the same grade and region. The treatment effect of attending a charter school is provided by the coefficient of  $T_{is}$  in each analysis and can be interpreted as the difference in charter school students' standardized test scores attributable to attending a charter school rather than TPS. We checked the sensitivity of the results by changing several inclusion criteria (e.g., including magnet students and exclusion of schools that closed) and procedural elements (e.g., imposing common

<sup>6</sup> We also checked for balance in the analyses limited to the broader Nashville region, the broader Memphis region, elementary school students, middle school

students, and high school students. Weighting also yielded better balances in these groups. Results are available upon request.

support instead of trimming, setting an earlier baseline year, evaluating intent to treat, and using one-to-one matching instead of weighting). The results of all

sensitivity analyses were consistent with those of the primary models, providing confidence in the findings.<sup>7</sup>

## APPENDIX

*Table 1. Covariate balance for state sample*

|                                     | Covid (2021)  |               |                 |        |                    |        | Post-Covid (2022) |               |                 |        |                    |        | Post-Covid (2023) |               |                 |        |                    |        |
|-------------------------------------|---------------|---------------|-----------------|--------|--------------------|--------|-------------------|---------------|-----------------|--------|--------------------|--------|-------------------|---------------|-----------------|--------|--------------------|--------|
|                                     | Unweighted    |               | Math - Weighted |        | English - Weighted |        | Unweighted        |               | Math - Weighted |        | English - Weighted |        | Unweighted        |               | Math - Weighted |        | English - Weighted |        |
|                                     | Charter       | TPS           | Charter         | TPS    | Charter            | TPS    | Charter           | TPS           | Charter         | TPS    | Charter            | TPS    | Charter           | TPS           | Charter         | TPS    | Charter            | TPS    |
| Female                              | <b>50.95%</b> | <b>48.69%</b> | 51.80%          | 52.08% | 51.81%             | 52.31% | <b>51.36%</b>     | <b>48.96%</b> | 52.03%          | 52.18% | 51.71%             | 52.12% | <b>50.99%</b>     | <b>48.63%</b> | 51.22%          | 51.83% | 51.00%             | 51.75% |
| Race                                |               |               |                 |        |                    |        |                   |               |                 |        |                    |        |                   |               |                 |        |                    |        |
| Hispanic                            | 26.17%        | 21.01%        | 30.20%          | 29.05% | 30.92%             | 29.28% | 27.62%            | 23.35%        | 30.14%          | 28.31% | 30.19%             | 28.51% | 28.42%            | 25.04%        | 34.15%          | 32.15% | 32.46%             | 31.35% |
| Black                               | <b>62.93%</b> | <b>36.57%</b> | 56.88%          | 59.26% | 55.85%             | 58.80% | <b>61.86%</b>     | <b>32.51%</b> | 58.41%          | 61.07% | 58.19%             | 60.43% | <b>61.53%</b>     | <b>29.71%</b> | 54.20%          | 57.24% | 56.14%             | 57.80% |
| Asian                               | <b>1.06%</b>  | <b>3.02%</b>  | 1.32%           | 1.22%  | 1.38%              | 1.20%  | <b>1.02%</b>      | <b>3.16%</b>  | 1.19%           | 1.09%  | 1.24%              | 1.14%  | <b>1.01%</b>      | <b>3.30%</b>  | 1.32%           | 1.21%  | 1.36%              | 1.21%  |
| Native American                     | <b>0.13%</b>  | <b>0.40%</b>  | 0.11%           | 0.11%  | 0.11%              | 0.11%  | <b>0.11%</b>      | <b>0.45%</b>  | 0.10%           | 0.10%  | 0.10%              | 0.11%  | <b>0.18%</b>      | <b>0.49%</b>  | 0.18%           | 0.18%  | 0.17%              | 0.19%  |
| Native Hawaiian or Pacific Islander | <b>0.04%</b>  | <b>0.19%</b>  | 0.03%           | 0.03%  | 0.04%              | 0.03%  | <b>0.04%</b>      | <b>0.22%</b>  | 0.05%           | 0.04%  | 0.05%              | 0.05%  | <b>0.05%</b>      | <b>0.25%</b>  | 0.07%           | 0.07%  | 0.09%              | 0.07%  |
| Economically Disadvantaged          | <b>56.10%</b> | <b>40.75%</b> | 53.36%          | 54.59% | 53.70%             | 55.45% | <b>48.83%</b>     | <b>34.28%</b> | 48.02%          | 48.93% | 48.42%             | 49.40% | <b>47.59%</b>     | <b>31.65%</b> | 44.63%          | 45.46% | 45.53%             | 46.52% |
| Special Education                   | <b>10.42%</b> | <b>11.73%</b> | 10.16%          | 9.99%  | 9.72%              | 9.97%  | <b>10.33%</b>     | <b>11.91%</b> | 9.89%           | 9.76%  | 9.67%              | 9.95%  | <b>10.78%</b>     | <b>12.41%</b> | 10.52%          | 10.40% | 10.18%             | 10.67% |
| English Second Language             | 10.21%        | 11.23%        | 9.55%           | 9.45%  | 9.45%              | 9.02%  | 11.19%            | 13.40%        | 10.12%          | 9.82%  | 9.71%              | 9.69%  | 11.59%            | 15.05%        | 10.26%          | 9.86%  | 9.25%              | 8.60%  |
| Baseline Math Score                 | -0.217        | -0.178        | -0.199          | -0.256 | -0.183             | -0.246 | <b>-0.479</b>     | <b>-0.210</b> | -0.459          | -0.499 | -0.458             | -0.499 | <b>-0.484</b>     | <b>-0.187</b> | -0.457          | -0.502 | -0.467             | -0.511 |
| Baseline English Score              | -0.323        | -0.187        | -0.308          | -0.351 | -0.295             | -0.322 | <b>-0.379</b>     | <b>-0.176</b> | -0.359          | -0.395 | -0.342             | -0.375 | <b>-0.366</b>     | <b>-0.173</b> | -0.340          | -0.376 | -0.350             | -0.361 |

Note: Statistically significant differences at the 5% level are bolded. Results for binary variables are represented in percentage of the sample with the given characteristics. Results for continuous variables represent mean values.

<sup>7</sup> The full results, robustness checks, and greater details of all analyses can be found in a technical paper at: <https://bit.ly/charter-covid>