

University of Denver

**Digital Commons @ DU**

---

Electronic Theses and Dissertations

Graduate Studies

---

2021

## **Math Achievement of Low-Socioeconomic Status Students: A Comparative Study of Public-School Settings**

Alexander Ohene Ansah

Follow this and additional works at: <https://digitalcommons.du.edu/etd>



Part of the [Educational Leadership Commons](#), [Elementary and Middle and Secondary Education Administration Commons](#), [Elementary Education Commons](#), and the [Secondary Education Commons](#)

---

Math Achievement of Low-Socioeconomic Status Students: A Comparative Study of  
Public-School Settings

---

A Dissertation

Presented to

the Faculty of the Morgridge College of Education

University of Denver

---

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

---

by

Alexander Ohene Ansah

June 2021

Advisor: Susan Korach, Ed.D

©Copyright by Alexander Ohene Ansah 2021

All Rights Reserved

**Author:** Alexander Ohene Ansah

**Title:** Math Achievement of Low-Socioeconomic Status Students: A Comparative Study of Public-School Settings

**Advisor:** Susan Korach, Ed.D.

**Degree Date:** June 2021

## **ABSTRACT**

In recent years, falling standards in the American public-school system have elicited public concern and criticism, leading to several public-school reforms. One such reform is the charter-school movement. Charter schools provide a public option for parents in search of an alternative to traditional public schools. At the same time, the achievement gap continues to widen, with students of low socioeconomic status on the losing end. Since the beginning of the charter school movement, research has focused on comparisons in achievement between students in charters and traditional public schools. Results have been mixed.

Focusing on low-SES student populations in Colorado, this quantitative study investigates differences in achievement between the two school types. The unit of analysis of the study was the school level. I hypothesized that charter schools would demonstrate statistically higher achievement, and that a school's SES would also statistically impact achievement. Two other hypotheses tested associations between school type and school SES, and percentage-minority and school SES.

A 2\*2 Factorial Analysis of Variance was used for the study. The study found that the effect of school type on student achievement was not statistically different. On school SES, the study revealed a statistically significant difference. A chi Square test of association between school type and School SES was not statistically significant.

However, the association between percentage-minority and school SES was statistically significant, indicating low-SES schools have a higher percentage of low-SES students than high-SES Schools. The relationship between percentage minority and school SES was an inverse one.

Recommendations include the need for future research to examine middle and high schools, where charter management organizations dominate. As well, the study should be replicated in other states for comparison of standardized results.

**Key Words:** Charter School, Non-Charter School, Student Achievement, School Effectiveness. Low-Socioeconomic Status

## ACKNOWLEDGEMENTS

This monumental achievement could not have been realized without the invaluable support, insights, and directions of many. I want to thank my dissertation director, Dr. Susan Korach, who has been there for me every step along this dissertation journey. Thank you for the countless hours and clear directions you provided toward the success of this work. My heartfelt thanks go to my dissertation committee members, Drs. Erin Anderson and Kathy Green. You are amazing! Dr. Anderson, you were always there to answer my questions, review my work, and provide incredible feedback. Thank you. Dr. Green, you captained me through the quantitative analysis and provided prompt responses and remarkable feedback. You taught me a great deal about cleaning and running my data for analysis. I am forever grateful to you.

To all members of my dissertation committee, Drs. Susan Korach, Kathy Green, and Erin Anderson: words cannot express how grateful I am. I owe you a debt of gratitude. Your phenomenal guidance has led this study to a precise ending. I also would like to thank Dr. Douglas Allen for serving as outside chair for my dissertation defense. You are awesome!

I cannot end these thank you notes without expressing my deepest appreciation to Drs. Dan Jorgensen and Lorna Beckett. You provided incredible support during my data mining for this study. Finally, I want to thank all my graduate instructors, particularly Drs. Lolita Tabron and Kristina Hesbol. You have provided splendid course experience and abundant knowledge that I will carry with me always.

## TABLE OF CONTENTS

<b>Abstract .....</b>	<b>ii</b>
<b>Acknowledgements .....</b>	<b>iv</b>
<b>List of Tables.....</b>	<b>viii</b>
<b>Chapter One: Introduction.....</b>	<b>1</b>
Table 1.1 .....	4
Table 1.2 .....	4
Table 1.3 .....	5
Statement of the Problem.....	5
Table 1.4 .....	7
Table 1.5 .....	7
Theoretical Framework.....	8
Purpose of the Study .....	10
Research Question .....	12
Hypotheses:.....	12
Significance of the Study .....	13
Limitations and Delimitations .....	15
Definition of Terms .....	16
Chapter Conclusion.....	17
<b>Chapter Two: Review of the Literature .....</b>	<b>19</b>
Search Criteria of Literature Reviewed .....	19
National Charter School Movement .....	20
First Generation: 1990–2000 .....	22
Second Generation: 2000–2010.....	24
Third Generation: 2010–2020.....	26
Table 2.1 .....	28
The Colorado Charter School Movement .....	29
Table 2.2 .....	33
Table 2.3 .....	33
Charter Schools and School-Effectiveness Theory .....	34
Charter-School Effectiveness Research.....	43
Achievement Gap and Opportunity Gap .....	49
Gaps in Literature .....	51
Chapter Conclusion.....	53

<b>Chapter Three: Methodology .....</b>	<b>54</b>
Research Design .....	54
Assumptions.....	55
Research Questions.....	55
Hypotheses:.....	56
Unit of Analysis .....	57
Data Sources/Collection .....	57
Measures in the Study (Student Achievement).....	58
Population .....	59
Sample .....	59
Outcome Variable .....	59
Independent (Explanatory) Variable.....	59
Data Analysis/Estimation Procedures.....	60
Reliability and Validity.....	61
Ethical Considerations .....	62
Chapter Conclusion.....	63
<b>Chapter Four: Findings .....</b>	<b>64</b>
Group Description.....	64
Descriptive Analysis .....	64
Table 4.1 .....	65
Statistical Design .....	65
Results.....	66
Research Question 1 .....	66
Hypothesis 1 .....	67
Hypothesis 2 .....	67
Table 4.2 .....	68
Hypothesis 3 .....	68
Table 4.3 .....	69
Hypothesis 4 .....	69
Table 4.4 .....	70
Chapter Conclusion.....	71
<b>Chapter Five: Discussion .....</b>	<b>72</b>
Discussion.....	73
Implications .....	76
Limitations/Ethical Considerations.....	78
Recommendations.....	78
Recommendations for Further Research.....	79
Conclusion .....	82

<b>References .....</b>	<b>84</b>
<b>Appendix: Dedication.....</b>	<b>103</b>

## LIST OF TABLES

<b>Chapter One: Introduction</b> .....	<b>1</b>
Table 1.1: Charter School Enrollment Growth in Colorado .....	4
<b>Table 1.2: Colorado PK-12 Enrollment Change</b> .....	<b>4</b>
Table 1.3: Test Score Comparison between Charter and Non-Charter Students.....	5
Table 1.4: Racial and Ethnic Minority Student Enrollment 2014–19 by School Type ...	7
Table 1.5: FRL-Eligible Student Enrollment 2014–19 by School Type .....	7
<b>Chapter Two: Review of the Literature</b> .....	<b>18</b>
Table 2.1: Achievement Comparison .....	28
Table 2.2: Racial and Ethnic Minority Student Enrollment 2014–19 by School Type .	33
Table 2.3: FRL-Eligible Student Enrollment from 2014–19 by School Type.....	33
<b>Chapter Four: Findings</b> .....	<b>63</b>
Table 4.1: Descriptive Statistics .....	65
Table 4.2: ANOVA of School Type x School SES .....	68
Table 4.3: Chi-Square Test of Association between School Type and School SES.....	69
Table 4.4: Percent-Minority by School SES.....	70

## **Chapter One: Introduction**

The national outcry concerning deficiencies in the United States public education system led to the publication of the report *A Nation at Risk: The Imperative of Educational Reform (1983)* in the last 20<sup>th</sup> century. The report sparked national discussion on the quality and purpose of U.S. public education (Borek, 2008). More recent research has linked low academic achievement with the low socio-economic status among students (Dietrichson et al., 2017; Paschall et al., 2018; Zilanawala et al., 2018). As well, the National Center for Education Statistics (NCES) survey and other research found that minority students lagged behind their white peers in academic achievement (Loeb & Hurd, 2019; Paschall et al., 2018; Rippner, 2015; Ross et al., 2012). Williams (2011) noted that the persistent achievement gap exists mostly between white and non-white students. The public, and particularly the educational sector, have produced policies and funding to address educational inequities, and research continues to target efforts to eradicate achievement gaps.

Traditional public education has been the focus of many reforms, with alternative public options like charter schools, entering the U.S. public education landscape in 1991. In contrast to a private education, charter schools provided a no-cost opportunity for families seeking alternatives to their neighborhood public school. Proponents of charter schools claim that the charter movement broke traditional bureaucracy and “galvanized

Democrats and Republicans, liberals and conservatives, to support an ambitious effort to restructure public education” (Wohlstetter et al., 2013, p. 1). Since 1991, charter schools have undergone a huge transformation to provide school choice for parents who had not previously had choice (Karanovich, 2009).

Research on the impact of charter schools on the public-school landscape is mixed. Opponents of charter schools raise concerns about segregation. Baker (2016) argued that charter expansion may cause an inequity surge, and bring about inefficiencies and redundancies, coupled with destabilization of funding and other barriers to excellent education for all children. Other research points to charter-school successes, especially concerning achievement gains among students who have not been traditionally successful. A study by Grosskopf, Hayes, and Taylor (2009) compared achievement gains of students in urban-charter and non-charter public schools in the state of Texas. The study used value-added measures on standardized tests in reading and mathematics, with results indicating that charter schools performed better than traditional public schools. An emphasis on closing the achievement gap is also visible in policy, with some state charter laws specifically indicating charter schools as part of the goal to close the achievement gap (Wohlstetter et al., 2013). Charter-school laws in nine states include a provision that outlines the primary purpose of charter schools is to improve student learning and achievement for student groups, such as low income and underperforming students (Wohlstetter et al., 2013).

Enrollment in charter schools has increased nationally. Hanushek, Kain, Rivkin and Branch (2007) commented on the rapid development of charter schools by, noting “in

just ten years of development, they are found in over three-fourths of the states and their enrollment exceeds 4% of the public-school population in some states” (p. 824).

Wohlstetter et al. (2013) reported that charter school enrollment increased from 340,000 to 1.6 million students in their first decade; and between 2011–2012, over five hundred charter schools opened. Rebarber and Zgainer (2014) reported that charter schools numbered 6,004 and served 2.2 million U.S. students in 2012. Rebarber and Zgainer (2014) asserted that demand for charter schools remains strong. This demand is seen in changes in students on the charter waiting lists. Based on a national survey of 5,300 operational charter schools from 42 states, the average number of students on waitlists surged from 233 in 2009 to 277 in 2012 (Rebarber & Zgainer, 2014). The authors argued that waitlists above 200 students indicate an excess of demand over charter school supply. Increase in demand suggests that charter schools could attain significant growth in a supportive policy environment (Rebarber & Zgainer, 2014).

Indeed, charter schools have shown a strong national growth trend, according to Rebarber & Zgainer (2014), with the “highest charter schools and enrollment growth...in jurisdictions with strong charter laws. Strong charter laws feature independent, multiple authorizers, few limits on expansion, and high levels of school autonomy” (p. 2). Even though other factors may impact the growth of charter schools, there seems to be a relationship between the growth of charter and legislation that is supportive of their establishment and development. Some states cap the number of charter schools, while others have no such caps. States with caps may not be able to respond to increased demand, while those that allow more charters may enhance charter growth when demand

occurs. Strong charter laws promote independent, multiple authorizers, few barriers on expansion, and high levels of autonomy (Rebarber & Zgainer, 2014).

In Colorado, the Department of Education (CDE, 2019) reports of a trend of significance where PK–12 charter enrollment has continued to increase while non-charter enrollment has begun to drop. Charter schools in Colorado have increased steadily from as few as two schools in the year 1993 to as many as 255 in the year 2019. Colorado charter enrollment has increased annually. Table 1.1 shows this trend.

**Table 1.1**

*Charter School Enrollment Growth in Colorado*

Year	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19
Student Enrollment	95,860	101,359	108,793	114,694	120,739	124,562

Source: CDE, 2019.

Table 1.2 captures public school enrollment data in Colorado that shows trends of increases for charter schools and decreases for non-charter schools.

**Table 1.2**

*Colorado PK-12 Enrollment Change*

Year	2016-17	2017-18	2018-19
Non-Charter	-103	-900	-2,636
Charter	5,901	6,045	3,823

Source: CDE, 2019

Increasing enrollment in Colorado charter schools supports the need for more research into charter effectiveness in comparison with non-charter public schools. State-level research on student outcomes and school types (charter and non-charter) can

measure impact of school type on specific student populations. A research report from the Colorado Department of Education (2016) indicated that low socioeconomic students (Free and Reduced Lunch eligible) performed better on benchmark expectations on Common Core (PARCC) and state level (CMAS) assessments (2014–2015) in charter than non-charter public schools. Table 1.3 provides comparative data.

**Table 1.3**

*Test Score Comparison between Charter and Non-Charter Students*

	<b>Charter</b>	<b>Non-charter</b>
CMAS Social Studies	8.2	7.7
CMAS Science	16.0	14.4
PARCC English Language Arts	27.0	22.4

Source: CDE, 2016

Even though there is contextual variation across school types, the market model of school choice supports research regarding student outcomes and school type.

### **Statement of the Problem**

The general education standard in the United States as measured by national and state assessments puts graduates from public schools at risk of global competitive disadvantage (Wagner, 2010). In the 2019 National Assessment of Educational Progress (NAEP) report, 2017 results of 4<sup>th</sup> and 8<sup>th</sup> grade reading, and mathematics were compared to NAEP achievement levels (NAEP Basic and NAEP Proficient). Most state results achieved the NAEP Basic level (Rahman et al., 2019). Results of a study examining percentage of students proficient for language and math from 452 New Jersey schools

revealed that by high school, 52% of the variance in language and 59% in math test scores were linked to SES and racial factors (White, et al., 2016). Urban school districts often have a higher density of a low-SES student population (Clark et al., 2015). Furthermore, research has found that the mean academic achievement in math and reading is lower in U.S. urban setting than in non-urban ones. These results for low-SES students suggest they are vulnerable to a lack of access to high-quality education (Rippner, 2016). In urban areas, charter schools may provide parents with an alternative public-school choice to educate their children.

In Colorado, charter schools have seen favorable legislation; thus, the number of charter schools has increased annually. In the 2018–2019 school year, there were 255 charter schools, serving 124,562 students: in contrast to 1,645 non-charter schools, serving 798,119 number of students in the same 2018–2019 school year (CDE, 2019). Since their inception in 1993, Colorado charter schools have increasingly served low SES students, growing from 29.7% FRL students in 2010 to 34.6% FRL students in 2019. This represents an increase of 4.9% for charter schools. The rate of non-charter schools serving FRL students has been more stable. In 2010, Colorado non-charter schools served 39.4% of FRL students, increasing to 41.9% in 2019, representing an increase of 2.5 percentage points (CDE, 2019). The percentage of FRL eligible students in non-charter public schools was 41.9. From 2014–2019, Colorado charter and non-charter schools serve comparable populations of students, considering variables of racial and ethnic diversity and socioeconomic status as identified by the population of students who qualify for free and reduced-price lunch.

**Table 1.4***Racial and Ethnic Minority Student Enrollment from 2014 through 2019 by school Type*

<b>Year</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Charter	45.3%	45.9%	46.9%	47.3%	48.1%	48.3%
Non-Charter	45.0%	45.6%	45.8%	46.2%	46.4%	46.5%

Source: CDE, 2019

**Table 1.5***FRL Eligible Student Enrollment from 2014 through 2019 by School Type*

<b>Year</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Charter	35.4%	35.1%	35.7%	35.6%	35.7%	34.6%
Non-Charter	42.9%	42.6%	42.8%	43.2%	42.7%	41.9%

Source: CDE, 2019

As seen in Tables 1.4 and 1.5, the population of racial and ethnic minority students and FRL eligible students in Colorado charter schools has exceeded or is comparable to non-charter public schools from 2014–2019.

Additionally, several Charter Management Organizations (CMOs) have entered the Colorado charter school landscape. “A CMO is a non-profit organization that creates a group of schools with a shared educational vision and mission” (Smith, Farrell, Wohlstetter, & Nayfack, 2009, p. 1). Many of these CMOs are designed to serve the FRL student population. Examples of CMOs designed for low-SES student populations are Knowledge is Power Program (KIPP), STRIVE Prep, and Denver School of Science and Technology (DSST). As charter schools increase their populations of racial and ethnic

diversity and FRL eligible students, it is important for research to explore their value proposition for this vulnerable population.

### **Theoretical Framework**

Morley and Rassool (2002) posited that school effectiveness is a theory of educational change. They maintained that school effectiveness has become a vast industry, generating costly research and influencing educational policies, including school-choice policy in diverse national settings. The economics of education, with the core concerns of economic and social returns of educational investment, has crucially been involved in the debate on school effectiveness and academic achievement. Thirty years ago, it was generally believed that schools and teachers could do little to bring about educational improvement. There was widespread belief supported by research (Coleman, 1966) that learning capacity was determined by fixed cognitive abilities and social indicators like SES, and that the work of teachers and schools had little impact. However, school effectiveness research provided evidence that some schools with similar populations of students were more successful than others. The school effectiveness movement demonstrated that schools do indeed make a difference in academic achievement (Morley & Rassool, 2002). Morley and Rassool (2002) indicated further that school effectiveness is measurable using achievement outcomes among similar student populations.

A central assumption in school-effectiveness theory is that neutral, value-free, and socially decontextualized standards are attainable (Morley & Rassool, 2002). While equity theories in education make important links between social identity and cognitive

ability, “school effectiveness focuses on student outcomes rather than power/knowledge conjunctions” (Morley & Rassool, 2002, p. 6). The analysis of school effectiveness theory thus reveals less emphasis on social exclusion, poverty, and deprivation, and more emphasis on organizational factors.

Charter schools are rooted in school effectiveness theory. Early charter school advocate, Joe Nathan (1996) stated that schools can have a “significant, measurable impact on young people” (p. 16). School effectiveness theory identifies the school as a unit of change. Charter schools emerged from the belief that schools with a shared vision of school community can improve opportunities for individual students and strengthen public education. A contract, or charter, stipulates academic goals and student assessment methods that are used to determine whether the school continues after a specified time, usually three to five years. Common characteristics of charters include the following:

- In exchange for explicit accountability, most district rules and regulations are waived, other than those related to building safety and achievement.
- Schools are free to set their working and governance systems, including the option to be worker-owned cooperatives.
- Charter schools receive the same per-pupil funding as other public schools
- No students are assigned to a charter school; each is a school of choice.

Multiple organizations (e.g., a state board of education, a public university) can sponsor a charter school with a local district. (Nathan, 1996, pp. 16–20).

The most significant characteristics of charter schools are the contracts that define specific expectations, and the autonomy which allows charter to tailor instruction to the needs of a specific population.

Maas and Lake (2015) list the characteristics of school effectiveness as:

a focus on a shared sense of purpose and mission that emphasizes academic performance, intensive use of assessment and monitoring progress, orderly, yet not oppressive atmosphere within the school facilitated by rewards structure, collaboration/extensive teacher coaching within the school, increased instructional time, and a culture of high expectations. (p. 169)

The charter-school contract and the requirement to demonstrate results provide the foundation for the shared mission and focus on student academic performance described in school-effectiveness theory. School-effectiveness theory posits that school type makes a difference in student achievement. As more racially and ethnically diverse, and low-SES students enter charter schools, it is important to learn more about the differences in student achievement between public school types (charter and non-charter).

### **Purpose of the Study**

The purpose of this study is to investigate differences in math academic achievement of low-SES elementary students in charter and non-charter schools in Colorado. The low-SES student population is defined as those who receive free and reduced lunch (FRL). Research has often used eligibility for free reduced lunch as a proxy for low-SES (Butler et al., 2018; Dickhoner & Fellow, 2020; Rebarber & Zgainer, 2014). Rebarber and Zgainer (2014) asserted that the FRL program is by far the most cited proxy for low-income status at the elementary and secondary levels. Furthermore, the authors noted that though FRL is not an ideal measure of low-income status, it is

often the only available measure. For this reason, the present study uses FRL as proxy for low-SES. In addition, research has demonstrated correlation between math achievement and SES, with Tate (1997) indicating a positive correlation between SES and math achievement. This correlation of math achievement and socioeconomic status provides the rationale for using math scores on the Colorado Measures of Academic Success (CMAS) as a proxy for achievement in the present study of low-SES students in Colorado.

Building on existing research, the present study explores the impact of charter schools on student achievement. The Center for Research on Education Outcomes (CREDO) has conducted research comparing the performance of charter schools and non-charter schools, with the most recent study (2010) asserting that low-income charter-school students performed better than their non-charter counterparts on measures of student achievement (Wohlstetter et al., 2013).

This study used a school-effectiveness lens to explore differences in math achievement among low-SES students in charter and non-charter schools in Colorado. The goal was to learn more about the effectiveness of charter schools as a public-school option for the low-SES student population in Colorado. To learn more about this phenomenon, this study also explored differences in SES proportionality, as well as the relationship between academic achievement and SES proportionality in charter and non-charter schools.

SES proportionality is important to this study. I clustered schools relating to FRL-eligible students into groups of high and low. This enabled me to see and compare

outcome of the groups by school level, and to specifically draw inferences about charter school and non-charter school effectiveness related to student achievement and SES.

This study used 2x2 ANOVA to find if there are significant differences in academic achievement produced by charter and non-charter schools for low-SES students in Colorado. The dataset was for the academic year 2018/19 and was obtained from CDE, and I explored differences in academic achievement for the low-SES population between the two school types. Findings from the present study will inform parents and policymakers about the value proposition of charter schools for low-SES students.

### **Research Question**

The present study asks: What are the effects of SES and public-school type (charter and non-charter schools) on math achievement in the 2018/19 academic year in the state of Colorado?

1. What are differences between math academic achievement in charter and non-charter schools?
2. What are differences in SES proportionality in charter and non-charter schools?
3. Is there any significant relationship between SES and percentage-minority?

### **Hypotheses:**

- H1<sub>0</sub>: There is no statistically significant main effect of school type or school SES category on math achievement of low-SES student population
- H1<sub>1</sub>: There is a statistically significant main effect of school type and SES on the math achievement of low SES student population. It is hypothesized that

the mean math achievement of low SES student population in charter schools is significantly higher than the mean math achievement of low SES student population in non-charter schools.

- H2<sub>0</sub>: There is no statistically significant interaction effect of school type and school SES on math achievement of low SES student population
- H2<sub>1</sub>: There is a statistically significant interaction effect of school type and school SES on the math achievement of a low SES student population
- H3<sub>0</sub>: There is no statistically significant association between SES category and charter/non-charter school type.
- H3<sub>1</sub>: There is statistically significant association between SES category and charter/non-charter school type.
- H4<sub>0</sub>: There is no significant difference in percentage minority students by SES category.
- H4<sub>1</sub>: There is a significant difference in percentage minority students by SES category.

### **Significance of the Study**

This study focused on the relationship between school type (charter and non-charter) and academic achievement in math for the low SES student population in Colorado. Hanushek et al. (2019) offered that “[I]ittle research attention has been given to trends in SES achievement gaps over the past half century” (p. 1), indicating furthermore that “in terms of learning, students at the 10<sup>th</sup> SES percentile remain some three to four years behind those in the 90<sup>th</sup> percentile” (p. 2). As Colorado charter schools have

steadily increased in number and become more diverse (CDE, 2019), the effects of this trend and the impact on low-SES student populations further exploration.

As school-effectiveness research shows, individual schools can influence academic achievement more than factors of poverty and race. This study seeks to contribute knowledge of how school-type relates to academic achievement among low-SES students. As Epple et al., (2016) asserted, “continuing to collect and analyze data on charter schools is crucial. It remains to be seen whether, as it continues to mature, the charter movement will fulfill fully the as yet unrealized aspirations of its founders” (p. 203). The results will reveal, in a Colorado context, if charter schools are fulfilling their promise in the education of low-SES students.

Rippner (2016) states: “Educational leaders and policymakers must focus on all students achieving at high levels in order to meet national educational attainment goals” (p. 3). This study will therefore inform policymakers, educational leaders, and administrators regarding how charter and non-charter schools impact math achievement for low-SES students. Additionally, the present seeks to explore the relationship between student achievement and SES proportionality in charter and non-charter schools. Exploring the proportionality of the low-SES student population in charter and non-charter is important because charter schools were founded to serve specific student populations. The performance of low-SES students in terms of Mean Scale Score in mathematics will be compared for charter and non-charter school students. Differences in these results will indicate the viability and effect of charter schools in providing educational services that promote academic achievement for low-SES students.

## **Limitations and Delimitations**

The use of aggregated SES measures may invoke the issue of “ecological fallacy” (Sirin, 2005, p. 419) when interpreting results from various studies with varying units of analysis. Sirin (2005) defines ecological fallacy as misinterpretation wherein an individual-level inference is made based on a group aggregated data. Colorado charter and non-charter schools constituted the population and the sample used in the study; therefore, conclusions from the study are limited to Colorado and may not be generalized to other U.S. states. In addition, individual schools self-report variables pertaining to economic status. This represents a limitation to the study, as the reports could be flawed with discrepancies. However, educators in the various schools conduct regular equity audits which lends increased authenticity to their economic-status reporting.

The present study used mean math scores at the school level as outcome measures even though schools offer many other subjects that could be aggregated as outcome measures. As well, even though there are many years of math achievement data, the study used just one year for the comparison of achievement between the two school types under review. This delimits information of the other years that could have been used for the analysis.

Finally, the study is delimited by not exploring racial impact on achievement. Race was not included for two reasons. First, the researcher wanted to focus on low-SES populations regardless of racial decent, even though a race may be highly represented in the low-SES student population. Second, there was not enough data on race to make analysis on race meaningful in relation to prediction of academic achievement. However,

proportion of minority students in each school was obtained from the CDE database. Even though this variable was not used in the factorial ANOVA, I explored the association between SES category and proportion of minority students using a chi-square test of association to help interpret the results.

### **Definition of Terms**

The following terms are used in this introductory chapter:

**Charter schools.** Charter schools are tuition-free, public schools that have the flexibility to be more innovative and are held accountable for student achievement.

**Charter management organizations (CMOs).** “A CMO is a non-profit organization that creates a group of schools with a shared educational vision and mission” (Smith, Farrell, Wohlstetter, & Nayfack, 2009, p. 1).

**Per-pupil operating revenue.** Charter schools are funded with state taxpayer dollars in the form of “per-pupil operating revenue” or PPR.

**Percentage of students that qualify for federally free and reduced lunch (FRL).** The percentage of students enrolled in a school that qualify for federally free or reduced lunch as an indicator of a socioeconomic status of the students at the school.

**Low socioeconomic status student population.** The population of students who are eligible for federally FRL.

**Student achievement.** The status of a student’s content knowledge of state standards is reflected as student achievement. The state of Colorado has subject-specific definitions:

***Math achievement.*** This is the percentage of students that scored proficient or advanced in mathematics on the Colorado state end of year assessment at a school.

***Reading achievement.*** This is the percentage of students that scored proficient or advanced in reading on the Colorado state end of year assessment at a school.

**Class size.** This refers to the number of students in a given course or classroom, specifically either (1) the number of students being taught by individual teachers in a course or classroom or (2) the average number of students being taught by teachers in a school, district, or education system.

**Poverty.** In its most general sense, poverty refers to the lack of necessities. Basic food, shelter, medical care, and safety are deemed necessary based on shared values of human dignity (Bradshaw, 2007).

## **Chapter Conclusion**

The current chapter opened with discussion of the plight of American education, and the public’s desire for alternative public-education models, and research on vulnerable student populations, namely low SES, was highlighted. The chapter indicated that traditional public education was a focus of many reforms and contributed to how charter schools entered the U.S. public-education landscape. Topics discussed in the chapter include a statement of the problem, theoretical framework, purpose of the study,

research questions and hypotheses, significance of the study, limitations and delimitations, and definition of terms. Chapter two explores research on topics such as charter movements (National and Colorado context), school effectiveness, and research on charter school effectiveness.

## **Chapter Two: Review of the Literature**

As the number of charter schools across the United States increases, it is important to explore how they serve the academic needs of our most vulnerable student populations. The purpose of this chapter is to present a history of the charter-school movement in the United States and Colorado, along with research on their effectiveness related to student achievement. Research on the achievement and opportunity gaps as well as charter schools serving low-SES student populations is also discussed.

### **Search Criteria of Literature Reviewed**

The literature review was carried out by first finding articles in ERIC, Google Scholar, and JSTOR. Keywords included: (“CHARTER SCHOOL” and “ACHIEVEMENT”), (“CHARTER SCHOOL” and “MOVEMENTS”), (“CHARTER SCHOOL” and “CHARTER EFFECTIVENESS”) (“ACHIEVEMENT GAP”) and “MINORITY”), and (“SCHOOL EFFECTIVENESS” and “CHARACTERISTICS”). After entering the keywords, I used “customize range” to locate related and most-current articles from 2010 to 2020. In addition, I conducted snowball sampling to find other relevant articles using references in the sources already retrieved. Some of these relevant articles obtained from the references would, however, have dates prior to the range 2010 to 2020, hence the use of some older references. I also consulted the University of Denver libraries for journals of school choice and books on charter schools.

## **National Charter School Movement**

This section documents the history of charter in the United States and highlights important features such as of parental choice, decentralized decision, and an initial focus on accountability.

American parents, scholars, politicians, and organizations have expressed dissatisfaction for American public education dating back to the 1980's (Rippner, 2015; Hanusheck et al., 2019). Concerns reflected questions about the ineffective and bureaucratic nature of public education, coupled with waning competitiveness among graduates from American public schools (Rippner, 2015). In 1983, the National Commission of Excellence in Education released "A Nation at Risk," a report that accelerated concerns about the quality of public education in the United States, pointed out its effects on global economic competitiveness, and highlighted the urgency to rectify the situation.

In response, the 1980s were characterized by several school-reform efforts, and the "charter movement" was one such reform (Wohlstetter et al., 2013). This movement critiqued the bureaucracy of public-school education and led to a push for school-based management, deregulation, and emphasis on school choice (Wohlstetter et al., 2013). Charter advocates believed that school communities, including parents—not district bureaucracy—should make decisions about curriculum, staff, and school budget.

Two prominent U.S. educators are credited with the rise of charter schools as a school reform strategy: Albert Shanker and Ray Budde. Shanker was the former president of the American Federation of Teachers and Budde was a retired schoolteacher who

coined the term “charter” (Weekes, 2016). During a local school-board meeting in New England in 1970, Budde suggested groups of teachers receive contracts called “charters.” In charter schools, teachers would be permitted to establish new educational practices. Charter schools should have more autonomy to promote increased graduation requirements, rigorous student courses, increased teacher accountability, preschool programs and childcare for young parents, and classes tailored to workforce preparation (Barnett, 2009). Budde worked hard on the charter concept but did not receive any support initially (Weekes, 2016). Later, Shanker endorsed Budde’s charter concept following a visit to Holweide Comprehensive School in Cologne, Germany. In Germany, Shanker was inspired by certain educational practices such as authentic accountability, flexible scheduling, and intimate relationships between teachers and students (Barnett, 2009; Kahlenberg & Potter, 2014; Weekes, 2016).

To pique the interest of the American public with the charter concept, Shanker gave a speech at the National Press Club in 1988 that endorsed the idea of teachers establishing autonomous schools (Wohlstetter et al., 2013). The idea that teachers would have the opportunity to establish autonomous or charter schools was appealing. Another key early supporter was Minnesota’s Citizens League “whose members served as policy champions. Early on, the Citizens League endorsed parental choice” (Wohlstetter et al., 2013, p. 6). The League suggested that low-income students should have the choice to attend both public and non-public schools, and they welcomed the idea of creating *new* schools in the public sector. In addition to school choice, the Citizens League also endorsed the idea of “decentralizing decision making to individual schools” (Wohlstetter

et al., 2013, p. 6). The first charter-school law was passed into law in Minnesota in 1991. The City Academy Charter School in St. Paul was the first charter school in the United States, enrolling fifty students in the fall of 1992. It is important to note that the initial focus of the charter school movement was teacher empowerment to drive accountability.

From these initial experiments, the U.S. charter-school movement began to spread with promises of greater autonomy with greater accountability. Charter school proponents claimed that the autonomy would free educators from the bureaucracy that constrained decision making, freeing school resources to accomplish their missions (Cohodes, 2018). In exchange for greater autonomy, charter schools needed to demonstrate their capability to meet student achievement goals, and fiscal and managerial standards. If they failed to meet the performance expectations in their contracts, schools would face closure (Cohodes, 2018). While the charter-school movement expanded across the United States, charter school closures have been relatively low (Hess, 2001; Rotherham, 2005; Vergari, 2000). As well, the existence of charter schools, and rules and regulations that govern charter schools vary widely and are dependent on the political climate of the state and local jurisdictions (Wohlstetter et al., 2013).

### ***First Generation: 1990–2000***

The first generation of charter schools in the United States began in the 1990s. Over the first decade, there was exponential growth of the number of states enacting charter laws, “from one in 1991 to twenty-five by 1998” (Wohlstetter et al., 2013, p. 7). This first generation was characterized by experimentation with the length of charter terms and types of authorizers (Wohlstetter et al., 2013). Many states had laws that

authorized charter schools for three to five years (with the notable exception of Arizona, which authorized fifteen-year charter contracts). There were variations among the states as to who should authorize charters. Some states gave charter authorization powers to local districts, while others established special school boards specifically for chartering. Some states entrusted universities with chartering authorization, and other states utilized a combination of authorizers (Wohlstetter et al., 2013). The first generation was characterized by ongoing discussions about the governance and organization of charter schools (Wohlstetter et al., 2013): Should they be non-profits, public, or some hybrid of the two?

In addition to these governance and organizational questions, the first generation of charter schools represented a range of school types and student populations. Some charter schools were initiated and developed from scratch by teachers, parents, and/or community organizations. In some states, district schools were converted to charter status (Wohlstetter et al., 2013). The charter schools established between 1990 to 2000 mostly targeted and enrolled underserved (disadvantaged) students (Wohlstetter et al., 2013).

In 1995, the Public Charter Schools Program empowered state education agencies to apply for funds to support development of charter schools in their states. The U.S. Department of Education let states make decisions about how to disperse the funds. However, clear directions were given on the use of the money: for planning, design, and implementation of new charter schools, and share information on successful charter schools (Wohlstetter et al., 2013). This funding incentive supported expansion of the charter school movement. By September 1999, more than 1,400 charter schools existed in

thirty-two states and the District of Columbia, with four additional states having charter statutes without any schools (Wohlstetter et al., 2013).

### ***Second Generation: 2000–2010***

Charter schools played a significant role in school improvement under the Elementary and Secondary Education Act (No Child Left Behind 2002) and in programs established under The American Recovery and Investment Act. The significant role of charter schools in school improvement is revealed by Wohlstetter et al. (2013), stating:

federal and state policy makers have institutionalized charters by intentionally including them in federal turnaround models (e.g., School Improvement Grants and the No Child Left Behind Act) and the setting up of new federal programs to assist in their scale-up and expansion. (p. 1)

As of November 2009, more than 5,000 charter schools served over 1.5 million students in 40 states and in the District of Columbia (Gleason et al., 2010). During this time period, charter schools became an established element of the public-school landscape and issues regarding authorization and governance began to emerge. Public concerns arose regarding the numbers and types of authorizers, as well as potential conflicts of interest when school districts were the only entities authorizing charter schools. These concerns led to the founding of The National Association of Charter Authorizers in the year 2000 (Wohlstetter et al., 2013), with the aims to ensure an objective authorizing body and to support the development and implementation of equitable and fair authorizing practices of each state (Wohlstetter et al., 2013).

Over time, more entities entered the charter school market. Without district supports, individual charter schools often struggled with operational and management issues. This

market need fostered the emergence of for-profit Education Management Organizations (EMOs) to provide operational and management services and take advantage of economies of scale by providing services to multiple schools (Wohlstetter et al., 2013). However, these organizations faced obstacles in the charter laws in many states that prevented them from opening charter schools themselves (Wohlstetter et al., 2013). EMOs gained a presence in the charter-school movement through partnering with charter schools to deliver a menu of services ranging from curriculum to back-office support (Wohlstetter et al., 2013). There was a growing interest to replicate charter school models that were demonstrating effectiveness with student achievement.

Soon, Charter Management Organizations (CMOs) that manage several schools with the same mission and educational approach began to emerge. A CMO is a nonprofit organization that creates a group of schools with a shared educational vision and mission. CMOs were established to help alleviate some of the common challenges faced by standalone charter schools (Smith et al., 2009), particularly resource scarcity through economies of scale. For example, a network of schools generates a level of state funds that strengthens CMOs' buying power to meet operational and facility needs, as compared to standalone charter schools. Further, CMOs provide governance and management oversight to schools in their network by creating a home office, which frees principals to serve as instructional leaders.

There are variances in the management structure of CMOs. In some management structures, state law requires each charter school under a CMO to have its own governing board; other laws permit schools to operate under a single board (Smith et al., 2009).

There are also geographic characteristics of CMOs, wherein they may pick a single district, city, or state in which to concentrate their efforts. Other CMOs base their choice of schools on targeted student populations. Several CMOs, for example, have opened schools in neighborhoods with high populations of low-income, African American, and Latino families.

### ***Third Generation: 2010–2020***

The third generation of charter schools reflects an era of refinements of state laws and authorizing practices. Charter schools began as a part of efforts to reform schools. This third decade is characterized by institutionalization rather than reform (Wohlstetter et al., 2013). Wohlstetter et al. (2013) noted “the institutionalization of charter schools as an integral piece of the education landscape, attracting federal and state dollars for expansion and turning around chronically low performing schools” (p. 12). In the third generation of the movement, there is model charter law that aims to strengthen existing U.S charter laws. A project “Measuring Up” was launched by the National Alliance for Public Charter Schools to examine how the existing state charter laws compares to a model law they created (Wohlstetter et al. 2013). The model laws have components that include provisions to spearhead innovation, promote transparency about charter school performance and how they are held accountable, and provide fairness in accessibility to public facilities and funds. Questions have been raised during this latest generation, and efforts geared towards the responses are accredited to the National Association of Charter School Authorizers (NACSA), such as:

what are the policies and practices of authorizers that lead to the operation of high-quality charter schools? What is the role of authorizers in enabling the replication of charter models that work, while closing down charters that do not? (p. 13)

In the last ten years, charter schools have become institutionalized in the policy landscape. The 2012 charter-school boom is attributed to the Obama administration's \$4-billion Race to the Top competition that rewarded states whose education reforms activated the growth of charter schools (Wohlstetter et al. 2013). There was a surge in enrollment, as sixteen states lifted the caps on number of charters schools, and the U.S. Department of Education initiated an expansion of the Charter School Program to include a separate fund for CMOs. As of 2017–18 school year, the number of charter schools in the nation was 7,038, serving estimated 3.2 million students in 45 states including the District of Columbia. In 2017, a total of 309 new charter schools were opened and 238 were closed (David & Helsa, 2018).

Interest in how charter schools perform compared to non-charter schools increased as the numbers of charter schools has risen. In 2012 the National Study of CMO Effectiveness (Furgeson et al., 2012) indicated positive student outcomes from some CMOs and test-score consistency across schools. In 2011, A+ Denver, a nonprofit organization focused on education in Colorado, published a report, "School Achievement in Denver." This research explored the academic performance of 137 schools in Denver Public Schools and compared the School Performance Frameworks (SPF) of 116 district operated schools and 21 charter schools. The result of this research was that the charter aggregate performance was better than district operated schools on median growth

percentiles in the cumulative total of all students (A+ Denver, 2011). This research showed that CMOs in Denver Public Schools (Denver School of Science and Technology, West Denver Prep, and KIPP) not only outperformed district and other individual charter schools but had a significant impact on the district’s overall growth (A+ Denver, 2011). The report indicated that the positive impact of charter schools in Denver is driven by the achievements of a small number of CMOs.

The Center for Research on Education Outcomes (CREDO) (2017) also conducted national research that compared the performance of charter networks to Traditional Public Schools (TPS) and Independent (Standalone) charter schools. The study included 26 states including Colorado. The results present the impact of attending CMOs, Traditional Public Schools, and Independent Charter Schools in terms of standard deviations. The study concluded, “students attending a charter school affiliated with a CMO tend to have stronger math growth equivalent to approximately 17 days of additional class time” (Woodworth et al., 2017, p. 20). Table 2.1 below shares some of the CREDO results.

**Table 2.1**

*Achievement Comparison*

	<b>2011–12</b>	<b>2012–13</b>	<b>2013–14</b>
TPS	0.00	-0.01	-0.02
CMO	0.02	0.03	0.03
Non-CMO	-0.01	-0.01	-0.01

Source: CREDO, 2017

Table 2.1 reveals that CMOs had the best achievement in all three years. The results of traditional public schools (TPS) were zero in the first year, with negative impacts in the following years. Non-CMO schools had negative impacts for all three years but performed better than TPS in the third year. The CREDO (2017) study showed that CMOs are having significant impact on the achievement of low-income students. The CREDO study indicated that, on average, a low-income student would have 34 days of additional math growth in a CMO compared to the experience of a similar student in TPS (Woodworth et al., 2017).

The initial vision of the charter reform movement—which promised increases in opportunities for teachers, innovations in education programs, student performance and school autonomy, opportunities for parent involvement and school accountability—has considerable variability across the landscape of U.S. charter schools. Lester (2018) says that though charter schools do not exhibit substantial performance gains when compared to traditional public schools generally, some charter schools do perform better. While the charter model demonstrates excellent potential, charter schools stand to benefit from further improvement (Lester, 2018).

### **The Colorado Charter School Movement**

As noted earlier, charter school legislation is controlled at the state level. Colorado was an early proponent, passing the charter legislation in 1993, only the third state to do so after Minnesota and California (Benigno & Morin, 2013). Many influential figures, parents, educators, and political leaders worked hard for the success of the charter movement, even though they had to face serious legal challenges. Colorado HB

1299 was the first charter-like bill to pass out of the legislative chamber. This bill made it through the house but died in the Senate Education Committee (Benigno & Morin, 2013).

The early 1990s saw the formation of organizations of citizen groups across Colorado with the primary purpose of pushing forward more educational choice. The increasing demand of the citizens resulted in a strategy needed to pass a bill that would allow parents and teachers to create their schools—free from restraints and regulations. Colorado policymakers made efforts to establish charter-like reforms, and they received formidable support and attention from the nation’s capital (Benigno & Morin, 2013). Senate Bill 183 was introduced and assigned to Meiklejohn’s committee. Meiklejohn was a Senator who introduced his own version of the bill to the committee. This bill gave charter school teachers the chance to contribute to the Public Employees Retirement Association (PERA). Testimonies were provided over three hearings, with the first witness, Barbara O’Brien, testifying on February 10. The second testimony was given by Royce Forsyth, the First Congressional District’s representative on the State Board of Education. This Democratic official told the Committee that the State Board of Education had passed a unanimous (7–0) resolution to register their support for charter schools (Benigno & Morin, 2013).

On June 3, 1993, Gov. Roy Romer signed the Charter School Act, SB 183, into law (Benigno & Morin, 2013). The first charter school in the state was opened on September 10, 1993. Two Colorado educators, Mary Ellen Sweeney and Rexford Brown, spearheaded the League of Charter Schools to provide support for charter schools. The Colorado League of Charter Schools was established in 1994, at a time when many

charter applications were being rejected by local school districts (Benigno & Morin, 2013). Since signing the Colorado's Charter Schools Act into law, there have been some legislative amendments such as more equitable funding and the elimination of the state's cap on the number of charters. By 1998, the statewide cap on the numbers of charter schools was removed.

The Colorado Charter School movement continued with efforts to advance the charter interest in the second generation. This generation spans the years 2000 and 2010, with important strides, as described by Benigno and Morin (2013): "One of the biggest innovative breakthroughs to bolster the charter movement was the 2004 establishment of the Charter School Institute (CSI)" (p. 34). The political nature of local school districts gave rise to the need to have an "objective" authorizing entity. Despite the failure of initial legislative attempts to create an alternative authorizer, a case involving the Steamboat Springs School District and the Montessori School provided the platform for change in the early 2000s. The Steamboat Springs school board had denied charter school applications, and this contentious battle catalyzed the push to establish the CSI. By the end of the second generation, charter schools in the state had grown into 187 schools serving approximately 89,000 students—about 11% of Colorado's public-school enrollment (CDE, 2016; Benigno & Morin, 2013).

Charter schools in Colorado saw significant growth, with a total of 226 schools serving 108,793 students in grades PK–12 in the 2015–2016 school year. This is an increase of 30.3% from the population of 83,478 in year 2013 (CDE, 2016). The total number of students served by charter schools in Colorado who qualified for free and

reduced lunch was 39,057, representing 36% of the total charter school enrollment in the 2015–2016 school year. As well, Colorado charter schools served more racially and economically diverse student populations in the 2015–2016 year than in previous years. Many Colorado charter schools are independent entities. There is, however, an increasing number of schools managed by CMOs and EMOs. Since 2013, the trend of national charter management companies in Colorado declined while the number of locally grown, Colorado-based organizations increased (CDE, 2019). In the 2018–19 school year, 15 of 255 or 5.9% of charter schools utilized a national organization to provide a managing support for their school. By contrast, 100 of 255 charter schools were associated with a local organization that managed two or more schools. In total, 115 of 255 schools worked with some type of multi-school management organization, making up 45.1% of all charter schools in the state (CDE, 2019).

Colorado is a good site for this study because it was the third state to adopt charter school legislation (Benigno & Morin, 2013), and Colorado has geographically diverse charter schools (CDE, 2019). In addition, there are CMOs that have entered the Colorado charter landscape, making significant improvement in academic outcomes of individual students and the entire public-school system, especially among students with low SES. Colorado’s population is growing, with approximately 10% constituting immigrants. The Denver metropolitan area is one of the most racially diverse in the state ([worldpopulationreview.com/states/Colorado-population](http://worldpopulationreview.com/states/Colorado-population)).

Charter schools in Colorado have a trending positive report of serving racially and economically diverse student populations (CDE, 2016). About 50% of charter schools in

Colorado are in the Metro Denver area. Similar patterns are visible in other states, generally supportive of the fact that across the country, charter schools are more likely to be in the urban areas. Since their inception in 1993, charter schools in Colorado have increasingly served low-SES students. In 2010, charter schools in Colorado served 29.7% FRL students and 34.6% in 2019, indicating that charter schools in Colorado have increasingly served an FRL-eligible student population. During this time, the rate of non-charter schools serving FRL students was more stable. In 2010, Colorado non-charter schools served 39.4% of FRL students in 2010 and 41.9% in 2019, representing an increase of 2.5 percentage points (CDE, 2019). Tables 2.2 and 2.3 report racial and ethnic minority and FRL-eligible student enrollment from 2014–2019 for charter and non-charter schools (CDE, 2019).

**Table 2.2**

*Racial and Ethnic Minority Student Enrollment from 2014–2019 by School Type*

Year	2014	2015	2016	2017	2018	2019
Charter	45.3%	45.9%	46.9%	47.3%	48.1%	48.3%
Non-Charter	45.0%	45.6%	45.8%	46.2%	46.4%	46.5%

Source: CDE, 2019

**Table 2.3**

*FRL-Eligible Student Enrollment from 2014–2019 by School Type*

Year	2014	2015	2016	2017	2018	2019
Charter	35.4%	35.1%	35.7%	35.6%	35.7%	34.6%
Non-Charter	42.9%	42.6%	42.8%	43.2%	42.7%	41.9%

Source: CDE, 2019

These trends reveal that the student populations in charter and non-charter schools are similar to charter schools in Colorado serving higher percentages of minority and English language learner (ELL) students, and lower percentages of FRL-eligible students and students with disabilities.

These details about the public-school landscape in Colorado provide the rationale for why the state is a good site for the present study. Charter schools in Colorado have comparable diversity to traditional public schools and charter school enrollment continues to increase. In the 2018–2019 school year, there were 255 charter schools serving 124,562 students; and there were 1,645 non-charter school serving 798,119 students. The charter school sector within Colorado has schools that are largely varied, and includes an array of education models such as Core Knowledge, STEM, Montessori, etc., and governance structures such as CMO, EMO, Network, etc. (CDE, 2019).

### **Charter Schools and School-Effectiveness Theory**

School-Effectiveness Theory identifies the school as a unit of change, arguing that the school can make a difference in the academic achievement of the student. The charter school focuses on an education model that provides alignment with school effectiveness theory. Under these education models, schools have diverse beliefs relating to how students should be educated. These schools are executing on these beliefs and are realizing better achievement of their students. CDE explains further:

Models can range from schools that hold a belief that students need to be taught a foundation of knowledge in a structured way to contribute meaningfully to society (Classical, Core Knowledge, etc.) and other models that are guided by a belief

that children construct their own knowledge, and that the school's role is to provide opportunities for students to make meaning through hands-on activities (Montessori, expeditionary learning, etc.). (CDE, 2019, p. 11)

Charter-school networks and CMO's define their education models. DSST Public schools is one of the leading open enrollment Science, Technology, Engineering, and Math (STEM) schools in the United States (dsstpublicschools.org). In Colorado, DSST is exhibiting high academic performance as well as replicating this performance, with 13 schools currently in its network. This CMO has a mission to transform urban public education by eliminating educational inequity and preparing all students for success in college and the 21<sup>st</sup> century (DSST Public Schools, n.d.). STRIVE Prep constitutes another CMO in Colorado with 11 school locations. KIPP, a CMO, that is locally and nationally managed, has six schools in its Colorado network. KIPP in Colorado has the mission to equip their students with the academic skills and character strengths necessary to succeed in college and the competitive world beyond (KIPP Colorado, n.d.). These are examples of CMOs focused on the needs of low-income students. Such schools are worth discussing in the present project, as it too focuses on low-SES student achievement in Colorado. Colorado KIPP (n.d.) elaborated the need for such programs:

The future of our country depends upon our collective commitment to providing all children with access to great public education. In particular, there is a level of urgency when we consider the challenges faced by one in five children living in poverty in America, according to the U.S. Census Bureau. We need to work together to challenge the reality that a child in a more affluent community is seven times more likely to graduate from college than a child growing up in poverty.

This particular description from Colorado KIPP, together with the mission statements of all these CMOs demonstrate their efforts and intent to serve low-SES students. In general, charter schools have a positive impact on academic achievement of students in

Colorado, especially the impact of CMOs on low-SES students, which makes this study necessary.

As noted in the prior section, charter schools often have specific educational models and focus on specific populations, like students of color and low-income students for example (CREDO, 2017). Charter schools are a significant part of the public-school landscape and they constitute 13.4% of schools in the state of Colorado (CDE, 2019). Additionally, Colorado is an open-enrollment state. Open enrollment is the policy of allowing qualifying students to enroll in schools of their choice. Students can choose to attend their neighborhood school or “choice in” to another public school. In states like Colorado, school effectiveness is a dimension that parents might consider in making choices about where to enroll their children. In other words, parents’ knowledge of school-effectiveness theory (which stipulates that the school can make a difference in the academic achievement of the student, and that schools are able to overcome the influence of socioeconomic status on achievement) will lead parents to filter schools for a better school choice for their children. Research about school effectiveness is important for families to make decisions regarding the best school choices for their children.

Before school choice became a part of the educational landscape, the Coleman Report (1966) and Plowden Report (1967) indicated that schools did not have a great influence on student achievement. The reports found that socio-economic and family backgrounds played essential roles in student educational success. Findings of Coleman’s large-scale survey conducted on the achievement of 645,000 students in 4,000 primary and secondary schools indicated that academic attainment was largely not dependent on

the schooling a child received (Morley & Rassool, 2002). Relentless efforts have been made by the school-effectiveness movement to demonstrate exceptions to the Coleman Report. Ron Edmond, one of the founders of the school-effectiveness movement in the United States, turned down the Coleman Report's findings, arguing that "all children are eminently educatable and ...the behavior of the school is critical in determining the quality of that education" (p. 2). Over the years, research has indicated schools and teachers can make a difference in educational achievement of students across socioeconomic groups (Morley & Rassool, 2002).

Morley and Rassool (2002) indicated that educational success is dependent on factors that can be measured. The authors assert that there has been a constant shift of explanatory variables identified in research, ranging from a psycho-social focus on the family to organizational factors. Charter schools have organizational characteristics that make them a unique school type: autonomy and accountability. The opening of a charter school entails processes with a requirement to be accountable for results. First, charters must go through a charter application that defines the contract and specific expectations and requires the founders to be mission-based. Second, performance is monitored and evaluated, and charters can face closure if they do not meet the charter conditions. Next, charter schools have autonomy over instruction, resources, and hiring. This autonomy may result in some school-based benefits. For example, autonomy over instruction allows charters to tailor their instruction to the needs of a specific population (Keddie, 2014; Toma & Zimmer, 2012). Autonomy over resources enables charters to direct funds to areas of most need (Keddie, 2014; Toma & Zimmer, 2012), and autonomy over staffing

ensures that charters pay staff based on their productive services, where hardworking staff are paid more than non-hardworking staff (Kaddie, 2014). Proponents of charter schools also hoped that flatter organizational structures would allow teachers to play a more active role in school-level decision-making and offer more opportunities for school leadership (Kahlenberg & Potter, 2015).

In proposing for restructuring public school districts via charter schools, Budde (1988) assumed that charters would “give teachers responsibility for their own learning and behavior” (p. 30). Through their analysis and research on the public-school system, Chubb and Moe (1990), stated:

the key to effective education...rests with granting them the autonomy to do what they do best. As our study of American high schools documents, the freer schools are from external control—the more autonomous, the less subject to bureaucratic constraint—the more likely they are to have effective organizations. (p. 187).

Proponents of charter schools maintain that the combination of autonomy and accountability yield better learning programs than the local public alternatives, resulting in better student achievement in charter schools (Bulkey & Fisher, 2003; Kolderie, 1990). School-effectiveness theory supports the general belief that the school as an organizational unit can coordinate efforts in delivering predictable educational results positing: “performance of schools, teachers, and students has become a register of truth about effectiveness” (Morley & Rassool, 2002, p. 3). In other words, the effectiveness of a school is not solely based on the student’s ability, but on the school itself.

There are roles to be played by the school as organizational unit in enhancing the educational success of students. Morley and Rassool (2002) document a trend that there

has been a transformation in educational policy about “failing” teachers and “failing” schools since New Right education reform in both United States and the U.K. in the 1980s. This transformation has been supported by political wings. For example, in Britain, New Labor, a period in the history of British Labor Party, used school effectiveness as a claim in the context of educational standards, and as a tool for challenging differentials and promoting social inclusion. That is, one’s socio-economic status should not exclude or limit their ability to improve. Schools as organizations could make a difference, eradicating the impact of socio-economic status, and helping all students reach expected academic standards. According to Morley and Rassool (2002), one of the essential ingredients of school effectiveness is the shift from the social to the organizational context. They claim, even though the school is represented as a bounded institution, it is precariously related with a broader social context. Schools can make a huge difference in the educational achievement of students, and that the school effect can be measured (Morley & Rassool, 2002).

Some research indicates that “good schools seem to look the same, regardless of governance model” (Maas & Lake, 2015, p. 166). This implies that effective schools have characteristics that are consistent across sectors. Maas and Lake (2015) indicated that “charter authorizers, district portfolio managers, and funders should look for these critical elements in new applications, or school improvement plans, as well as a well-thought-out theory of how they will work together coherently” (p. 165). Maas and Lake (2015) and Sammons (1995) focused on school characteristics that provide learning opportunities and environments for students to achieve. Examples of these characteristics

are shared sense of purpose and mission that emphasizes academic performance and progress monitoring. Shepherd (2011) indicates, even though social contexts may significantly impact students' outcomes, attending effective school generally have positive influence on students' outcomes than ineffective schools.

The claim in this effectiveness literature review is that there are certain conditions which, when implemented, sustained, and replicated, whether by charter or non-charter schools, will lead to the production of high student outcomes. The charter contract and emphasis on accountability theoretically align charter schools with school-effectiveness theory (my study sought to test this theory), and the potential of individual schools to impact the achievement outcomes of students. Some scholars and educational leaders believe that charter schooling sets an alternative stage that provides school leadership the opportunity to create coherent and effective schools free from institutional bureaucratic constraints (Maas & Lake, 2015). The charter sector has mounted creative support structures that scale successful schools.

School-effectiveness research indicates that the school, as an organizational unit can make a difference in student outcomes. This effectiveness is based on certain characteristics that must be present. Although background factors are important, schools can have significant impact (Sammons, 1995). School-level characteristics play crucial roles in influencing student achievement (Morley & Rassool, 2014). School effectiveness research indicates that the school is the unit of change that makes a difference in student academic achievement.

One of the key attributes of charter schools is the promise that autonomy at the school level will result in increased accountability and improved student outcomes. Research has identified benefits of greater autonomy at the school level. For example, greater school autonomy permits teachers to abandon things that do not work and to create a structure that embraces student learning and engagement (Oberfield, 2016). Keddie (2016) studied how autonomy can be mobilized to maintain integrity of public education. This comparative study examined autonomous schooling in the United States and Australia. Three values of autonomy were: “(1) public ownership (i.e., governance that is responsive to the people it serves), (2) equity and access (i.e., adequate funding and inclusive student admission practices) and (3) public purpose (i.e., prioritizing the moral and social purposes of education)” (p.249). This study found that government reforms with varying degrees and at different time points have provided conditions in schools in United States and Australia to exercise greater self-management; and that granting schools more control and authority over their governance leads to more effective, responsive, and innovative education systems. This study went on to report that autonomy increased greater flexibility in curriculum delivery, control over setting pay, where hardworking staff are paid more, and school duration whereby longer school periods will positively impact student learning (Keddie, 2014). This research influenced policymakers in Australia. Keddie (2014) reported that Christopher Pyne, Federal Education Minister of Australia, made the following claim: “All international evidence points to the fact that the more autonomous a school, the better the outcomes for students” (p. 249). Suggett (2015) maintained:

there is no definitive or simple conclusion from assessing the impact of autonomy on student achievement, but neither does the evidence reject the contribution of autonomy. Rather, the evidence points to autonomy as a key and necessary component of a mature and high-performing system. (p.1)

Other studies raised concerns about autonomy as a solution to improve schools.

Keddie (2014) studied the different ways in which schools currently engage their autonomy to cope with the “demands of audit culture” (p. 4). Explained further, Keddie (2014) asserted that autonomy can be experienced in different ways, including schools mobilizing autonomy to focus on students and learning, rather than external tests and measures. On the other hand, autonomy can be mobilized in improper ways. For example, schools could prioritize looking good on external measures at the expense of student learning. Keddie (2014) found that “the power granted through greater school autonomy might weaken schools’ commitment to such moral accountabilities through their efforts to ascribe to the demands of external performing measures” (p. 515). Suggett (2015) indicated that in certain situations or conditions, autonomy does not function well: “strong institutional processes like accountability and leadership development are crucial parallel system features, and many schools or systems starting out on an improvement pathway from a low performance base may be disadvantaged by autonomy” (p. 2). Suggett (2015) suggested that context impacts the effectiveness of autonomy and claimed that there is a degree of uncertainty associated with autonomy because certain aspects of autonomy may be better than others.

Research has found that weaknesses of institutional structures or constraints are congruent with autonomy. Betts and Tang (2011) suggested another negative side of autonomy is the burden of managing change, instead of simply adopting traditional

practices, coupled with a situation where autonomous school leaders lack the capability to innovate. According to Jensen (as cited in Suggett, 2015), autonomous leaders need to identify and be more accountable for several interrelated factors in executing autonomy, which may crowd out the potency of autonomy. OECD (as cited Suggett, 2015) concluded that factors close to teaching affect performance; but on the other hand, administrative changes used to drive greater school autonomy lack the effect. The co-existence of autonomy and accountability influences collaborative culture between teachers and principals, promoting conversations of leadership dimensions and structures that create the platform for schools to reap the benefits of autonomy (Suggett, 2015).

In conclusion, research indicates that student academic achievement is influenced by school characteristics, and the school can be the unit of change for effectiveness. A significant element of the charter school model is greater autonomy than other public schools. The charter school principle of autonomy for accountability is related to school-effectiveness research.

### **Charter-School Effectiveness Research**

Several studies have explored charter-school effectiveness and have indicated that charter schools have shown to be of greater benefit to low-income and minority students (Clark, Gleason, Tuttle, & Silverberg, 2016; Cohodes, 2018; and CREDO, 2010). These studies also indicated that charter elementary and middle schools are more likely to have better achievement results than charter high schools (Betts & Tang, 2011 CREDO, 2010). Researchers have used student-achievement test results to assess charter school effectiveness by comparing charter performance against non-charter school performance

(CDE, 2019). Berends (2015) stated, “Findings reveal mixed results where student achievement is concerned (i.e., some positive, some negative, some neutral)” (p. 159). The following synthesis of research on the effectiveness of charter school research is focused on the following areas of comparison: population served (charters in urban areas serving low-income and minority students); time of charter establishment (new versus old); and school level (e.g., elementary).

Research has found that charter schools serving low-income and minority students in urban areas have positive effects on student achievement (Cohodes, 2018; CREDO, 2010; Clark, Gleason, Tuttle, & Silverberg, 2015). The national study conducted by Center for Research on Education Outcomes (2017), found that low-income charter schools outperformed their non-charter school counterparts. The study compared low-income students attending CMOs to those of non-charter and found that on average, a student in poverty (low-income) would have 34 days of additional math growth in a CMO in comparison to the experience of a similar student in non-charter schools.

Research points to a positive impact by charter schools in urban areas serving more disadvantaged populations. Angrist, Pathak, and Walters (2013) conducted series of studies using large sample schools to examine the effects of attending Boston KIPP schools. In one of the studies, Angrist et al. (2013) constructed a model that indicated causal interactions with demographics, where a term in the model (equation) captures the part the urban-charter advantage explained by differences in demographics. Resulting from the study, Angrist et al., (2013) said it is increasingly evident that urban charter schools are highly potent in bringing about achievement gains, and this evidence is

prevalent for minority students living in high-poverty areas. Boston and Lynn charter middle schools increased student achievement by about 0.4 standard deviations per year in math; and about 0.2 standard deviations per year in English Language Arts (ELA). High school attendance in Boston charter schools increased student achievement by about 0.3 standard deviations in math and 0.2 standard deviations in ELA. Studies of charter schools in the Harlem Children's Zone (Dobbie & Fryer, 2011) and Washington DC charter boarding school (Curto & Fryer, 2011) revealed similar results.

The Knowledge is Power Program (KIPP) charter schools are designed to serve an urban, low-socioeconomic student population. These CMOs commissioned studies to research their effectiveness and the findings contribute to their marketing and improvement efforts. A study by Tuttle et al. (2010) involving a student-level longitudinal data was designed to examine the achievement trends of KIPP students in pre- and post-periods of their entrance into KIPP schools in comparison to the achievement trends of those who continued schooling in their district's traditional schools. The results of the study indicated that in 18 out of 22 schools, students significantly improved in math; and in 15 out of 22 schools, student improvement in reading was significant. The production of math effect is alleged to be equivalent to moving to the 48<sup>th</sup> percentile from the 30<sup>th</sup> percentile. Research has found generally small but statistically significant test score gains from attending a CMO school (Cohodes, 2018). Furgeson et al. (2012) maintained that CMOs with comprehensive policies in their schools tended to have positive impacts on math and reading achievement, and not all CMOs performed better than traditional public schools. Furgeson et al. (2012) found over

40% of the CMOs studied performed worse, when compared to nearby district schools in math and reading. As cited in Berends (2015), Furgeson et al. (2012) studied 22 charter schools (CMOs) and found that 11 had significant effects in mathematics, seven had significant negative effects, and the remaining four had no significant effect.

On the other hand, studies also report that charter schools serving low-income students report lower student achievement (Saas, 2006). The state of California has explored how standardized test scores from charter schools compared with non-charter schools (Slovacek et al., 2002). The study presented findings of the Academic Performance Index (API) scores based on SATs taken in 1999, 2000, and 2001. This study also explored the variable of SES and how it related to student achievement. The results indicated that SES is strongly correlated with student performance on standardized tests. Second, the research asserted that charter schools habitually choose to work with at-risk students and have done so with lower funding levels per student (Slovacek et al., 2002). Furthermore, the authors maintained that charter schools are proving to exert control over some known significant challenges faced by start-up schools, including the lack of facilities funding (estimated to be over \$1,000 per student). Historically, non-charter schools receive significant facilities funds and support.

Research on charter schools serving low-SES student population draws some variable conclusions. Some of the research indicates that charter schools serving low-income students perform poorly academically. However, a majority maintain that charter schools do a better job in promoting high academic achievement for disadvantaged students.

Research shows variation in charter-school effectiveness by school level (elementary, middle, and high). That is, achievements can differ based on the level of schooling. Some studies concluded that charter schools perform better than most non-charter schools at the elementary and middle school levels; however, this outperformance is not seen at the high school level (Betts & Tang, 2019; CREDO, 2010). Betts and Tang (2019) tested for the existence of positive and negative effects of charter schools on student achievement in reading and math. They found that for reading, the probability of charter elementary schools having no positive effect was less than 0.001 (exceedingly rare), and the probability of having no negative effect was 0.987. This “strongly suggests that some elementary charter schools outperform in reading and no study has produced evidence that charter schools underperform” (Betts & Tang, 2019, p. 14). For math, the probability of elementary charters having no positive effect and no negative effects were both less than 0.001. This implies that “for math, there is strong evidence that elementary charter schools both underperform and outperform, depending on the time and location, which vary across studies” (Betts & Tang, 2019, p. 14). For reading in middle charter schools, Betts and Tang (2019) found that the probability of having no negative effect was 0.994. In middle school math, the probability of charter having no positive effect was less than 0.001, and the probability of charter having no negative effect was 0.978.

Research also indicates that older (i.e., more established) charter schools tend to have more positive effects on student achievement, while those newly established have lesser positive or negative effect on student achievement (Wohlstetter et al., 2013; Hoxby, 2004). Hoxby (2004) asserts that charter schools that have been established long

enough (five years and over) display better academic performance than non-charter with similar student population characteristics. This study and others explain that newly established charter schools usually underperform as they grapple with the challenges new schools encounter. Hoxby (2004) compared charter school students to traditional public schools' and indicated:

charter students are 2.5% more likely to be proficient in reading if their school has been in operation for 1 to 4 years, 5.2% more likely to be proficient in reading if their school has been in operation 5 to 8 years, and 10.1% more likely to be proficient in reading if their school has been in operation 9 to 11 years. For math, there is a roughly similar increase in the likelihood of a proficiency advantage with a school's years in operation. (pp. 15, 16).

Emerging research indicates that charter schools are having a positive influence on student alternative outcomes (Epple et al., 2016; Sass et al., 2016). Alternative outcomes constitute outcomes other than test scores (Epple et al., 2016), including high school completion and college entrance. A thorough analyses of data from the state of Florida and the city of Chicago by Rand Education research (Booker et al., 2008) indicated that charter schools in Florida and Chicago had significant effects on the rates of high school completion and college entrance. Statistically, students in charter high schools were 7 to 15 percentile points more likely to earn a standard diploma than their counterparts in non-charter schools (Epple et al., 2016). Further, Epple et al. (2016) found charter schools' positive and compelling effects on high-school graduation and college entrance in Chicago. Some researchers have focused on charter school's effects on earnings in adulthood. Sass et al. (2016) estimated charter schools' effects on future earnings and found that charter-school students are more likely to enter college and earn a higher income in their mid-20s. Epple et al. (2016) summarized this finding:

Coupling the overall results of the achievement and alternative-outcomes literatures together, it could be argued that while charter schools are not having a consistent effect on test scores, there is emerging research suggesting that charter schools are having more consistent positive effects on alternative outcomes. (p. 179)

In conclusion, the effectiveness of charter schools is highly variable; however, research does indicate some positive results. National and state studies have indicated that charter schools serving low-income student population and minority students in urban areas have higher levels of student achievement than non-charter schools (Cohodes, 2018; CREDO, 2010; Gleason et al., 2016). In particular, high levels of student achievement are more prevalent at charter elementary and middle schools than in charter high schools, and the age of charter schools is generally found to be positively correlated with charter performance. Newly opened charters perform poorly compared to non-charter schools. Finally, research indicates that charter schools may have more consistent positive effects on alternative student outcomes compared to non-charter schools.

### **Achievement Gap and Opportunity Gap**

The purpose of this section is to discuss the achievement gap and opportunity gaps, as they relate to the research question. The first research question explores the difference of math achievement between charter and non-charter schools, and the population of the study is low-SES students. The academic achievement gap, as indicated in the introduction of this study, mainly exists between poor students and those from affluent families. The opportunity gap is also discussed since the lack of, or the availability of inputs, determines the achievement gap. The ability of a charter school to

serve as an opportunity for greater student achievement and a narrowing of the achievement gap for low-SES families is central to this study.

The achievement gap refers to outputs: the unequal and inequitable distribution of educational results across groups of students. Huang (2015) argued that even though there have been decades of educational reforms, the achievement gap persists based on socioeconomic status. Macroeconomic forces have created a widening gap between the affluent and poor families, increasing the difficulty in helping children from low-income families acquire the skills needed to keep up with competition (Duncan & Murnane, 2015). As Duncan and Murnane described it:

Changes in the ways that families at the different ends of the income spectrum use their money and time have helped transformed income gaps into achievement gaps. At the same time, increasing residential segregation based on income is widening the quality gap between the schools that low- and higher- income children attend while compounding the unique problems faced by high-poverty schools. (Duncan & Murnane, 2015, p. 2)

Children in low SES families could be deprived of certain basic things they need for healthy development.

The opportunity gap refers to inputs: the unequal or inequitable access to resources and opportunities. These resources and opportunities include but are not limited to experienced teachers, rigorous coursework, reliable transportation, and clean, well-maintained physical facilities. Huang (2015) explains that children face inequalities by virtue of their home, neighborhood, peer environment, which trickle down to inequalities they confront late in life. Provision of equitable resources to narrow the opportunity gap is critical in addressing the achievement gap. Dietrichson and colleagues (2017) hone-in

on opportunity gaps that exist in the system by saying that low-SES students seem to have fewer resources in many areas. Ladson-Billings (2006) talks about education indebtedness which she defined as:

the forgone schooling resources that we have (should have) been investing in (primarily) low-income kids, which deficit leads to a variety of social problems (e.g., crime, low productivity, low wages, low labor force participation) that require on-going public investment (p. 5).

Ladson-Billings (2006) seems to be emphasizing the opportunity gap, and charter schools may provide a new resource and opportunity for low-income families.

Both the achievement gap and the opportunity gap have widened in recent years.

Cohodes (2018) suggested that expanding highly effective charters and their practices may offer a way to close achievement gaps, stating,

given the current growth rate of charter schools, even if all new charters were established as highly effective urban charter schools, the charter sector isn't large enough to reduce nationwide achievement gaps in a meaningful way. (p. 14)

Essentially, Cohodes (2018) suggested that expanding successful charter schools and adopting their practices in traditional public schools can ameliorate the achievement gap.

### **Gaps in Literature**

Duncan and Murnane (2014) maintain that most charter schools are no more effective than traditional public schools at improving the skills of low-income children.

They explained:

Charter schools face daunting tasks, including hiring promising teachers, developing curriculum, and designing and implementing a code for student behavior. Then there are the logistical challenges: finding space, satisfying

building codes, dealing with vendors for everything from health insurance to school lunches. Thus, it may not be surprising that most charter schools are no more effective at educating disadvantaged children than conventional public schools have been. (p. 79)

Epple et al. (2016) asserted further “continuing to collect and analyze data on charter schools is crucial. It remains to be seen whether, as it continues to mature, the charter movement will fulfill the yet unrealized aspirations of its founders” (p. 203).

Concerns about whether charter schools are producing higher levels of student achievement for low-SES student populations, coupled with the trends of charter management organizations focusing marketing and school designs to serve low-SES populations warrant further research in this area. Furthermore, the mixed findings of charter-school effectiveness research (Abdulkadiroglu et al., 2009; Angrist et al., 2013; Betts & Tang, 2011; Clark et al., 2015; Cohodes, 2018; CREDO, 2009; Duncan & Murnane, 2014; Epple et al., 2016; Gleason et al., 2010) solidifies the need for further study. The present research is intended to explore these gaps by studying math achievement results for the low-SES student population and examine differences of SES proportionality in both charter and non-charter schools in Colorado. As indicated previously, exploring SES proportionality is important to this study. I will use percentage-FRL to cluster schools into high and low SES and will be able to compare outcomes of these groups at the school level. Though the results will not be generalizable replications of state level studies, they may inform the charter promise of improved student achievement for our most vulnerable student populations.

## **Chapter Conclusion**

This chapter reviews literature on the history of charter-school movements in the United States (National and Colorado context) and research on charter effectiveness related to student achievement. The literature review uncovered patterns and differences emanating from different research approaches. Topics reviewed included the three generations of national charter school movement; nuances of the Colorado charter school movement; school effectiveness research; and finally, the achievement gap and the opportunity gap. The next chapter will describe the methodology for the present research and discuss research design and other related topics.

### **Chapter Three: Methodology**

The purpose of this study was to investigate differences in math academic achievement among low-SES elementary students in Colorado charter and non-charter schools. To explore the effect of how the student population of the school is related to student achievement, this study also examined differences in SES proportionality in charter and non-charter schools. Results add to existing knowledge about whether charter schools are fulfilling the charter promise in the Colorado context. This chapter presents the methodology used in the present study, describing the quantitative design and analytic procedures. The following sections include research design, assumptions, research questions, hypotheses, unit of analysis, data sources/collection, measures used in the study, population, sample, outcome (dependent) variable, explanatory (independent) variable, data analysis, and ethical considerations.

#### **Research Design**

This study used a quantitative approach to compare math achievement at the school level between charter and non-charter schools in Colorado. A quantitative approach was used for the study, as relationships between variables drove the study and generated to results. According to Creswell (2014), quantitative research dwells on examination of how variables relate.

A 2x2 factorial ANOVA was used to find if there is main effect of school type (charter or non-charter) and school SES category on student achievement of a low SES

student population. CDE (2019) reports Mean Scale Math Score (one score) for each school for the FRL group and has compared charter and non-charter achievements at the school level for this group using the Mean Scale Score. The interaction effect (school type by SES) was tested as well. ANOVA can be used to investigate differences in mean scores under multiple conditions.

### ***Assumptions***

When assumptions are met, the statistical estimates obtained are more reliable. Generally, extreme violations of assumptions suggest the test cannot be used appropriately, giving way to the use of another test. Prior to using ANOVA, the following assumptions were tested: homogeneity of variance, normality, and independence (Stevens, 2009). Levene's test was used to test for homogeneity of variance. If the test was not significant, then the variances of the population of groups were equal within sampling error. Normality was determined by a scatter plot with a line of fit. The normality test showed if the dependent variable (student achievement) was normally distributed in the study period for each cell in the analysis. Independence means that the value of one observation did not influence or affect the value of other observations and can be assumed when data are provided independently for each unit of analysis. Independence cannot be tested.

### **Research Questions**

The research question and sub-questions for the present study are:

1. What are the effects on math achievement of low-SES students and school SES category and elementary public-school type (charter and non-charter schools) in the 2018/19 academic year in the state of Colorado?

2. What are differences between math academic achievement in charter and non-charter schools?
3. What are differences in SES proportionality in charter and non-charter schools?
4. Is there a significant relationship between SES and percentage-minority?

**Hypotheses:**

- H1<sub>0</sub>: There is no statistically significant main effect of school type or SES category on math achievement of low-SES student population.
- H1<sub>1</sub>: There is a statistically significant main effect of school type and SES on the math achievement of Low SES student population. It is hypothesized that the mean math achievement of low SES student population in charter schools will be significantly higher than the mean math achievement of low SES student population in non-charter schools.
- H2<sub>0</sub>: There is no statistically significant interaction effect of school type and school SES on math achievement of Low SES student population.
- H2<sub>1</sub>: There is a statistically significant interaction effect of school type and school SES on the math achievement of a Low SES student population.
- H3<sub>0</sub>: There is no statistically significant association between SES category and charter/non-charter school type.
- H3<sub>1</sub>: There is statistically significant association between SES category and charter/non-charter school type.

- H4<sub>0</sub>: There is no significant difference in percentage minority students by SES category.
- H4<sub>1</sub>: There is a significant difference in percentage minority students by SES category.

### **Unit of Analysis**

“School level” was the unit of analysis for this study. Student-level data has advantages when the researcher intends to zoom in on micro-level effects, such as identifying achievement at the individual level. By contrast, this study emphasizes the impact of school as an organization. The present study’s focus on the impact of charter and non-charter schools as *organizational units* drove the use of school-level data.

### **Data Sources/Collection**

Publicly available data from the Colorado Department of Education (CDE) was the main data source for this study. The data provide CMAS Mean Scale Math Scores for both FRL-eligible students (the population of interest in this study) and those ineligible for FRL in all the schools. That is, for each year, CDE reports a Mean Scale Math Score (a score) for FRL-eligible students in each school. Data are downloadable at three levels: Elementary, Middle, and High School; Elementary is the level of interest in the present study. Data on percent-FRL for charter and non-charter schools is also obtainable on the CDE site. Data were collected and used to examine the SES proportionality. The main use of the percentage-FRL data was to categorize schools into high and low SES, so that school SES could be used as a factor. Another data source was the National Center for Education Statistics (NCES).

## **Measures in the Study (Student Achievement)**

The study used CMAS math scores as proxies for student achievement (see below for reliability and validity information), and to compare the effectiveness of charter and non-charter schools in educational outcomes among the low-SES student population. Even though they are not the only measure of educational outcome, test scores, are frequently used in educational research. Test scores are measured with numerical representations, reflecting a primary way for parents, policymakers, educators, politicians, and even students to compare or assess school-performance measures.

SES constitutes the other measure in the study. School SES was measured by the percentage of students eligible for FRL in the school. For the CMAS score corresponding to the FRL student population of a school, CDE (2019) produced the mean scale score for each school, representing the aggregated score for all students eligible for FRL. CDE (2019) used this mean scale score to compare the achievement in various subject areas such as math and social studies for the FRL student population of charter and non-charter schools. The percentage-FRL of the school produces a variable frequently used as a predictor in statistical analyses. Perhaps more importantly, school FRL is widely used as an SES-measure in policy applications, where it is typically treated as a surrogate for school poverty. For example, “eligibility for Title I funds depends on school FRL and schools with FRL rates equal to or greater than 40% are automatically eligible” (Harwell, 2018, p. 15). Based on the above quotation, I defined a school with a high percentage of low-SES students as any school at or above 40% FRL; and high school-SES as any school at or below 39% of FRL-eligible students. The 40% cutoff was chosen based on Harwell’s (2018) Title I indicator noted above.

In addition, the proportion of minority students in each school was obtained from the CDE database. While this variable was not used in the factorial ANOVA, SES category was associated with the proportion of minority students using a t-test as an aid to interpretation of the results. An association between school type and school SES was explored using a Chi Square test.

### **Population**

This study targets low-SES students in all Colorado public schools (charter and non-charter) in 2019. The two groups were not balanced, as there were substantially more non-charter schools than charter schools in the data set.

### **Sample**

The sample used for this study constitutes a low-SES student population enrolled in all public elementary schools (charter and non-charter) in Colorado during 2018/19 school year. Low SES is reflected in student eligibility for free reduced lunch. Schools with small populations and missing data were eliminated from the sample. The sample of the study comprised of approximately eight hundred (800) schools. This sample yields a power of 0.8 at 5 percent alpha level.

### **Outcome Variable**

The dependent variable of this study was student achievement (Mean Scale Score of math) for FRL-eligible students.

### **Independent (Explanatory) Variable**

The independent variables of the study were the school type (charter and non-charter) and school SES, categorized as low-SES being schools with high percentage of FRL students (40% or more FRL), and high-SES being schools with a low percentage of

FRL students (39% or less FRL). Percent minority for the school was obtained from the CDE database.

### **Data Analysis/Estimation Procedures**

The data, which was primarily sourced from the Colorado Department of Education, was cleaned using Excel and exported to SPSS for analysis. To begin with, *a priori* G\*Power analysis was conducted to obtain a fair idea of the sample size of schools needed to obtain statistical significance. To achieve this, I obtained an *a priori* power calculator and entered an expected power of 0.8. To be conservative, I used Cohen's *d* effect size of 0.5 (medium), and for alpha level I used 0.05. This yielded a sample size of 62.

Using factorial ANOVA, analyses began with a test of assumptions, followed by the ANOVA. Hypotheses were tested. The first test looked at the effect of school type. That is, does school type alone predict difference in student achievement? If the *p*-value obtained is more than 0.05 (using 5% level of significance), it means the result is not statistically significant, and school type alone does not predict student achievement. If the *p*-value is less than 0.05, the result is statistically significant, and school type alone can be said to have predictive power for student achievement. Second, I conducted a test for the main effect of SES. If statistically significant, it implies SES alone can predict student achievement. On the other hand, if the result for the test of SES is not statistically significant, it means SES alone cannot predict student achievement. The hypothesis test of the interaction between school type and SES was conducted. A *p*-value of less than 0.05 would indicate statistically significant interaction between school type and SES. This statistically significant interaction between SES and school type would be followed

by additional analysis at the simple level. The next step was to check for statistical significance between groups. If the between subjects (groups) is statistically non-significant—for instance 0.07, more than 0.05, for school type (between charter and non-charter)—it means there is no statistical difference between charter and non-charter. If there exists statistical significance between the groups (charter and non-charter), it means that the charter group is different from the non-charter group. There is no need for *post hoc* tests at this point, as the research only concerns two groups.

CDE data on percent-FRL were used to answer research question 3, which looked at SES proportionality in charter and non-charter schools. The percent FRL data were used to group schools into high and low SES, allowing use of school SES as a factor in the ANOVA. The effect of school SES on achievement (as measured by the Mean Scale Math Score) of the low SES portion of students in schools was assessed. The direct association between SES category and school type was determined using a chi-square test of association. A t-test was conducted to answer hypothesis 4, involving the significance of the difference in percentage minority by school SES. This was mainly to find differences in composition of minority students in low- and high-SES schools.

### **Reliability and Validity**

Reliability of the research instrument is an essential component in quantitative research for reducing errors that accompany measurement of variables. It refers to the accurate and precise measurement of a variable. Reliability means a measure is stable over time (Bobko, 2001). CDE (2016) provides an indication that Colorado assessments are accurate measures of student mastery of Colorado academic standards. The test provides the assessment that aligns with the changing standards which are more focused,

coherent, and rigorous. CMAS replaced the Traditional Colorado Assessment Program (TCAP). According to CDE (2016), the preliminary analysis of achievement data for the CMAS indicated how charter schools may be faring compared to non-charter counterparts. CMAS continues to be used to compare charter and non-charter student performance (CDE, 2019). The CMAS test score has been used since its inception to assess student performance.

Validity is also an essential component of a quantitative study. It refers to the degree to which a study accurately reflects or assesses the specific concept or construct the researcher is attempting to measure. Validity assures that a test measures the attribute it is intended to measure (Bobko, 2001). The content on which the CMAS test is based is presented to all students in the public (charter and non-charter) schools setting. CDE (2016) reports the performance of FRL students who meet or exceed grade level benchmark in charter and non-charter schools. The report maintains that the total FRL students at charter schools are performing better. CMAS is reported to be culturally relevant—that is, students in Colorado schools from all backgrounds, including FRL-eligible students can understand the questions. According to CDE (2019), CMAS effectively measures student performance, and is reliable and valid; however, I was not able to locate specific reliability/validity estimates.

### **Ethical Considerations**

The present study focused on the low-SES student population. In every step and stage of this research, I avoided any practices that would ethically harm schools or students the study population. Ethical considerations were exercised in domains of data collection, data analysis, and reporting of data on the entire results. The unit of analysis in

this study is the school level. Even though individual students were not the unit of analysis, care was taken so that data reported did not include any school name. Reporting results that include school names may expose the study schools to public scrutiny. Each school was anonymized throughout the study to maintain proper ethics.

As a researcher, I attempted utter impartiality in data analysis, avoiding the disclosure of results that only seem positive (Creswell, 2014). My reporting cuts across all findings and provides detailed perspectives and findings that are contrary (Creswell, 2014). I endeavored to avoid sharing data with any other entity (Creswell, 2014). Together, these strategies preempted ethical issues in this study.

### **Chapter Conclusion**

In this chapter, I reviewed research design, assumptions, unit of analysis, data collection/sources, main measures in the study, population, sample, outcome variable, explanatory variable, data analysis/estimation procedures, and ethical considerations. The study employed factorial ANOVA to explore school effectiveness of charter and non-charter schools as they produce academic achievement for the low-SES student population.

In the subsequent chapter, I share results of the factorial ANOVA, and tables are displayed and explained.

## **Chapter Four: Findings**

The purpose of this study was to investigate differences in math academic achievement of low-SES elementary school students in charter and non-charter schools in Colorado. In addition, the study explored differences in SES proportionality and how it relates to achievement. These differences were analyzed using ANOVA. To further understanding of charter/non-charter schools, a chi-square was conducted between this factor and SES. Second, the difference in percentage-minority by SES category was examined using a t-test, also to support interpretation of the results. In this chapter, findings of the data, quantitatively analyzed, are presented.

### **Group Description**

A 2\*2 ANOVA displays the effects of school type (charter or non-charter) and school SES (high or low) on achievement (mean scale math score). Therefore, the two independent variables were school type and school SES, and the dependent variable was achievement (Mean Scale Math Score). The Statistical Package for the Social Sciences (SPSS) software was used for data analysis.

### **Descriptive Analysis**

A total of 864 charter and non-charter schools were included in the final sample. Sample size (N) for non-charter schools was 771, and charter schools numbered 93. School SES was categorized into high and low, with high-SES determined by a free and

reduced lunch (FRL) composition of 39% or less; and low-SES schools reflecting FRL composition at or above 40%. Non-charter schools in the low-SES group outnumbered the rest of the schools in the sample, with  $N = 468$  and a mean achievement score of 723.95. For non-charter high-SES schools,  $N = 303$  and the mean achievement score was 729.67. For charter schools,  $N = 49$  for its low-SES schools, with a mean score of 725.57. Charter high-SES schools recorded  $N = 44$  and a mean score of 727.54. Table 4.1 below details the statistics. High-SES schools showed significantly higher performance than low-SES schools.

**Table 4.1**

*Descriptive Statistics*

	School SES	Mean	Std Deviation	<i>N</i>
Non-Charter	Low SES	723.95	9.79	468
	High SES	729.67	11.23	303
	Total	726.20	10.74	771
Charter	Low SES	725.57	12.84	49
	Hight SES	727.54	13.67	44
	Total	726.50	13.20	93
Total	Low SES	724.10	10.11	517
	High SES	726.23	11.03	864

**Statistical Design**

A 2\*2 ANOVA was conducted to answer the research questions and hypotheses. A Chi-Square test of association was used to examine the association between school type and school SES category. The last research question and the last hypothesis focused

on percentage minority and SES. A t-test was used to examine the association between these variables.

## **Results**

Prior to running ANOVA, the normality and homogeneity of variance assumptions were tested. The assumption of independence was assumed to be met because the study schools were independent and reported data independently. The data met the normality assumption based on skewness. The skewness range for normality is -1 to +1. Non-charter low-SES and high-SES schools showed respective skewness of 0.31 and 0.21. Charter school low SES recorded skewness of -0.42 and that of charter high SES was -0.65. All skewness values fell within the normal range. However, the assumption of homogeneity was not met. To meet the equal variance assumption, the Levene's test result must be nonsignificant. The results indicated Levene's  $F = 4.559$ ,  $p = 0.004$ , indicating that the error variance of the dependent variable (Mean Scale Score) was not equal across the groups. The rationale for reporting results of the analysis despite the violation of the homogeneity assumption is that the effect size is exceedingly small. Even though there may be some inaccuracy in the  $p$ -value, it is very unlikely that the conclusion would change because the Partial Eta Squared (effect size) is very small.

### ***Research Question 1***

What are the differences between math academic achievement in charter and non-charter schools?

The research question seeks to investigate the differential effects of school type, charter, and non-charter, on math achievement of low SES student population.

## **Hypothesis 1**

- H1<sub>0</sub>: There is no statistically significant main effect of school type or SES category on math achievement of low-SES student population.

H1<sub>1</sub>: There is a statistically significant main effect of school type and SES on the math achievement of Low SES student population. It is hypothesized that the mean math achievement of low-SES student population in charter schools will be significantly higher than the mean math achievement of low SES student population in non-charter schools.

The first part of hypothesis 1 examined the mean scale score for non-charter and charter schools. The ANOVA test of the effect of school type resulted in  $F(1,860) = 0.05, p = 0.827$ . Since the  $p$ -value is over the 0.05 alpha level, the main effect of school type was not statistically significant. That is, charter and non-charter schools did not differ significantly in the achievement among low the SES-student population.

The second part of hypothesis 1 examined whether there is statistically significant main effect of school SES,  $F(1,860) = 10.61, p = 0.001$ . These results can be found in Table 4.2, and the result indicates that school SES had a statistically significant main effect on Mean Scale Score.

## **Hypothesis 2**

- H2<sub>0</sub>: There is no statistically significant interaction of school type and school SES on math achievement in the low-SES student population.
- H2<sub>1</sub>: There are statistically significant interaction effects of school type and school SES on the math achievement of the low-SES student population.

The interaction effect between school type and school SES was not statistically significant,  $F(1,860) = 2.53, p = 0.112$ . See Table 4.2 below. The absence of interaction between school type and school SES means that the effect of school type on Mean Scale Score does not depend on School SES and vice versa. A t-test was conducted between high and low SES and the result indicate that the means are statistically significant, with high SES having a higher mean performance.

**Table 4.2**

*ANOVA of School Type x School SES*

Factor	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	Partial Eta Squared
School Type	5.49	1	5.49	0.05	0.827	0.00
School SES	1218.43	1	1218.43	10.61	0.001	0.012
School Type* School SES	290.89	1	290.89	2.53	0.112	0.003
Error	98788.08	860	114.87			
Total	104915.5	863				

### **Hypothesis 3**

A Chi Square test was conducted to determine the relationship between school type and school SES category. Hypothesis three was therefore answered by the Chi Square test. The null and alternative hypotheses are specified below:

- H3<sub>0</sub>: There is no association between school type and school SES
- H3<sub>1</sub>: There is an association between school type and school SES

Since the  $p$ -value (0.137) was greater than the alpha level (0.05), the null hypothesis could not be rejected. The conclusion is that there is not enough evidence to suggest an association between school type (Charter and Non-charter) and school SES,  $\chi^2(1) = 2.22, p = 0.137$ . Table 4.3 below details the results of the nonsignificant Chi-Square test of association.

**Table 4.3**

*Chi-Square Test of Association between School Type and School SES*

			<i>Low SES</i>	<i>High SES</i>	<i>Total</i>
<i>School Type</i>	Non-Charter	Count	468	303	771
		Expected Count	461.4	309.6	771.0
		Std. Residual	0.3	-0.4	
	Charter	Count	49	44	93
		Expected Count	55.6	37.4	93.0
		Std. Residual	-0.9	1.1	
<i>Total</i>		Count	517	347	864
		Expected Count	517.0	347.0	864.0

**Hypothesis 4**

The last hypothesis tested the difference in the percentage-minority students by SES. Minority students comprise students from all races except the White race. A t-test was conducted to explore if there existed any significant difference between percentage minority and SES category. The hypotheses are:

- H4<sub>o</sub>: There is no significant difference in percentage minority students by SES category H4<sub>o</sub>:  $\mu_1 = \mu_2$
- H4<sub>1</sub>: There is a significant difference in percentage minority students by SES category H4<sub>1</sub>:  $\mu_1 \neq \mu_2$

The p-value (0.001) was less than the alpha level (0.05). This means that the difference in percentage of minority student by SES category was statistically significant. The null hypothesis of  $\mu_1 = \mu_2$  was rejected, and the alternative hypothesis that  $\mu_1 \neq \mu_2$  was supported,  $t(824.28) = 18.70, p < 0.001$ . The interpretation is that high-SES schools had a statistically significant lower percentage of minority students, and low-SES schools had a higher percentage of minority students. Table 4.4 below shows the sample size, mean, and the standard deviation of the two groups.

**Table 4.4**

*Percent Minority by School SES*

	<i>School SES</i>	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>
<i>Percent Minority</i>	Low SES	506	60.54%	26.58%
	High SES	346	33.75%	15.05%

As shown in Table 4.4 above, the sample size in low-SES schools was 506, with a mean composition of 60.54% minority students, and a standard deviation of 26.58%. With the high-SES group, the sample size was 346, with a mean of 33.75%, and a standard deviation of 15.05%.

## **Chapter Conclusion**

This study investigated differences in math academic achievement among low-SES elementary school students in charter and non-charter schools in Colorado. This chapter provided results of the study, using a 2\*2 Analysis of Variance (ANOVA), supported by a Chi-Square test of association and a t-test.

Research question one and the first part of hypothesis one sought to investigate the effect that school type (charter and non-Charter) had on student achievement. Results showed that school type had no statistically significant effect on student achievement. The second part of hypothesis one examined effect of school SES on student achievement. The result revealed that school SES had a small but significant effect on student achievement. The second research question and hypothesis two looked at the interaction effect of school type and school SES on student achievement. This was not statistically significant, meaning the effect of school type on Mean Scale Score does not depend on school SES. Thirdly, I tested association between school SES and school Type by conducting a Chi Square test to answer hypothesis three. The Chi Square test found no significant association between school type and school SES. Finally, a t-test was conducted to investigate the dependence of percentage minority on school SES. The t-test revealed dependence of percentage minority on school SES, with a higher percentage minority in lower-SES schools.

The next and last chapter focuses on discussion and recommendations for the study.

## **Chapter Five: Discussion**

The public education system in the United States has gone through many reforms. Beginning in 1991, the charter-school movement offered new public-school options for parents and educators from across backgrounds. Most research into charter schools has focused on comparing achievement between charter and non-charter schools, coming to various conclusions (Dickhoner & Fellow, 2020). Some studies report that charter schools do a better job than their non-charter counterparts; others report the opposite or find no difference in academic performance between school types (Brends, 2015; Cohodes, 2018; Dickhoner & Fellow, 2020; Furgeson et al., 2012; Gleason et al., 2010).

Other research has considered the impact of these schools on specific student populations, as some charter schools and charter-school networks concentrate their efforts on educating low-SES students (CREDO, 2017; Furgeson et al., 2012). Indeed, some research indicates that charter schools enhance the education of low-SES students—especially in urban communities (Gleason et al., 2016; Cohodes, 2018; CREDO, 2010).

Grounded in school-effectiveness research, the present study explored differences in achievement among low-SES students in charter and non-charter schools in Colorado and examined SES proportionality in relation to achievement. Morley and Rassool (2002) indicated that organizational factors contribute to school effectiveness and impact student

achievement. Likewise, charter schools often employ specific educational and organizational models that focus on serving the needs of specific populations of students, such as students of color and low-income students (CREDO, 2017). As enrollments of low-SES students in Colorado charter schools continue to rise, it is important to understand the effectiveness of charter schools in comparison with non-charter public schools.

## **Discussion**

The first research question was two-fold, seeking to understand whether academic achievement among students with low SES differed between charter and non-charter schools. The first part of the hypothesis examined if school type (charter and non-charter) affected academic performance of students with low SES differently. Findings were nonsignificant: the designation of charter and non-charter had no significant impact on achievement of low-SES students. It is also important to note that student math achievement in charter schools was not lower than students in non-charter schools. Overall, the math achievement of low SES students was no better or worse in elementary charter and non-charter schools. These results contradict findings of other Colorado-based research on differences between charter and non-charter student achievement. According to one study, Charter Management Organizations (CMOs) in Colorado are making significant differential improvement in achievement among Colorado public schools, mostly in Denver (A+ Denver, 2012). However, these CMOs operate mainly at middle- and high-school levels, and this study focused on elementary schools.

In addition, results from the first part of hypothesis might suggest that there are not enough differences by school type (charter and non-charter) at the elementary level to yield significant differences in student achievement. A future study that investigates specific components of school programming and operations might reveal school conditions that impact student achievement. However, non-charter elementary schools have adopted specialty approaches (e.g., Montessori and Expeditionary Learning) that used to be found only in charter and private schools. Another confounding variable is that Colorado is an open-enrollment state. Open enrollment requires all public schools to market and recruit students. Market forces, especially at the elementary level, may have decreased differences between charter and non-charter schools.

The second part of hypothesis one examined impacts of school SES on student achievement. The result was significant in both charter and non-charter schools, even though the effect size, measured by Partial Eta Squared, was small. These statistically significant results indicated that school SES can make a difference in educational achievement among low-SES student populations. In this study, school SES is tied to SES proportionality, with *high* SES reflected by 39.99% or less FRL student eligibility; and *low* SES reflected by 40% or more FRL student eligibility. Results indicated that percentage-FRL has an effect on achievement, and that high-SES schools have significantly higher mean performance than low-SES schools. The statistical significance of school SES may be related to resource availability, with more resources in schools based in affluent communities than poor communities. In addition, fewer FRL-eligible students may have access to schools in affluent neighborhoods. The disparity between

school SES and student achievement persists, even in a school-policy context of choice and open enrollment. This indicates that not all families have equal access to school choice. It also indicates that social factors like SES are better predictors of math achievement at the elementary level than school type. School-effectiveness research postulates that school is a unit of change that can make a difference in the academic achievement of its student population, regardless of their background (Morley & Rassool, 2002). The organizational factor of school type (charter and non-charter) does not seem to make difference in academic achievement in schools with low-SES student populations.

The second hypothesis examined the interaction effect between school type and school SES on achievement. The result of the test was not significant at the 0.05 alpha level. This is an indication that the effect of school type on achievement does not depend on school SES, and vice versa. Hypothesis three tested the association between school type and school SES. The association between the two variables was not statistically significant. The study revealed that school SES significantly impacted achievement, with high-SES schools exhibiting significantly higher performance. At high-SES schools, low-SES students performed significantly higher than low-SES students at low-SES schools. As policymakers seek to bridge the achievement gap between high- and low-SES schools, this finding has important implications for resource availability and differences.

Hypothesis four explored the relationship between percentage minority and school SES. An independent *t*-test was conducted to compare the means, where percentage-minority was the dependent variable and school SES was the independent

variable. The test was statistically significant and indicated a strong association between percentage-minority and school SES. The relationship between the two variables was an inverse one. That is, low-SES schools had a higher percentage of minority students while high-SES schools had a lower percentage of minority students. This result is in line with literature reviewed for the study. Huang (2015) posited that inequalities imputed on children by virtue of their home, neighborhood, and peer environment resulted in inequalities in adult life. In effect, these inequalities translate into poor academic achievement early in life, primarily in elementary school, and have continuing repercussions. Access to equitable resources will narrow the opportunity gap and the achievement gap by consequence. Exploring the opportunity gap, Dietrichson and colleagues (2017) maintain that low-SES students have fewer resources in many areas. Duncan and Murnane (2015) indicate further that macroeconomic forces have spurred a widening gap between affluent and poor American families, which inhibits students from acquiring the skills needed to compete in the contemporary economy. This creates a vicious cycle of poverty, as graduates from poor communities are unable to give back and support their communities. Duncan and Murnane (2015) provide that differences in earned income, and how income is spent at opposite ends of the income spectrum, resulted in achievement gaps that reflect income gaps.

### **Implications**

The initial promise of charter schools was that they would offer a choice—especially for students who might not otherwise have access to higher-performing school districts or private schools. According to Cohodes (2018), the charter promise was greater

autonomy with greater accountability. The present study focused on Colorado charter schools at the elementary level and found no significant differences between math achievement among students attending charter and non-charter elementary schools. Results did reveal differences in math achievement of elementary students; however, the variables of significance were SES and race. Thus, these results indicate that when looking solely at school type, elementary charter schools in Colorado have not provided a better opportunity for low-SES students than non-charter elementary schools.

When the charter school movement began, there were only standalone schools. These schools lacked the economies of scale to provide services like those found in districts. Economies of scale represent cost savings and competitive advantages larger businesses and organizations have over smaller ones. Since non-charter schools have access to specialized departments within a district organization, they can undertake more specialization to enhance education production for students. Charter Management Organizations (CMOs) were established to help reduce common challenges faced by standalone charter schools (Smith et al., 2009). Research indicates that CMOs can help alleviate problems of resource scarcity through economies of scale. For example, through CMO networking, schools can generate state funds, increasing their ability to meet operational and facility costs, compared to standalone charter schools. In 2012, the National Study of CMOs Effectiveness (Furgeson et al., 2012) concluded that many CMOs have positive student outcomes, and their test scores are consistent across schools. As well, studies that explored charter-school effectiveness indicated that charter schools are of greater benefit to low-income and minority students. The studies specifically found

that charter schools serving low-income and minority students in urban areas have positive effects on student achievement (Gleason et al., 2016; Cohodes, 2018; CREDO, 2010). Furthermore, CREDO (2017) found that low-income charter schools outperformed their non-charter counterparts. As CMOs mainly operate at middle and high schools and this study focused on elementary schools, the impact of a CMO on charter-school performance was not explored.

### **Limitations/Ethical Considerations**

The present study was limited to Colorado elementary schools; thus, results cannot be generalized to other states or nations. However, similar studies could be conducted in other U.S. states for comparison. As well, even though other states may employ different assessments, test scores could be standardized for comparable results.

Second, individual schools self-report variables of economic status such as free and reduced lunch (FRL) as used in this study. School self-reporting could be flawed, leading to discrepancies in results. Another limitation is embedded in the use of only one subject (math) to measure achievement. A range of subjects are offered in the study schools, and math may not reflect true achievement at the school level. Lastly, the data did not have balanced groups, which may have impacted statistics like the  $p$  values. However, the partial eta squared were so small, it is unlikely that any impact on the  $p$  value would change the study conclusion.

### **Recommendations**

Equitable school access to material and human resource distribution is essential to closing the opportunity gaps (Keddie, 2016). It is anticipated that school-level staff

selection may lead to systemic “residualization,” where the best-quality teachers are allocated to the highest-performing schools (Keddie, 2016). Carter and Welner (2013) maintain that while school quality is important, out-of-school learning and learning-related resources and opportunities for children in poor communities can significantly improve their academic achievement and reduce achievement gaps. There is compelling need for the United States to address the inequalities that exist between and within schools; and, at the same time, redress inequalities among different individuals, groups, and communities (Carter & Welner, 2013).

Teacher knowledge of low-SES student needs and supports is critical to their achievement. Student stress, compounded by a lack of family resources, requires educators provide an adequate response to release student stress and prepare them to grasp lessons with ease. Special tutoring (one-on-one) coupled with trusting teacher-student relationships may go a long way to bring low-SES students to expected standards.

### **Recommendations for Further Research**

As various types of charter schools emerge, future studies could explore programmatic variability in charter schools in relation to achievement, especially regarding low-SES students in the school population. Colorado’s open enrollment model may have diminished differences between charter and non-charter schools; or, school differences may be more distinct at middle and high school levels. There are also more CMOs operating at middle and high schools. Expanding this study to include achievement results for students at the middle and high school level might reveal more differences according to school type. Given the governance model in CMOs and

standalone charters, which may impact organizational factors, future research could compare CMOs and standalone charters at the three levels: elementary, middle, and high schools. Non-charters could be an added variable in this comparative study as well. Additionally, future studies could focus on types of charters. As CMOs are increasing their concentration in the state, it will be helpful to research specific CMOs and compare their achievements to non-charter schools. In the data collection process, some charter schools excelled in mean math scores, while others waned. Research into the types of charter schools could reveal why some charters are more successful than others.

The theoretical framework of this study was school-effectiveness theory, which stipulates that schools can make a difference in student achievement regardless of student backgrounds. The present study's results of no statistically significant differences in student achievement challenge that school type (charter vs. non-charter) makes a difference at the elementary school level. The limitations of this study warrant more investigation and research into the organizational features of schools that impact student achievement.

Results from this study revealed that school SES was statistically significant across both school types. High-SES schools had higher mean performance. It might be important to learn about specific programming at the schools, and there are many organizational school-level variables (e.g., staffing, curriculum, size, etc.). This finding is consistent with extant literature and warrants more investigation into specific programming and resources at the school level. Students who live in low-SES communities have the same potential as those in high-SES communities. This study

indicates that opportunity gaps exist. Further research is needed to provide each child, regardless of SES, the optimal resources that lead to high levels of achievement.

Future studies could consider factors such as teacher quality, stability of teachers, class size, and the length of school in the year and day. These may call for the use of different methodologies. Examining a classroom and teacher level may exhibit certain conditions and opportunities that may not only be beneficial to all students, but particularly to low-SES students.

Data acquisition can be an issue in the design of a study. In designing this study, I found that certain variables had a lot of missing data; hence, they could not be used. An example is data on race for the low-SES student population. Achievement outcomes were not reported in cases where there were fewer than 16 results at the CDE website (CDE, 2019). Therefore, I recommend more data be made available at the CDE website to expand research on education in the state of Colorado. The school-data reporting system should be made in such a way that schools are not only forced to report data adequately but also in a timely manner to improve overall research of schools in the state.

Charter schools were designed with greater autonomy in exchange for higher academic performance. This spurs the need for a study that examines the relationship between quality and autonomy. Such a study will enable educators and policymakers to implement quality reform, as charters endeavor to serve the low-SES students in their schools and narrow the achievement gap.

Another recommendation for research is finding ways to increase economies of scale for charter schools and autonomy for non-charter schools. Such approaches will

increase chances that each school type will improve outcomes for the students they serve. With access to professional associations and service providers, school districts in the non-charter sector offer far more resources and supports than standalone charter schools and CMOs. Thus, they enjoy economies of scale. For example, because they are so large, they can spread internal function costs over more units. On the other hand, non-charter schools often lack the autonomy in school operations that charter schools enjoy. Research is needed to explore the relationship between autonomy and economies of scale, and its impact on student learning. The literature reviewed for this study mentioned how CMOs are helping to alleviate challenges of the charter school sector through economies of scale. Despite CMO networking endeavors, the charter school sector still trails behind the non-charter school sector in economies of scale.

The final recommendation for research is using longitudinal data as an alternative approach to looking at growth in charter and non-charter schools at the elementary level. Dumas and MacNeish's (2017) learning-capacity work requiring longitudinal data could serve as a guide.

## **Conclusion**

This study looked at math achievement and elementary schools. Going beyond math to include other subjects might have influenced the results. Since the study focused on elementary schools, it might mean that the differences between charter and non-charter elementary schools are not distinct. In general, elementary schools have a more generalist focus, and most elementary charter schools are standalone—not part of a CMO. Differences by SES might mean the differences between charter and non-charter

schools are not distinct, and that neither school type is effective at supporting the needs of low-SES students. Thus, parents selecting a charter school only because they think it will improve their elementary child's education should consider dimensions beyond school type. The designation of charter/non-charter does not seem to be predictive.

The findings of the study do challenge the consideration of school type (charter vs. non-charter) as a significant variable for school effectiveness at the elementary level. It might be important to learn more about specific programming at individual schools. Perhaps elementary schools where students performed better had similar programming, regardless of whether they were designated charter or non-charter. However, this study only looked at school type and SES. The results indicate that elementary schools are segregated by SES and race; and schools with higher concentrations of low-SES and greater diversity had lower math scores. Finally, the study supported existing opportunity-gap data revealing that schools with lower-SES populations have lower student achievement. This would warrant a study of access to resources, staffing, programs, and other factors.

## REFERENCES

- A+ Denver (2012). *School achievement in Denver: The impact of charter schools*.  
<https://apluscolorado.org/wp-content/uploads/2016/07/CharterSchoolImpactJan2012FINAL1.pdf?ref=723>
- Abdulkadiroglu, A., Angrist, J., Cohodes, S., Dynarski, S., Fullerton, J., Kane, T., & Pathak, P. (2009). *Informing the debate: Comparing Boston's charter, pilot and traditional schools*. Harvard University Center for Education Policy Research.  
<https://cepr.harvard.edu/publications/informing-debate-comparing-bostons-charter-pilot-and-traditional-schools>
- Abdulkadiroğlu, A., Angrist, J. D., Dynarski, S. M., Kane, T. J., & Pathak, P. A. (2011). Accountability and flexibility in public schools: Evidence from Boston's charters and pilots. *The Quarterly Journal of Economics*, 126(2), 699–748.  
<https://doi.org/10.1093/qje/qjr017>
- Akey, T., Plucker, J. A., Hansen, J. A., Michael, R., Branon, S., Fagen, R., & Zhou, G. (2008). *Study of the effectiveness and efficiency of charter schools in Indiana*. Indiana University Center for Evaluation and Education Policy.  
<https://files.eric.ed.gov/fulltext/ED504591.pdf>
- Angrist, J. D., Dynarski, S. M., Kane, T. J., Pathak, P. A., & Walters, C. R. (2010). Inputs and impacts in charter schools: KIPP Lynn. *American Economic Review*, 100(2), 239–243. <https://doi.org/10.1257/aer.100.2.239>

- Angrist, J. D., Dynarski, S. M., Kane, T. J., Pathak, P. A., & Walters, C. R. (2012). Who benefits from KIPP? *Journal of Policy Analysis and Management*, 31(4), 837–860.
- Angrist, J. D., Pathak, P. A., & Walters, C. R. (2013). Explaining charter school effectiveness. *American Economic Journal: Applied Economics*, 5(4), 1–27.  
<https://doi.org/10.1002/pam.21647>
- Ameel, M. H. (2016). *An analysis of successful charter school operations*. (Publication No. 693 [Doctoral Dissertation, Eastern Michigan University]. Digital Commons @EMU.  
<https://commons.emich.edu/cgi/viewcontent.cgi?article=2058&context=theses>
- Baker, B. D. (2016, November 30). Exploring the consequences of charter school expansion in U.S. cities. *Economic Policy Institute*.  
<https://www.epi.org/publication/exploring-the-consequences-of-charter-school-expansion-in-u-s-cities/>
- Barnett, W. D. (2009). *A comparative analysis of the academic outcomes of Ohio public K–8 charter schools and their comparison districts*, (Document No. toledo1261605387) [Doctoral dissertation, University of Toledo]. OhioLINK.  
[http://rave.ohiolink.edu/etdc/view?acc\\_num=toledo1261605387](http://rave.ohiolink.edu/etdc/view?acc_num=toledo1261605387)
- Benigno, P., & Morin, K. (2013, June 2). On the road of innovation: Colorado’s charter school law turns 20. *Independence Institute*. <https://i2i.org/on-the-road-of-innovation-colorados-charter-school-law-turns-20/>

- Berends, M. (2015). Sociology and school choice: What we know after two decades of charters schools. *Annual Review of Sociology*, *41*, 159–180.  
<https://doi.org/10.1146/annurev-soc-073014-112340>
- Berends, M., Springer, M. G., & Walberg, H. J. (2017). *Charter school outcomes*. Routledge.
- Betts, J. R., & Tang, Y. E. (2008). Value-added and experimental studies of the effect of Charter schools on student achievement. *Center on Reinventing Public Education*.  
[https://www.crpe.org/sites/default/files/pub\\_ncsrp\\_bettstang\\_dec08\\_0.pdf](https://www.crpe.org/sites/default/files/pub_ncsrp_bettstang_dec08_0.pdf)
- Betts, J. R., & Tang, Y. E. (2011). The effect of charter schools on student achievement. *Center for Reinventing Public Education National Charter School Research Project*.  
[https://www.crpe.org/sites/default/files/pub\\_NCSRPNCSRP\\_BettsTang\\_Oct11\\_0.pdf](https://www.crpe.org/sites/default/files/pub_NCSRPNCSRP_BettsTang_Oct11_0.pdf)
- Bobko, P. (2001). *Correlation and regression: Applications for industrial organizational psychology and management*. Sage Publications.
- Bodilly, S., & Li, J. (2009). *The role of charter schools in improving education* (Research Brief No. RB-9428). RAND Corporation. <https://doi.org/10.7249/RB9428>
- Booker, K., Sass, T. R., Gill, B., & Zimmer, R. (2008). *Going beyond test scores: Evaluating charter school impact on educational attainment in Chicago and Florida* (Working Paper No. 6026). RAND Corporation.  
[https://www.rand.org/pubs/working\\_papers/WR610.html](https://www.rand.org/pubs/working_papers/WR610.html)

- Borek, J. (2008). A nation at risk at 25. *Phi Delta Kappan*, 89(8), 572–574.  
<https://doi.org/10.1177%2F003172170808900807>
- Bosetti, L., Brown, B., Hasan, S., & Van Pelt, D. N. (2015). *A primer on charter schools*.  
Fraser Institute. <https://www.fraserinstitute.org/sites/default/files/primer-on-charter-schools.pdf>
- Boyd, A., Maranto, R., & Rose, C. (2014). The softer side of ‘no excuses.’ *Education Next*, 14(1), 48–53. <https://www.educationnext.org/the-softer-side-of-no-excuses/>
- Bradshaw, T. K. (2007). Theories of poverty and anti-poverty programs in community development. *Community Development*, 38(1), 7–25.  
<https://doi.org/10.1080/15575330709490182>
- Buckley, J. (2007). *Choosing schools, building communities? The effect of schools of choice on parental involvement*. Education Working Paper Archive.  
<https://files.eric.ed.gov/fulltext/ED508943.pdf>
- Bulkley, K., & Fisler, J. (2003). A decade of charter schools: From theory to practice. *Educational Policy*, 17(3), 317–342.  
<https://doi.org/10.1177%2F0895904803017003002>
- Burns, D., Darling-Hammond, L., & Scott, C. (2019, September 10). *Closing the opportunity gap: How positive outlier districts in California are pursuing equitable access to deeper learning*. Learning Policy Institute.

<https://learningpolicyinstitute.org/product/positive-outliers-closing-opportunity-gap-brief>

Butler, O., Yang, X. F., Laube, C., Kühn, S., & Immordino-Yang, M. H. (2018).

Community violence exposure correlates with smaller gray matter volume and lower IQ in urban adolescents. *Human Brain Mapping*, 39(5), 2088–2097.

<https://doi.org/10.1002/hbm.23988>

Carter, P. L., & Welner, K. G. (Eds.) (2013). *Closing the opportunity gap: What America must do to give every child an even chance*. Oxford University Press.

Center for Research on Education Outcomes. (2009). *Multiple choice: Charter school*

*performance in 16 states*. [https://www.ewa.org/sites/main/files/file-](https://www.ewa.org/sites/main/files/file-attachments/multiple_choice_credos.pdf?1381015949)

[attachments/multiple\\_choice\\_credos.pdf?1381015949](https://www.ewa.org/sites/main/files/file-attachments/multiple_choice_credos.pdf?1381015949)

Clark, M. A., Gleason, P. M., Tuttle, C. C., & Silverberg, M. K. (2015). Do charter

schools improve student achievement? *Educational Evaluation and Policy*

*Analysis*, 37(4), 419–436. <https://doi.org/10.3102%2F0162373714558292>

Cohodes, S. (2018). *Charter schools and the achievement gap*. Princeton-Brookings, The

Future of Children, 1–16.

[https://futureofchildren.princeton.edu/sites/futureofchildren/files/resource-](https://futureofchildren.princeton.edu/sites/futureofchildren/files/resource-links/charter_schools_compiled.pdf)

[links/charter\\_schools\\_compiled.pdf](https://futureofchildren.princeton.edu/sites/futureofchildren/files/resource-links/charter_schools_compiled.pdf)

Cohodes, S., Setren, E., & Walters, C. R. (2019). Can successful schools replicate?

Scaling up Boston's charter school sector. *American Economic Journal*, 13(1), 138–167. <https://doi.org/10.1257/pol.20190259>

Coleman, J. S. (1966). Equal schools or equal students? *National Affairs*, 47. [https://www.nationalaffairs.com/public\\_interest/detail/equal-schools-or-equal-students](https://www.nationalaffairs.com/public_interest/detail/equal-schools-or-equal-students)

Colorado Department of Education. (2016). *2016 State of Charter Schools Triennial Report*. Schools of Choice Unit, Colorado Department of Education. <https://www.cde.state.co.us/communications/20160719stateofcharterupdated>

Colorado Department of Education. (2020). *2019 State of Charter Schools Triennial Report*. Schools of Choice Unit, Colorado Department of Education. [cde.state.co.us/cdechart/2019charterschooltriennialreport](https://www.cde.state.co.us/cdechart/2019charterschooltriennialreport)

Crane, E., & Edwards, B. (2007). *California's charter schools: Measuring their performance*. EdSource Annual Report. <https://files.eric.ed.gov/fulltext/ED497131.pdf>

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Curto, V. E., & Fryer, Jr., R. G. (2011). *Estimating the returns to urban boarding schools: Evidence from SEED* (Working Paper No. 16746). National Bureau of Economic Research. <https://doi.org/10.3386/w16746>

Darling-Hammond, L. (2003). Keeping good teachers: Why it matters, what leaders can do. *Educational leadership*, 60(8), 6–13.

David, R., & Hesla, K. (2018). *Estimated public charter school enrollment, 2017–2018*. National Alliance for Public Charter Schools.

[https://www.publiccharters.org/sites/default/files/documents/2018-03/FINAL%20Estimated%20Public%20Charter%20School%20Enrollment%252c%202017-18\\_0.pdf](https://www.publiccharters.org/sites/default/files/documents/2018-03/FINAL%20Estimated%20Public%20Charter%20School%20Enrollment%252c%202017-18_0.pdf)

DeAngelis, C. A., Wolf, P. J., Maloney, L. D., & May, J. F. (2018). *Charter school funding: (More) inequity in the city*. School Choice Demonstration Project.

<http://www.uaedreform.org/downloads/2018/11/charter-school-funding-more-inequity-in-the-city.pdf>

Dickhoner, B. B., & Fellow, C. E. (2020). *Digging into the data on Colorado charter schools: An in-depth look at graduation rates for students of color*. Common

Sense Institute. [https://commonsenseinstituteco.org/wp-content/uploads/2020/07/REPORT\\_DataOnCOCharterSchools.pdf](https://commonsenseinstituteco.org/wp-content/uploads/2020/07/REPORT_DataOnCOCharterSchools.pdf)

Dietrichson, J., Bøg, M., Filges, T., & Klint Jørgensen, A. M. (2017). Academic interventions for elementary and middle school students with low socioeconomic

status: A systematic review and meta-analysis. *Review of Educational Research*, 87(2), 243–282. <https://doi.org/10.3102%2F0034654316687036>

Dobbie, W., & Fryer, Jr., R. G. (2011). Are high-quality schools enough to increase achievement among the poor? Evidence from the Harlem Children's

Zone. *American Economic Journal: Applied Economics*, 3(3), 158–187.

<http://dx.doi.org/10.1257/app.3.3.158>

Dolan, K. K. (2014). *Promising leadership for school turnarounds*. The School Leadership Pipeline Series, Part 2. Donnell-Kay Foundation.

<https://files.eric.ed.gov/fulltext/ED558133.pdf>

Dumas, D. G., & McNeish, D. M. (2017). Dynamic measurement modeling: Using nonlinear growth models to estimate student learning capacity. *Educational Researcher*, 46(6), 284–292.

Duncan, G. J., & Murnane, R. J. (2014). *Restoring opportunity: The crisis of inequality and the challenge for American education*. Harvard Education Press.

Epple, D., Romano, R., & Zimmer, R. (2016). Charter schools: A survey of research on their characteristics and effectiveness. In E. A. Hanushek, S. Machin & L. Woessmann (Eds.), *Handbook of the Economics of Education* (Vol. 5, pp. 139–208). Elsevier. <https://doi.org/10.1016/B978-0-444-63459-7.00003-8>

Feng, L., Figlio, D. N., & Sass, T. (2010). *School accountability and teacher mobility*.

National Center for Analysis of Longitudinal Data in Education Research.

<https://www.urban.org/sites/default/files/publication/33236/1001396-School-Accountability-and-Teacher-Mobility.PDF>

Fryer, Jr., R. G. (2011). *Injecting successful charter school strategies into traditional*

- public schools: Early results from an experiment in Houston* (Working Paper No. 17494. National Bureau of Economic Research. <https://doi.org/10.3386/w17494>
- Furgeson, J., Gill, B., Haimson, J., Killewald, A., McCullough, M., Nichols-Barrer, I., Teh, B., Verbitsky-Savitz, N., Bowen, M., Demeritt, A., Hill, P. & Lake R. (2012). *Charter-school management organizations: Diverse strategies and Diverse Student Impacts*. Mathematica Policy, Research Center on Reinventing Public Education. [https://www.crpe.org/sites/default/files/pub\\_cmofinal\\_Jan12\\_0.pdf](https://www.crpe.org/sites/default/files/pub_cmofinal_Jan12_0.pdf)
- Gleason, P., Clark, M., Tuttle, C. C., & Dwoyer, E. (2010). *The evaluation of charter school impacts: Final report* (No. 2010-4029). National Center for Education Evaluation and Regional Assistance. <https://ies.ed.gov/ncee/pubs/20104029/pdf/20104029.pdf>
- Goodman, J. F. (2013). Charter management organizations and the regulated environment: Is it worth the price? *Educational Researcher*, 42(2), 89–96. <https://doi.org/10.3102%2F0013189X12470856>
- Grosskopf, S., Hayes, K. J., & Taylor, L. L. (2009). The relative efficiency of charter schools. *Annals of Public and Cooperative Economics*, 80(1), 67–87. <https://doi.org/10.1111/j.1467-8292.2008.00381.x>
- Hanushek, E. A., Kain, J. F., Rivkin, S. G., & Branch, G. F. (2007). Charter school quality and parental decision making with school choice. *Journal of public economics*, 91(5–6), 823–848. <https://doi.org/10.1016/j.jpubeco.2006.09.014>

- Hanushek, E. A., Peterson, P. E., Talpey, L. M., & Woessmann, L. (2019). *The unwavering SES achievement gap: Trends in U.S. student performance* (Working Paper No. 25648). National Bureau of Economic Research.  
<https://doi.org/10.3386/w25648>
- Harwell, M. (2018). Don't expect too much: The limited usefulness of common SES measures and a prescription for change. *National Education Policy Center*.  
<https://nepc.colorado.edu/publication/SES>
- Hassel, E. A., Hassel, B. C., Arkin, M. D., Kowal, J. M., & Steiner, L. M. (2006). *School restructuring under No Child Left Behind: What works when? A guide for education leaders*. The Center for Comprehensive School Reform and Improvement. <https://files.eric.ed.gov/fulltext/ED496104.pdf>
- Hess, F. M. (2001). Whaddy mean you want to close my school? The politics of regulatory accountability in charter schooling. *Education and Urban Society*, 33(2), 141–156. <https://doi.org/10.1177%2F0013124501332004>
- Hoxby, C. M. (2004). *Achievement in charter schools and regular public schools in the United States: Understanding the differences*. Harvard University Press.
- Huang, H. (2015). Can students themselves narrow the socioeconomic-status-based achievement gap through their own persistence and learning time? *Education Policy Analysis Archives*, 23(108). <https://files.eric.ed.gov/fulltext/EJ1084023.pdf>
- Kahlenberg, R. D., & Potter, H. (2014). *A smarter charter: Finding what works for*

*charter schools and public education*. Teachers College Press.

Kahlenberg, R. D., & Potter, H. (2015). What charter schools can teach us about teacher voice. *Teachers College Record*.

<https://www.tcrecord.org/books/Content.asp?ContentID=17890>

Karanovich, F. (2009). The evolution of charter schools: From concept to public schools of choice. *Journal of Philosophy & History of Education*, 59, 203–208.

Keddie, A. (2014). ‘It’s like Spiderman...with great power comes great responsibility’: School autonomy, school context and the audit culture. *School Leadership & Management*, 34(5), 502–517. <https://doi.org/10.1080/13632434.2014.938040>

Keddie, A. (2016). Maintaining the integrity of public education: A comparative analysis of school autonomy in the United States and Australia. *Comparative Education Review*, 60(2), 249–270. <https://doi.org/10.1086/685556>

Kolderie, T. (1990). Beyond choice to new public schools: Withdrawing the exclusive franchise in public education (Policy Report No. 8). Progressive Policy Institute. <https://files.eric.ed.gov/fulltext/ED327914.pdf>

Lackman, A. M. (2013). The collapse of Catholic school enrollment: The unintended consequence of the charter school movement. *Albany Government Law Review*, 6, 1–19.

Ladson-Billings, G. (2006). From the achievement gap to the education debt:

Understanding achievement in U.S. schools. *Educational Researcher*, 35(7), 3–12. <https://doi.org/10.3102%2F0013189X035007003>

Ladson-Billings, G. (2013). Lack of achievement or loss of opportunity? In P. L. Carter & K. G. Welner (Eds.), *Closing the opportunity gap: What America must do to give every child an even chance* (pp. 11–22). Oxford University Press.

Lester, P. (2018). *Building and using evidence in charter schools: How charter schools could become innovation laboratories for K–12 education*. Social Innovation Research Center. <https://files.eric.ed.gov/fulltext/ED592885.pdf>

Loeb, E., & Hurd, N. M. (2019). Subjective social status, perceived academic competence, and academic achievement among underrepresented students. *Journal of College Student Retention: Research, Theory & Practice*, 21(2), 150–165. <https://doi.org/10.1177%2F1521025117696821>

Maas, T., & Lake, R. (2015). Effective charter and traditional school characteristics: Aligning finding for informed policy making. *Journal of School Choice*, 9(2), 165–178. <https://doi.org/10.1080/15582159.2015.1028311>

Merseth, K. K. (2009). *Inside urban charter Schools: Promising practices and strategies in five high-performing schools*. Harvard Education Press.

Miron, G., & Urschel, J. L. (2010). *Equal or fair? A study of revenues and expenditures in American charter schools*. Education and the Public Interest Center & the

Education Policy Research Unit. <https://nepc.colorado.edu/publication/charter-school-finance>

Miron, G., Urschel, J. L., Mathis, W. J., & Tornquist, E. (2010). *Schools without diversity: Education management organizations, charter schools, and the demographic stratification of the American school system*. Education and the Public Interest Center & the Education Policy Research Unit. <https://nepc.colorado.edu/publication/schools-without-diversity>

Morley, L., & Rassool, N. (2002). *School effectiveness: Fracturing the discourse*. Routledge.

Oberfield, Z. W. (2016). A bargain half fulfilled: Teacher autonomy and accountability in traditional public schools and public charter schools. *American Educational Research Journal*, 53(2), 296–323. <https://doi.org/10.3102%2F0002831216634843>

O'Brien, E. M., & Dervarics, C. (2010). *Charter schools: Finding out the facts*. Center for Public Education.

Paino, M., Renzulli, L. A., Boylan, R. L., & Bradley, C. L. (2014). For grades or money? Charter school failure in North Carolina. *Educational Administration Quarterly*, 50(3), 500–536. <https://doi.org/10.1177%2F0013161X13505289>

Paschall, K. W., Gershoff, E. T., & Kuhfeld, M. (2018). A two-decade examination of historical race/ethnicity disparities in academic achievement by poverty

status. *Journal of Youth and Adolescence*, 47(6), 1164–1177.

<https://doi.org/10.1007/s10964-017-0800-7>

Rahman, T., Bandeira de Mello, V., Fox, M. A., & Ji, C. S. (2019). Mapping state proficiency standards onto the NAEP scales: Results from the 2017 NAEP reading and mathematics assessment (No. 2019-040). National Center for Education Statistics.

<https://nces.ed.gov/nationsreportcard/subject/publications/studies/pdf/2019040.pdf>

[f](#)

Ratterman, M. J., & Reid, B. (2009). *A comparison of student academic growth between Indiana charter schools and traditional public schools*. Center of Excellence in Leadership of Learning.

Reardon, S. F. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In D. B. Grusky & J. Hill (Eds.), *Inequality in the 21<sup>st</sup> Century* (pp. 177–189). Routledge.

Reardon, S. F., Valentino, R. A., Kalogrides, D., Shores, K. A., & Greenberg, E. H.

(2013). *Patterns and trends in racial academic achievement gaps among states, 1999–2011*. Center for Education Policy Analysis, Stanford University.

<https://cepa.stanford.edu/sites/default/files/reardon%20et%20al%20state%20achievement%20gaps%20aug2013.pdf>

Rebarber, T., & Zgainer, A. C. (Eds.) (2014). *Survey of America's charter schools*

2014. Center for Education Reform. <https://edreform.com/wp-content/uploads/2014/02/2014CharterSchoolSurveyFINAL.pdf>

Rippner, J. A. (2015). *The American education policy landscape*. Routledge.

Robinson, R. (2001). *The debt: What America owes to Blacks*. Penguin.

Rotherham, A. (2005). The pros and cons of charter school closures. In R. J. Lake & P. T. Hill (Eds.), *Hopes, fears and reality: A balanced look at charter schools in 2005* (pp. 43–52). National Charter School Research Project.

[https://www.crpe.org/sites/default/files/HopesandFears2005\\_report\\_0.pdf](https://www.crpe.org/sites/default/files/HopesandFears2005_report_0.pdf)

Ross, T., Kena, G., Rathbun, A., KewalRamani, A., Zhang, J., Kristapovich, P., & Manning, E. (2012). Higher education: Gaps in access and persistence study. Statistical Analysis Report (No. 2012-046). National Center for Education Statistics. <https://nces.ed.gov/pubs2012/2012046.pdf>

Sammons, P. (1995). *Key characteristics of effective schools: A review of school effectiveness research*. University of London, Institute of Education. <https://files.eric.ed.gov/fulltext/ED389826.pdf>

Sass, T. R. (2006). Charter schools and student achievement in Florida. *Education Finance and Policy*, 1(1), 91–122. <http://dx.doi.org/10.1162/edfp.2006.1.1.91>

Sass, T. R., Zimmer, R. W., Gill, B. P., & Booker, T. K. (2016). Charter high schools' effects on long-term attainment and earnings. *Journal of Policy Analysis and Management*, 35(3), 683–706. <https://doi.org/10.1002/pam.21913>

- Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, 75(3), 417–453.  
<https://doi.org/10.3102%2F00346543075003417>
- Slovacek, S. P., Kunnan, A. J., & Kim, H. J. (2002). California charter schools serving low-SES students: An analysis of the academic performance index. Charter College of Education, Program Evaluation and Research Collaborative.  
<https://files.eric.ed.gov/fulltext/ED469276.pdf>
- Smith, J., Farrell, C., Wohlstetter, P., & Nayfack, M. (2009). *Mapping the landscape of charter management organizations: Issues to consider in supporting replication*. National Resource Center on Charter School Finance and Governance.  
[https://charterschoolcenter.ed.gov/sites/default/files/files/field\\_publication\\_attachment/MappingTheLandscape-SupportingReplication\\_0.pdf](https://charterschoolcenter.ed.gov/sites/default/files/files/field_publication_attachment/MappingTheLandscape-SupportingReplication_0.pdf)
- Stevens, J. P. (2009). *Applied multivariate statistics for the social sciences* (5th ed.). Taylor & Francis Group.
- Suggett, D. (2015). School autonomy: Necessary but not sufficient. *Evidence Base: A Journal of Evidence Reviews in Key Policy Areas*, 2015(1), 1–26.  
<https://doi.org/10.21307/eb-2015-001>
- Tate, W. F. (1997). Race-Ethnicity, SES, gender, and language proficiency trends in mathematics achievement: An update. *Journal for Research in Mathematics Education*, 28(6), 652–679. <https://doi.org/10.2307/749636>

- Toma, E., & Zimmer, R. (2012). Two decades of charter schools: Expectations, reality, and the future. *Economics of Education Review*, 31(2), 209–212.  
<https://doi.org/10.1016/j.econedurev.2011.10.001>
- Tuttle, C. C., Teh, B. R., Nichols-Barrer, I., Gill, B. P., & Gleason, P. (2010). Student characteristics and achievement in 22 KIPP middle schools: Final report. Mathematica Policy Research. <https://files.eric.ed.gov/fulltext/ED511107.pdf>
- Hirsch, Jr., E. D. (2007). Narrowing the two achievement gaps. The Core Knowledge Foundation. <https://www.coreknowledge.org/wp-content/uploads/2017/01/EDH-narrowing-the-two-achievement-gaps.pdf>
- Saultz, A., Fitzpatrick, D., & Jacobsen, R. (2015). Exploring the supply side: Factor related to charter school openings in NYC. *Journal of School Choice*, 9(3), 446–466. <https://doi.org/10.1080/15582159.2015.1028829>
- Shepherd, D. L. (2011). *Constraints to school effectiveness: What prevents poor schools from delivering results*. Stellenbosch Economic Working Paper (No. 05/11).  
<https://learningportal.iiep.unesco.org/en/library/constraints-to-school-effectiveness-what-prevents-poor-schools-from-delivering-results>
- Stuit, D. A., & Smith, T. M. (2012). Explaining the gap in charter and traditional public-School teacher turnover rates. *Economics of Education Review*, 31(2), 268–279.  
<https://doi.org/10.1016/j.econedurev.2011.09.007>
- U.S Department of Education. (2006). *Charter high schools: Closing the achievement*

gap: *Innovations in education*. <https://files.eric.ed.gov/fulltext/ED494482.pdf>

Vergari, S. (2000). The regulatory styles of statewide charter school authorizers: Arizona, Massachusetts, and Michigan. *Educational Administration Quarterly*, 36(5), 730–757. <https://doi.org/10.1177%2F00131610021969182>

Wagner, T. (2010). *The global achievement gap: Why even our best schools don't teach the new survival skills our children need—and what we can do about it*. Basic Books.

Weekes, T. L. (2016). *Characteristics of high-performing California charter schools serving low-income minority students* [Doctoral dissertation, San Francisco State University]. ScholarWorks. <http://hdl.handle.net/10211.3/173628>

White, G. W., Stepney, C. T., Hatchimonji, D. R., Mocerri, D. C., Linsky, A. V., Reyes-Portillo, J. A., & Elias, M. J. (2016). The increasing impact of socioeconomic and race on standardized academic test scores across elementary, middle, and high school. *American Journal of Orthopsychiatry*, 86(1), 10–23. <https://doi.apa.org/doi/10.1037/ort0000122>

Williams, A. (2011). A call for change: Narrowing the achievement gap between white and minority students. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 84(2), 65–71. <https://doi.org/10.1080/00098655.2010.511308>

Wohlstetter, P., Smith, J., & Farrell, C. C. (2013). *Choices and challenges: Charter school performance in perspective*. Harvard Education Press.

Wolf, P. J., & Jacob, A. M. (2013). School choice. In R. S. Rycroft (Ed.), *The Economics of Inequality, Poverty, and Discrimination in the 21st Century* (pp. 398–414).

ABC-CLIO

Woodworth, J. L., Raymond, M. E., Han, C., Negassi, Y., Richardson, W. P., & Snow, W. (2017). *Charter management organizations*. Center for Research on Education Outcomes. [http://www.k12accountability.org/resources/Charter-Schools/CREDO\\_CMO\\_FINAL.pdf](http://www.k12accountability.org/resources/Charter-Schools/CREDO_CMO_FINAL.pdf)

Worcester, J. (2019). *Is School of Choice a Choice for All in Douglas County, Colorado?* (Publication No. 13808110) [Doctoral dissertation, University of Colorado at Denver]. ProQuest Dissertations Publishing.

Yatsko, S., Gross, B., & Christensen, J. (2009). *Charter high schools: Alternative paths to graduation*. Center on Reinventing Public Education. [https://www.crpe.org/sites/default/files/whp\\_ics\\_altpaths\\_nov09\\_0.pdf](https://www.crpe.org/sites/default/files/whp_ics_altpaths_nov09_0.pdf)

Zilanawala, A., Martin, M., Noguera, P. A., & Mincy, R. B. (2018). Math achievement trajectories among black male students in the elementary-and middle-school years. *Educational Studies*, 54(2), 143–164. <http://dx.doi.org/10.1080/00131946.2017.1369414>

Zimmer, R., Gill, B., Booker, K., Lavertu, S., & Sass, T. R. (2009). *Charter schools in eight states: Effects on achievement, attainment, integration, and competition*. Rand Corporation. <https://www.rand.org/pubs/monographs/MG869.html>

## **APPENDIX: DEDICATION**

To God be the glory! I thank God for his love, protection, mercies, and providence for me and my family. May this degree mark a new beginning to achieve the will of God for my life. This dissertation is dedicated to my father, Alexander Solomon Ohene Ansah, who passed away in the year 2001. He was a loving and caring father who loved and provided for his family. Dad instilled in me the hope that all things are possible through our Lord Jesus Christ. I see him celebrating this achievement as well. To my wonderful family, my wife, Joanitta Dokua Ansah; my first born, Nathaniel K. Ohene Ansah; my second born, Stephen Owusu Ansah; and my last-born, Evangeline Ohenewaa Ansah: I say thank you!

My wife has been incredibly supportive of the family, and I am blessed to have her as wife. Her support released some time for me to go through this Ph.D. coursework. My daughter Evangeline provided technical support for me, a period of the pandemic when technical resources were hampered by restricted movements, when one could not physically seek help from the technical support department on campus. My gratitude to the family God has given is infinite. I also dedicate this dissertation to my older and loving brother, Seth Ohene Adjei, and his family. Your support will never be forgotten. I cannot wrap up without mentioning my mother, Hagar Amankwah, to whom this dissertation is also dedicated. To all others who have supported me, I am deeply thankful. May the good God bless you all.