Examining the Relationship between Charter Competition, Teacher Quality, and School Resources on Ohio's Reading Achievement

Percy Jenkins[1,*], Kim Love[2]

[1]Liberty University, Lynchburg, VA, USA
[2]K. R. Love QCC, Athens, GA USA
*Corresponding author: Pjenkins14@Liberty.edu

Abstract The purpose of this article is to examine the relationships between charter competition, teacher quality, and school resources on reading achievement. According to the market-based theory, the threat that charter competition poses should encourage traditional public schools to adopt policies and practices that lead to increased student achievement. A linear mixed-effects model was used to analyze district and building-level date to determine which variable(s) presents as the best predictor of reading achievement in Ohio. The sample consisted of 293 schools from four districts between 2005 and 2017. The findings suggest that as the charter school to public school ratio increases in a district, the reading achievement of students attending traditional public schools decreases; when the average reading proficiency for charter schools increases in a district, traditional public students demonstrate higher reading proficiency; the focus on teachers with a highly qualified certification does not lead to increased reading performance scores; and that after accounting for other predictors, the amount of per-pupil funding allocated for curriculum and instruction are significantly related to reading achievement at the elementary level but not at middle school level.

Keywords: charter schools, student achievement, school choice, market-based theory

Cite This Article: Percy Jenkins, and Kim Love, "Examining the Relationship between Charter Competition, Teacher Quality, and School Resources on Ohio's Reading Achievement." *American Journal of Educational Research*, vol. 9, no. 3 (2021): 133-141. doi: 10.12691/education-9-3-7.

1. Introduction

Advocates of school reform have encouraged school choice and competition between schools since the early to mid-1900s [1]. The idea of school vouchers came about during the 1970s [2]. In 1983, an assessment of the K-12 education system in America titled A Nation at Risk indicated that "The educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and as a people" [3]. Students' poor performance reported by [3] may have been the primary impetus prompting Minnesota to become the first state to authorize charter schools in 1991 [4,5,6]. While the first charter school did not open until 1992, there are now more than 7,000 charter schools serving approximately 3.2 million students [7,8]

Alfred Marshall's market-based competition theory is often considered the primary justification for providing families a charter school option [9]. Marshall's philosophy suggests that organizations producing similar products "impacts the efficient allocation of scarce resources and therefore impacts the optimality of the market system as a whole" [[9], p.1]. For example, in the educational market, charter schools impact society as a whole and America's educational system, financially and demographically. Since charter schools in many states receive the same per-pupil funding as allocated for Traditional Public Schools (TPS), students departing the traditional setting for charter schools impacts local school funding, affecting staffing and student resources [4]). Furthermore, whether intended or not, charter schools often lead to a re-segregation of schools [10,11]. Reference [10] found that in 75 percent of states, "black students are overrepresented in charter schools" (p. 362). Consequently, the picture of diversity typically associated with public schools has changed significantly [10].

When applying this theoretical perspective to the educational environment as in this study, one would expect the independent variable, school type (charter or traditional public school) to influence or explain the dependent variable (students' reading achievement). Based on the tenets of the theory, the loss of students to competing charter schools should cause TPS to operate more efficiently and increase the level of services they provide to encourage students to remain in a traditional setting. In essence, TPS will adopt policies designed to increase student achievement, which will allow them to be competitive in the educational market. Since these policies

may be based on "how and why" student achievement will improve, [12] stressed, "scrutinizing policy theory is especially valuable" (p. 523). Although it has been more than 23 years since City Academy High School became the first charter school to open, there is limited research-based evidence to confirm whether a theory that has proven effective in the economic market is successful in the educational market [13].

The purpose of this study was to examine whether the relationships between the independent variables (charter competition, teacher quality, and school resources) and the dependent variable of interest (student reading achievement on statewide assessments in TPS) allows educational stakeholders to predict students' academic performance on standardized assessments reliably. While all Ohio's TPS are required to participate in the Ohio Achievement Assessment (OAA) each school year, only elementary and middle schools from 4 of Ohio's 8 challenged public school districts were examined. According to [14] new charter schools can only be established in challenged districts.

2. Literature Review

Because of the desire to offer educational choices, The State of Ohio has a charter school program, known as EdChoice, that is linked directly to school accountability and a school voucher program that allow students from underperforming public schools to attend private or religious schools [15,16,17]. While eligibility requirements have changed since the EdChoice program was initially approved in 2005, eligible students' primary prerequisite of attending underperforming schools remains [16,17]. Like in many other states, Ohio's policy-makers hypothesized that the competition from alternative school choices would influence TPS to make improvements that will translate to increased student achievement [5,15,18] Based on this hypothesis, there is an assumption that charter schools are as effective as TPS. Linick [18] emphasized how the focus of most studies on the competitive impact of charter schools tended to compare the academic achievement of students attending charter schools to students in TPS. However, concerns have long existed among some researchers regarding the validity of results comparing academic achievement because many researchers fail to control for extraneous factors that may also contribute to student achievement [15].

Similarly, research on school choice's systematic effect often examines variables that are endogenous and poor indicators of a competitive environment [19]. Studies examining the competitive impact of school choice on the academic achievement of TPS is limited, and the available research has found mixed results [6,8,15,20]. Carpenter and Medina [21] suggest that one of the reasons for the limited research in this area is that most scholars conduct studies related to the benefits of school choice, the impact on segregation or stratification, academic achievement within charter schools, and academic achievement of charter students compared to students attending TPS. Given these methodological issues and limited current research, this study's primary purpose is to examine

whether competition from charter schools is a valid predictor of students' reading achievement in TPS.

2.1. Charter Schools

When examining academic achievement levels of students attending charter schools to those attending TPS, researchers also are investigating the effectiveness of charter schools or charter school systems. Considering the impact that these unregulated public entities known as charter schools have on resources typically allocated for TPS, it is natural for researchers and educators, parents, and politicians to desire information validating or invalidating their effectiveness. Given the ongoing scrutiny of charter schools, since 1993, the Center for Education Reform (CER) has worked to achieve its mission of increasing educational opportunities for all Americans [22]. CER publishes a document each year that uses a letter grade and classification to rank states by the strength of charter school's legislation [23]. States in which statutes promote charter schools' development are considered more favorably than states in which laws provide charter schools with less autonomy to operate as they choose [23].

In 2012, to aid parents in making an informed decision with school choice options and to provide resources parents can use to advocate for increased reform options, CER began providing parents with what is known as the "Parent Power Index" [24,25]. Each state receives an index score based on the level of access parents have to school choice regardless of the families' social-economic status or their children's academic abilities [24]. More than a decade later, the CER stresses the importance of strong state legislation [26]. The CER indicates that "The states and cities with the most innovative, high performing charters are those that protect the main principles of charter schooling – autonomy in exchange for accountability – with strong laws and sound implementation of those laws" [[26], p. 6]. According to CER [24], Florida, Indiana, and Arizona, with Power Indexes of 86%, 84%, and 83% respectively, were the top three states providing parents with the ability to "drive changes in how students are educated and how schools operate" [[24], p. 1].

2.2. School Resources

As with any business, the level of success achieved is often influenced by one's ability to obtain and allocate resources to support that business. Given the market-based theory of competition, some may question whether schools are businesses. According to the educational and business consultants at edTactics, since schools desire to offer quality products, regularly communicate with stakeholders, and consider the community's desires and needs, schools are like businesses [27]. While there may be significant differences in how businesses and schools operate, as a "business-like entity," schools that are not financially stable are unlikely to be able to provide the best possible products. When discussing their fairness of school funding report, Baker, Farrie, and Sciarra [28] indicates that school funding is significant because it impacts the "availability and level of resources" (p. 1).

Although this is the case, many states continue to inadequately fund schools, especially those that serve economically disadvantaged students, students with disabilities, and students with limited English proficiency [28].

Although the Elementary and Secondary Education Act (ESEA) provides federal funding to states, the U.S. Constitution mandates that the funding of public K-12 education is the responsibility of each state [29]. Baker et al. [28] was a national study that assessed the fairness of state funding based on schools' abilities to provide equal educational access to all students. While the report rated states on several components each year from 2011 to 2015, this study's primary measure of interest was the 2015 fairness funding level. In 2015, the states with the top three per-pupil expenditures, ranked in order from 1st to 3rd, were New York, Alaska, and Vermont with per-pupil funding of $18,719, $18,568, and $18,188 respectively [28]. In some cases, student funding in these states was an average of $10,000 more than funding in other states. Ohio, the state of interest for the current study, was the 15th ranked state with a funding level of $11,547 [28]. Regarding within-state differences, an examination of per-pupil funding ratios between high poverty and low poverty schools was as much as $16,000 [30]. Even more disconcerting, the federal funding allocated to states via ESEA is not adequate to close the funding gaps between districts or states [30]. As mentioned above, the reports provide insight into the financial stability or instability of educational systems nationally.

2.3. Teacher Qualifications

Stakeholders often view high academic achievement and increased student achievement as the primary indicator(s) of an individual school or district's quality. Researchers Hirsch, Koppich, and Knap [31] emphasize how teaching quality, at that time, had become the "third wave" of educational reform (p. 2). Early reform efforts tended to focus on the development of rigorous curriculums, providing more structure for teachers and the restructuring of schools [30]. This "third wave" of reform focused on "improving the quality of teaching" by providing "more relevant professional development" to increase teacher preparedness and, ultimately, the development of higher quality teachers [[31], p. 2]. While individual states were developing policies and procedures that only impacted their students, the federal government continued implementing legislation such as No Child Left Behind [32] that mandated requirements for all students. The authors of NCLB [32] may have been guided by researchers such as Darling-Hammond [33], Kaplan & Owings [34], and Wenglinsky's [35] findings suggesting positive correlations between teacher qualifications and student achievement. As such, NCLB [32] included a mandate requiring states to outline "the specific steps the State educational agency (SEA) will take to ensure that both school-wide programs and targeted assistance schools provide instruction by highly qualified instructional staff" (p. 29).

In 2015, President Barack Obama signed the Every Student Succeeds Act (ESSA), which prompted amendments to the Elementary and Secondary Education Act of 1965 [36]. The changes discontinued seven NCLB provisions, one of which was the requirement to hire highly qualified teachers [37]. While a designation of highly qualified is no longer required, ESSA Title II, Part A indicates a goal of providing minority students and students from low-income families equitable access to "effective teachers, principals, and other school leaders" [[38], p. 20].

Even with the vast body of research conducted over time, there continues to be a disagreement among practitioners and researchers on the attributes of teacher quality [39]. In a study conducted for the National Center of Analysis of Longitudinal Data in Education Research (CALDER), Harris & Saas [39] qualified teacher training as "formal pre-service university education, in-service professional development, and informal training through on-the-job experience" (p. 2). The literature review associated with this study indicated mixed findings regarding the effect of formal education on teacher quality [39]. According to Harris & Saas [39], the inconsistencies noted among research can be attributed to methodological issues with (a) quantifying teacher productivity; (b) the lack of random assignment of students and (c) the difficulty with linking teacher training to student outcomes. Using panel data from a Florida statewide administrator's database, Harris & Saas [39] indicated that they were able to overcome these challenges because the database provided a means to tie student performance to teachers and tie teachers to professional development. The examination of students' third through tenth grade reading and math achievement for the 1999-2005 school years concluded that (a) no relationship exists between advance degrees and student achievement; (b) there is a significant positive relationship between number of first and second year teachers and student achievement for elementary and middle school students; (c) there is no significant relationship between number of first and second year teachers and student achievement of high school students; and (d) except for math at the middle school level, there was a negative or insignificant relationship between advanced degrees and student achievement [39].

Nationally and internationally, countries continue their quest to implement policies that will lead to higher-quality teachers' employment and development. A teacher consists of many characteristics and traits. Consequently, the literature reveals the difficulty in identifying which attributes constitute a highly qualified teacher. The results from many research projects using various statistical procedures have led to mixed conclusions on which qualities of a teacher are the best predictors of increased student achievement. Regardless of the current literature, it is unlikely that critical stakeholders in education, such as politicians, parents, and reform advocates, will reduce efforts to ensure that children are only entrusted in the hands of the best and brightest teachers.

3. Methodology

3.1. Design

This quantitative study employs a longitudinal design, incorporating observations of the same schools over time

and allowing for the detection of relationships at the school and county levels. This study considered longitudinal (every third school year from 2005 to 2017), aggregated school and district-level data to examine the research questions. Data of this type allowed the researchers to consider other possible explanatory variables that may influence the dependent variable. The dependent variable is students' reading achievement scores, specifically, the percentage of a school's students who score proficient or higher on the 3rd and 6th grade OAA. This percentage is referred to as "Reading Proficiency." "The Ohio Achievement Assessments (OAA) are designed to meet both state and federal law and to measure student achievement of Ohio's academic content standards" [43]. There are four primary independent/predictor variables: Ratio of Charter Schools to Public Schools (CStoPSRatio), Average Reading Proficiency for Charter Schools (AvgCSProf), Teacher Quality Index (TQI), and the School Resource Index (SRI). CStoPSRatio3rd is the ratio of charter schools to public schools with reading proficiencies reported for 3rd grade, times 100 (to be presented as a percent—e.g., if the ratio in the data is 50, that means the number of charter schools = 50% of the number of public schools). CStoPSRatio6th is the ratio of charter schools to public schools with reading proficiencies reported for 6th grade, times 100 (to be presented as a percent—e.g., if the ratio in the data is 50, that means the number of charter schools = 50% of the number of public schools). Avg3rdCSProf is the average 3rd grade reading proficiency for the charter schools in the district. Avg6thCSProf is the average 6th grade reading proficiency for the charter schools in the district. TQI refers to the percent of core subjects taught by teachers with a highly qualified certification. SRI is the percent of per pupil funding allocated to classroom instruction. Further, there are 10 covariates included in the analysis that potentially have additional influences on reading achievement. Those are

Average Daily Enrollment (ADE), Attendance Rate (ATT), Percent of Economically Disadvantage Students (ED), Percent of Students with Limited English Proficiency (LEP), Percent of Students with Disabilities (DISAB), Percent of Core Courses Taught By properly certified teachers (PCT), Percent of Teachers with At Least A Masters Degree (MLT), and Total Spending Per Pupil (TSPP).

3.2. Research Questions

The questions guiding this study are
(1) Is there a relationship between CStoPSRatio, AvgCSProf, TQI, and/or SRI and third grade OAA reading achievement?
(2) Is there a relationship between CStoPSRatio, AvgCSProf, TQI, and/or SRI and sixth grade OAA reading achievement?

3.3. Setting

The Ohio public school system is the sixth-largest public school system in the nation [40]. Ohio's public school districts serve more than 1.8 million students and have more than 245,000 full time employees [40]. During the final school year, 2017-2018, from which data were collected for this study, there were 607 traditional public school districts in Ohio [41].

3.4. Sample

This study's sample consisted of schools in four of Ohio's challenged school districts with 3rd and 6th-grade students who completed the OAA. The schools are all TPS from districts in which charter schools were authorized to be established. These districts were selected because they represented the two largest and two smallest "challenged" school districts when data collection first started. Across the four school districts, the sample size ranged from 363 schools in 2005 to 312 schools in 2014. Based on the school's typology, as described by The Ohio Department of Education [42], three of the districts were categorized as Typology Code 8 (Urban School District with very high poverty). The remaining district was classified as Typology Code 4 (Small Town District with High Student Poverty). The median income ranged from the upper $19,000s to approximately $28,000. Given this, student poverty ranged from 56% to 100%. Although one of the school district's percentage of minority students was less than 15%, the other districts averaged a minority population of roughly 80%.

3.5. Instrumentation

The Ohio Achievement Assessment is administered to all 3rd – 8th-grade students attending charter and TPS each school year. While the OAA measures knowledge of Ohio's content standard for each grade level in reading, writing, math, and science, this study focused on the reading component only. The 3rd grade assessments contain 36 multiple-choice, short answer, and extended response test items [43]. The 6th-grade reading assessments contain 37 test items [43]. According to Pearson, all scorers must (a) have an accredited bachelor's degree or higher, (b) reside in the continental United States, Alaska, or Hawaii, and (c) be a U.S. citizen, resident alien, or have a U.S. work permit. The subject matter and grade level standards-based design of the OAA suggest content validity.

3.6. Data Analysis

The Statistical Package for Social Science (SPSS version 26) was used to analyze the data. The data set used for analysis initially included 293 schools in four districts: 52 schools in Akron City, 22 schools in Canton City, 96 schools in Cleveland Municipal City, and 123 schools in Columbus City. Each building had five records in the data set, one for each of the following years: 2005, 2008, 2011, 2014, and 2017, although not all entries were complete. In particular, the outcomes of interest (Third Grade Reading Proficiency and Sixth Grade Reading Proficiency) were recorded in multiple years for these schools. Consequently, the observations are not independent of one another; observations from the same building over time should be related. The non-independence of observations violates the assumptions of some models we might have considered using—in particular, linear regression [44].

The solution is to use a model that can account for this kind of dependence among observations. Because these measures (the outcomes in particular) are repeated over time, the researcher needs to use a repeated measures model. An appropriate option for this data set with the intended analysis is to use a linear mixed-effects model (LMM). This design is appropriate for research studies in which continuous outcome variables are normally distributed but may not be independent of each other [45,46]. Like linear regression, LMMs allow researchers to "quantify the relationships between a continuous dependent variable and various predictor variables" [[46], p. 9]. According to Hoffman [47], "each predictor is weighted by an estimated slope parameter that describes the size of its unique relationship with the outcome."

The LMM contains fixed effects like those one would see in a linear regression (these are the variables that are assumed to have a universal effect, and that the researcher is interested in measuring in the study), and random effects, which are the result of the random units used in the study—in this case, the districts and the schools. Random effects are those that another researcher would not be interested in specifically, but which affect the outcomes nonetheless. Using these adjusts for the similarities (dependencies) that the researcher might see between two outcomes from the same school, or between two outcomes from schools in the same district.

The formula for the model is

$$y_{ijk} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \ldots$$
$$+ \beta_{12} x_{12} + b_{0i} + b_{0ij} + \epsilon_{ijk}$$

where y_{ijk} is Third Grade Reading Proficiency or Sixth Grade Reading Proficiency for the kth observation of the jth school in district i; β_0 is the intercept of the model; β_1-β_{12} are coefficients indicating the effects of the four main variables of interest along with the covariates; x_1 is the value of CStoPSRatio for this observation; x_2 is the value of Avg3rdCSProf for this observation; x_3 is the value of TQI for this observation; x_4 is the value of SRI for this observation; x_5-x_{12} are the values of the 8 covariates included in the model; b_{0i} is the random intercept effect for district i; b_{0ij} is the random intercept effect for the jth building in district i; and ϵ_{ijk} is the random error associated with the observation.

From reviewing this formula, one can see that each building and each district's random effect allows them to perform higher than predicted (if random intercept effects are positive) or lower than predicted (if random intercept effects are negative) based on all of the fixed effects recorded for that building and district in that year. This will happen consistently across all observations, thus modeling the correlation the researcher might expect in these observations taken at different times and adjusting for the lack of independence among observations.

The model assumptions were examined for both third grade and sixth grade models. Normality of residuals and random effects was found to hold for both models, the residuals were found to be homogenous, and the relationships of independent and dependent variables were found to be linear in nature.

4. Findings

4.1. Third Grade Reading Proficiency

There are 990 observations in the data set with reported Third Grade Reading Proficiency values. Of these, 942 also include all required independent variables (main variables of interest + covariates). The coefficients resulting from the LMM are given in Table 1.

Table 1. Coefficients, Standard Errors, Tests of Significance and 95% Confidence Intervals for Third Grade Reading Proficiency Model

Parameter	Est. Coefficient	Std. Error	df	t	p
Intercept	-265.343	31.077	133.114	-8.538	< 0.001
CStoPS Ratio3rd	-0.263	0.0471	26.126	-5.576	< 0.001
Avg3rd CSProf	0.465	0.0542	332.134	8.579	< 0.001
TQI	-0.0852	0.0897	44.538	-0.951	0.347
SRI	0.722	0.196	142.939	3.683	< 0.001
ADE	0.00827	0.00513	826.034	1.614	0.107
Att	2.604	0.253	557.922	10.286	< 0.001
ED	-0.0411	0.0528	611.862	-0.778	0.437
LEP	-0.104	0.0629	167.862	-1.656	0.100
DISAB	-0.158	0.0795	449.143	-1.986	0.048
PCT	0.140	0.125	817.795	1.116	0.265
MLT	0.137	0.0314	755.715	4.344	< 0.001
TSPP	0.000660	0.000503	304.853	1.312	0.191

From Table 1, there is a statistically significant relationship of the CS to PS Ratio (t(26.126) = -5.576; p < 0.001) with the percentage of third graders achieving proficiency on the reading portion of the OAA; as the CStoPSRatio increases by one percentage point, the percentage of third graders achieving proficiency decreases by an average of -0.263. Furthermore, there is a statistically significant relationship of the Avg3rdCS reading proficiency(t(332.134) = 8.579; p < 0.001) with the percentage of third graders achieving proficiency on the reading portion of the OAA; as the Avg3rdCS reading increases by one percentage point, the percentage of third graders achieving proficiency increases by an average of 0.465. Finally, there is a statistically significant relationship of the SRI (t(142.969) = 3.683, p < 0.001) with the percentage of third graders achieving proficiency on the reading portion of the OAA; as the SRI increases by one dollar, the percentage of third graders achieving proficiency increases by an average of 0.722. Covariates significant at the 0.05 level include attendance, students with disabilities, and Master Level Teachers.

4.2. Sixth Grade Reading Proficiency

There are 648 observations in the data set with reported Sixth Grade Reading Proficiency values. Of these, 618 also include all required independent variables (main variables of interest + covariates). The coefficients resulting from the linear mixed effects model are given in Table 2.

From Table 2, there is a statistically significant relationship of the CS to PS Ratio (t(19.288) = -4.838; p < 0.001) with the percentage of sixth graders achieving proficiency on the reading portion of the OAA; as the

CStoPSRatio increases by one percentage point, the percentage of sixth graders achieving proficiency decreases by an average of -0.156. Furthermore, there is a statistically significant relationship of the Avg6thCS reading proficiency(t(375.369) = 12.252; p < 0.001) with the percentage of sixth graders achieving proficiency on the reading portion of the OAA; as the Avg6thCS reading increases by one percentage point, the percentage of sixth graders achieving proficiency increases by an average of 0.771. Covariates significant at the 0.05 level include average daily enrollment, attendance, students with limited English proficiency, students with disabilities, Properly Certified Teachers, Master Level Teachers, and the Total Spending Per Pupil.

Table 2. Coefficients, Standard Errors, Tests of Significance and 95% Confidence Intervals for Sixth Grade Reading Proficiency Model

Parameter	Est. Coefficient	Std. Error	df	t	p
Intercept	-53.875	32.119	495.303	-1.677	0.094
CStoPS Ratio6th	-0.156	0.0323	19.288	-4.838	< 0.001
Avg6th CSProf	0.771	0.0629	375.369	12.252	< 0.001
TQI	0.0923	0.0883	471.260	1.045	0.296
SRI	-0.249	0.214	87.189	-1.164	0.248
ADE	0.01413	0.00528	447.939	2.676	0.008
Att	1.784	0.251	460.611	7.102	< 0.001
ED	-0.1139	0.0643	563.933	-1.773	0.077
LEP	-0.188	0.0823	265.861	-2.286	0.023
DISAB	-0.352	0.0796	399.411	-4.42	< 0.001
PCT	-0.595	0.124	580.102	-4.788	< 0.001
MLT	0.077	0.0369	546.720	2.1	0.036
TSPP	-0.001659	0.000538	41.836	-3.083	0.004

5. Conclusions

5.1. Summary

The purpose of this longitudinal study was to examine whether the relationships between the independent variables (charter competition, teacher quality, and school resources) and the dependent variable of interest (student reading achievement on the OAA in TPS) allows educational stakeholders to reliably predict the level of achievement that students will demonstrate on 3rd and 6th grade reading standardized assessments in Ohio. The 3rd grade proficiency data analysis found a statistically significant relationship between the charter school to public school ratio and reading achievement, in which reading achievement decreases an average of 0.262 percent as the relative number of charter schools goes up one percent. There was also a statistically significant relationship between 3rd grade charter school average reading proficiency to public school reading achievement, in which reading achievement increases an average of 0.465 percent as the average charter school's reading proficiency goes up by one point. While there was no significant relationship between TQI and reading achievement, there was a statistically significant relationship between SRI and 3rd grade reading achievement, in which reading achievement increases an average of 0.722 as SRI increases.

Regarding 6th grade proficiency data, there was a statistically significant relationship between the charter school to public school ratio and reading achievement, in which reading achievement decreases an average of 0.156 percent as the relative number of charter schools goes up one percent. There was also a statistically significant relationship between 6th grade charter school average reading proficiency to public school reading achievement, in which reading achievement increases an average of 0.771 percent as the average charter school's reading proficiency goes up one point. There was no significant relationship between TQI and 6th grade reading achievement or SRI and 6th grade reading achievement.

5.2. Implications

Our review of literature suggests that most researchers who examines the competitive impact of charter schools on TPS focus on comparing the academic achievement exhibited by students in the different settings. Furthermore, research designed to focus on educational outcomes often fail to examine extraneous factors that may also explain student achievement [15,18,19,21]. Consequently, research on the competitive impact of school choice on TPS remains limited, and findings are inconsistent [6,8,10,15]. This study is different in that we focus only on the academic achievement of TPS and examine multiple variables that may explain academic performance.

Analysis of the charter school to public school ratio suggests that even when TPS provide rigorous instruction to all students, regardless of any subgroup, such as economically disadvantaged students, students with disabilities, and students with limited English proficiency, and irrespective of whether students are in a grade designated for assessment, TPS students demonstrate decreased levels of reading achievement in districts with higher CStoPSRatios. As the percentage of students attending charter schools increases, the academic proficiency for students attending TPS decreases at both grade levels. While the data may not reflect a cause and effect, it may indicate that many high-performing readers are departing from the traditional setting for charter school enrollment. Consequently, reading proficiencies in districts with increased CStoPSRatios suffers. Although stakeholders may view the declining results as an indication that TPS are failing students, one may reasonably assume that charter schools target the best and brightest students for recruitment. In actuality, the decrease in performance may be a reflection of the innate abilities of students remaining in TPS rather than the quality of the education provided. Furthermore, the findings may reflect the effect of charter schools moving into low-performing districts, i.e., the causal relationship could actually be in reverse; when the reading scores are lower, there are more charter schools.

In some cases, it is the availability of alternative choices such as charter schools that prompts TPS to make changes that lead to improvements. There is a positive relationship between the average charter school reading proficiency and TPS reading proficiency for both grades. As the AvgCSProf increases in TPS districts, the schools in those districts also demonstrate higher reading achievement levels. Again, while this analysis may not

indicate cause and effect, it suggests that TPS response to charter schools may be henge on the quality of charter schools in their districts. Consistent with the market-based competition theory, TPS may be taking measures to present themselves as the best choice for their stakeholders.

The relationship between the quality of teachers and reading achievement is considered from three perspectives: (1) the percent of teachers who are highly qualified (TQI), (2) the percent of teachers properly certified, and (3) the percent of teachers with a master's degree.

Although the highly qualified designation was one of NCLB's primary mandates, the results of the current study found that, while not significant at the 0.05 level, as the percent of highly qualified teachers increases, students' academic achievement decreased at the 3rd grade level and increased at the 6th grade level. These findings suggest that just because a teacher is designated as highly qualified, they still may not possess the qualities or knowledge that would allow him or her to be an effective teacher for all students in the classroom. Furthermore, these findings may be the primary reason that in 2015, ESSA removed the NCLB's highly qualified mandate [3,37].

In regard to teacher quality, the relationship between properly certified teachers and academic achievement, the results for 3rd grade were not significant. At the 6th grade level, although the results were significant, PCT had a negative effect on academic achievement. This analysis may imply that while Ohio's Department of Education desires for school districts to place properly certified teachers in classrooms, doing so may not translate to increased reading performance on statewide assessments. In contrast, the findings for the relationship between master level teachers and reading achievement were significant and positive for both grades. Although we cannot say that this is a cause-and-effect relationship, our analysis suggests that the students of teachers with advanced degrees will demonstrate higher levels of reading achievement than the students of teachers with a 4-year degree.

To examine the relationship between school resources and reading achievement, the researchers investigated two factors that directly correlate with staff, teacher, and student resources. First, the researchers wanted to know if and to what degree student per-pupil funding (SRI) designated strictly for curriculum and instruction influences student achievement. Secondly, the researchers wanted to know if and to what extent the total spending per pupil (TSPP) rates may affect student achievement. Regarding 3rd grade, SRI indicated a significant positive relationship. The finding suggests that when funding dedicated to curriculum and instruction increases, students demonstrate modest gains in reading achievement. Surprisingly, within the 6th-grade data set of this sample, as funding for curriculum and instruction increases, 6th-grade performance declined (although not significant at the 0.05 level of significance). It may be beneficial for middle school administrators to compare their expenditures to elementary schools' expenditures to identify any areas of focus that may be contributing to increases in performance. In respect to TSPP, while funding increases translated to gains in 3rd grade reading achievement, the results were not significant. In contrast, the findings for the 6th-grade data set of this sample indicates a significant negative relationship. As the total funds allocated increases per TSPP, 6th-grade achievement significantly declined. Some people believe that you can solve problems by throwing money at them. In light of these findings, one can assert that, in the educational realm, nothing could be further from the truth. Having adequate funding is essential. However, having a well thought out plan that leads to conscious decision making about how to use available finances is critical to implementing programs and strategies aimed at increasing student academic achievement.

5.3. Limitations

The four school districts identified for this study were selected based on providing a sufficient sample size for each predictor variable in a regression model [48]. The sample size may limit the generalization of findings to other settings. Furthermore, since these districts are not demographically representative of all school districts (3 x urban districts, 1 x small town with high poverty district), any significant findings may only apply to the research locations, urban school districts, or TPS in Ohio. While extraneous variables such as the curriculum, average age of teachers, and the number of years teaching may impact student achievement, variables such as these were not examined or controlled for during the current study.

5.4. Recommendations for Future Research

As discussed in the limitations section, only four districts that fall under The Big Eight umbrella of districts in which charter schools are currently allowed were included in this study. Future research is recommended to investigate the relationship between charter competition and reading achievement for students attending schools in all eight of those districts. Additionally, it is recommended that a researcher duplicate the current study for math achievement to determine if there is a difference between charter competition relationships and the two academic subjects. Lastly, to generalize the findings to a larger population, future research would consider a multi-state longitudinal study. The desire for school choice options remains prevalent in today's society. The number of new charter schools and the number of students attending them continue to increase. As such, the recommendations for future research would add to the body of research regarding how TPS respond to charter competition. Studies such as these would also provide a basis for the establishment of or amendments of education policies.

References

[1] Loeb, S., Valant, J., & Kasman, M. (2011). Increasing choice in the market for schools: recent reforms and their effects on student achievement. *National Tax Journal, 64*(1), 141-163.

[2] Abowitz, K.N. & Karaba, R. (2010). Charter schooling and democratic justice. *Educational Policy 24*(3), 534-558.

[3] Tillman, L. (2006). A nation at risk. In *Encyclopedia of educational leadership and administration*. Retrieved from http://www.liberty.edu:2048/login?url=http://literati.credoreferenc

e.com.ezproxy.liberty.edu:2048/content/entry/sageela/a_nation_at_risk/0.

[4]   Curtis, J.M. (2012). A fighting chance: Inequities in Charter school funding and strategies for achieving equal access to public school funds. *Howard Law Journal, 55*(3), p. 1057-1096.

[5]   Toma, E., & Zimmer, R. (2012). Two decades of charter schools: Expectations, reality, and the future. *Economics of Education Review, 31*(2), 209-212.

[6]   Zimmer, R., & Buddin, R. (2009). Is charter school competition in California improving the performance of traditional public schools? *Public Administration Review, 69*(5), 831-845.

[7]   National Alliance for Public Charter Schools (2019). About charter schools. Retrieved from https://www.publiccharters.org/sites/default/files/documents/2020-03/2019-Annual-report-web_0.pdf.

[8]   Zimmer, R., Gill, B., Booker, K., Lavertu, S., & Witte, J. (2012). Examining charter student achievement effects across seven states. *Economics of Education Review, 31*, 213-234.

[9]   Pitelis, C. (2008). Market-based theory. In international encyclopedia of organization studies. Retrieved from http://www.liberty.edu:2048/login?url=http://literati.credoreferenc e.com.ezproxy.liberty.edu:2048/content/entry/sageorgstud/market_based_theory/0.

[10]   Almond, M.R. (2012). The black charter school effect: Black students in American charter schools. *The Journal of Negro Education, 81*(4), 354-365.

[11]   Jenkins, P. Jr. (2005). Effective of not: The plight of Ohio's charter schools. (Specialist's thesis). Retrieved from http://etd.ohiolink.edu/view.cgi?ris.cgi?acc_num=miami1121886517.

[12]   Weiss, J. A. (1998). Policy theories of school choice. *Social Science Quarterly, 79*(3), 523-532.

[13]   Carlson, D., Lavery L., & Witte J.F. (2012). Charter school authorizers and student achievement. *Economics of Education Review, 31*(2), 254-267.

[14]   Office of Community Schools, Ohio Department of Education. (2019). 2018-2019 annual report on Ohio community schools. Retrieved from file:///Volumes/Lexar/2018-2019-Community-Schools-Annual-Report.pdf.

[15]   Carr, M. (2011). The impact of Ohio's EdChoice on traditional public school performance. *The Cato Journal 31*(2), 257-284.

[16]   Poiner, J. (2017). Ohio's voucher programs: An overview (R.Y. Frank & C.L. Adis). Washington DC: Thomas B. Fordham Institute. Retrieved from https://fordhaminstitute.org/ohio/research/policy-brief-ohios-voucher-programs.

[17]   Stewart, M.S., & Moon, J.S. (2016) Understanding how school vouchers are funded: Summary of funding for Ohio's Cleveland scholarship and EdChoice programs. Research Brief October 2016. Bloomington, IN: Indiana Center for Evaluation and Education Policy. Retrieved from https://files.eric.ed.gov/fulltext/ED574826.pdf.

[18]   Linick, M.A. (2016) Examining charter school policy and public school district resource allocation in Ohio. *Education Policy Analysis Archives, 24*(19).

[19]   Gray, N. L. (2012). School choice and achievement: the Ohio charter school experience. *The Cato Journal, 32*(3), 557-579.

[20]   Arsen, D., & Ni, David. (2012). The effects of charter school competition on school district resource allocations. *Educational Administration Quarterly, 48*(1), 3-38.

[21]   Carpenter, D. M., & Medina, P. M. (2011). Exploring the competitive effects of charter schools. *International Journal of Educational Reform*, 20(1), 33-56.

[22]   Center for Education Reform. (2020). Demanding progress for a nation at risk. Retrieved from https://edreform.com/.

[23]   Garrison, L. F., & Holifield, M. (2005). *Are charter schools effective? Planning and Changing, 36*(1/2), 90-103.

[24]   Center for Education Reform. (2018a). About the parent power! index. Retrieved from https://parentpowerindex.edreform.com/about-the-index/.

[25]   Ni, K. (2013, January 23). Parent power index rates each state on education options. *The Epoch Times.* Retrieved from https://edreform.com/2013/01/parent-power-index-rates-each-state-on-education-options/.

[26]   Center for Education Reform. (2018b). National Charter School Law Rankings & Scorecard—2018. Retrieved from https://edreform.com/wp-content/uploads/2019/01/CER_National-Charter-School-Law-Rankings-and-Scorecard-2018_screen_1-30-19.pdf.

[27]   EdTactics (n.d.). 3 ways schools are like businesses [Web log post]. Retrieved from http://www.edtactics.com/3-ways-schools-are-like-businesses/.

[28]   Baker, B.D., Farrie, D., and Sciarra, D. (2018) Is school funding fair? A National Report Card, Seventh Edition. Newark, NJ: Education Law Center. Retrieved from http://www.schoolfundingfairness.org/.

[29]   U.S. Department of Education. (2014). 10 facts about K-12 education funding. Retrieved from https://www2.ed.gov/about/overview/fed/10facts/10facts.pdf.

[30]   Baker, B.D., Weber, M., Srikanth, A., Kim, R., and Atzbi, M. (2018b) The real shame of the nation: The causes and consequences of interstate inequity in public schools investments. NJ: Education Law Center. Retrieved from http://www.schoolfundingfairness.org/related-papers.

[31]   Hirsch, E., Koppich, J.E., & Knapp, M.S. (1998). What states are doing to improve the quality of teaching: A brief review of current patterns and trends. Seattle, WA: Center for the Study of Teaching and Policy.

[32]   No Child Left Behind Act of 2001, Pub. L. No. 107-110, § 115, Stat. 1425 (2002). Retrieved from http://www2.ed.gov/policy/elsec/leg/esea02/107-110.pdf.

[33]   Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Educational Policy Analysis Archives 8*(1). Retrieved from http://epaa.asu.edu/ojs/article/view/392/515.

[34]   Kaplan, L.S., & Owings, W.A. (2001). Teacher quality and student achievement: recommendations for principals. *National Association of Secondary School Principals (NASSP) Bulletin 85*(628), 64-73.

[35]   Wenglinsky, H. (2000). How teaching matters. Bringing the classroom back into discussions of teacher quality. A policy information center report. Princeton, NJ: The Milken Family Foundation and Educational Testing Service. Retrieved from http://www.ets.org/Media/Research/pdf/PICTEAMAT.pdf.

[36]   U.S. Department of Education. (2020). Every Student Succeeds Act (ESSA). Retrieved from https://www.ed.gov/essa?src=ft.

[37]   U.S. Department of Education. (2017). Transitioning to the every student succeeds act (ESSA). Retrieved from https://www2.ed.gov/policy/elsec/leg/essa/essatransitionfaqs11817.pdf.

[38]   U.S. Department of Education. (2016). Non-regulatory guidance for Title II, Part A: Building systems of support for excellent teaching and learning. Retrieved from https://www2.ed.gov/policy/elsec/leg/essa/essatitleiipartaguidance.pdf.

[39]   Harris, D.N., & Saas, T.R. (2011). Teacher training, teacher quality and student achievement. *Journal of Public Economics 95*, 798-812.

[40]   Ohio School Board of Education (2020). Policies and procedures manual Rev. ed. Retrieved from ftp://ftp.ode.state.oh.us/StateBoardBooks/Policy%20&%20Procedures%20Manual/.

[41]   Thomas B. Fordham Institute (2018, February). Ohio education by the numbers. Washington, DC: Thomas Fordham Institute. Retrieved from https://fordhaminstitute.org/ohio/research/ohio-education-numbers-2018-edition.

[42]   Ohio Department of Education. (n.d.). Typology of Ohio School Districts. Retrieved March 03, 2018, from http://education.ohio.gov/Topics/Data/Report-Card-Resources/Ohio-Report-Cards/Typology-of-Ohio-School-Districts.

[43]   Office of Curriculum and Assessment, Ohio Department of Education. (2011). Ohio statewide assessment program: Rules book. Retrieved from https://www.ocali.org/up_doc/Ohio_Statewide_Assessment_Program_Rule_Book.pdf.

[44]   Gall, M. D., Gall, J. P., & Borg, W.R. (2007). Discovering statistics using SPSS, 3rd Edition: Introducing statistical methods. Thousand Oaks, CA: Sage Publications Inc.

[45] SPSS Inc. (2005) Linear mixed-effects modeling in SPSS: An introduction to the MIXED procedure (Technical Report). Retrieved from https://www.spss.ch/upload/1126184451_Linear%20Mixed%20Effects%20Modeling%20in%20SPSS.pdf.

[46] West B., Welch, K.B., & Galecki A.T. (2015) Linear mixed models: A practical guide using statistical software, second edition. [VitalSource Bookshelf]. Retrieved from https://bookshelf.vitalsource.com/#/books/9781466561021/.

[47] Hoffman, L. (2015). Longitudinal analysis: Modeling within-person fluctuation and change. [VitalSource Bookshelf]. Retrieved from https://bookshelf.vitalsource.com/#/books/9781317591085/.

[48] Field, A. (2013). Discovering statistics using IBM SPSS statistics, 4th Edition: Thousand Oaks, CA: Sage Publications Inc.