2020

Elementary Charter School Enrollment and Economic Segregation in Two Urban Minnesota Public School Districts

Jeffrey Michael Sambs
Bethel University

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by
Jeffrey Michael Sambs

A dissertation submitted to the faculty of Bethel University
in partial fulfillment of the requirements for the degree of
Doctor of Education

Saint Paul, MN
December 15, 2020

Approved by:

Advisor: Dr. Barry Sullivan

Reader: Dr. Adam Wyse

Reader: Dr. Mike Lindstrom

Abstract

This study used a quantitative historical research design and multivariate mixed method analysis to examine whether there is a relationship between charter school enrollment and economic segregation at the elementary level in the public schools of two urban Minnesota districts, Saint Paul Public Schools and Minneapolis Public Schools. Economic segregation is measured using dissimilarity index scores calculated from 2006 to 2010. Data were collected from the Minnesota Department of Education using the federally mandated October 1 reporting statistics database. The results of the study were different for each school district. There was a statistically significant, and positive, relationship between charter school enrollment and students at the elementary level who qualify for free lunch in Saint Paul Public Schools but not for students who qualify for free lunch in Minneapolis Public Schools. There was not a statistically significant relationship between charter school enrollment and students at the elementary level who qualified for reduced-price lunch or students who do not qualify for free or reduced-price lunch in either school district.

Acknowledgments

I want to express my gratitude to the many people in my life that helped me complete this project and point out a few by name. Thank you to Johnny Denbleyker who was absolutely essential to helping construct the statistical model and guiding me through the world of mixed modeling. This project would not have been completed without your help. To my dissertation advisor, Barry Sullivan, thank you for consistently advocating for me throughout the entire process and to my committee readers, Adam Wyse and Mike Lindstrom, for being flexible and providing valuable feedback to improve my study. I also need to thank all of my friends who supported me by asking questions, pestered me to keep me going, and ridiculed me for taking so long. Especially, Dr. Andrew Thompson. Thank you to my parents, Judy and Chuck Sambs, for modeling curiosity, kindness, and work ethic. Finally, the people who sacrificed the most to help me complete this project, thank you to my wife Tasha, son Aidan, and daughter Sophia. You gave me the greatest gifts that allowed me to finish, time and unconditional love.

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Chapter I: Introduction

Introduction to the Problem

Two significant phenomena appear to be occurring simultaneously in today's public schools, an increasingly resegregated student population and the rise of unregulated school choice enrollment policies (Frankenberg & Lee, 2002; Mickelson, Bottia, & Southworth, 2008; Orfield, 2009; Orfield & Lee, 2002). Progress towards desegregating schools appears to have ended, resulting in a sharp increase in segregation by race and socioeconomic status now being observed in nearly all large urban public school districts across the country (Frankenberg & Lee, 2002). At the same time, the enrollment tools and policies many urban districts traditionally used to manage student populations when integrated schools were a high priority, are now left to parents acting in increasingly uncontrolled or unregulated school choice systems. One of the major beneficiaries of this trend has been the public charter school movement.

Background of the Study

Charter schools expanded rapidly, quadrupling enrollment from 2000-2010 (U.S. Department of Education, 2012). The first charter opened in Minnesota in 1991, and now includes over 7,000 schools in 44 states serving more than three million students nationwide (U.S. Department of Education, 2020). While charter school enrollment during the times period of this study represented only about 5% of all students who attend public schools (Center for Education Reform, 2013), the

market growth is significant enough to ask if this enrollment shift has influenced the demographic characteristics of traditional public school districts.

Statement of the Problem

Despite the increasing reliance on choice systems to drive enrollment decisions and the growth in charter school enrollment, the mission to integrate public schools cannot be ignored. Since *Brown v. Board of Education* (1954), this mission has been interpreted to mean integrated public schools are an essential component to creating equal opportunity educational experiences for all students. In addition to state-level attempts to manage segregated enrollment, public schools receive federal dollars, requiring them to conform to the Equal Protection Clause of the Fourteenth Amendment and Title V and VI of the 1964 Civil Rights Act, both which have been interpreted and used to address integration goals and public school admission procedures (Eckes & Trotter, 2007; Nowak, Rotunda, & Young, 1995). Regardless of what model drives enrollment decisions, from strictly regulated court ordered desegregation to unregulated parental choice, it is crucial that all educational policies and public options, including charter schools, that are competing for students and dollars be examined to clearly understand how they align with the mission to integrate public schools (Minow, 1999).

Purpose of the Study

The purpose of this study was to examine whether there is a relationship between charter school enrollment and economic segregation at the elementary level

in two urban school districts in Minnesota, Saint Paul Public Schools and Minneapolis Public Schools.

Rationale

Researchers have raised questions about how well unregulated free choice systems align with the broad variety of values, mandates, and expectations public schools are required to address, including integrated student populations (Cobb & Glass, 2009). Growing evidence, using a variety of approaches, appears to demonstrate that unregulated choice systems and public options including charter schools have the potential to exacerbate racial and economic stratification (Bifulco, Ladd, & Ross 2009; Godwin & Kemerer, 2002; Koedel, Betts, Rice, & Zau 2009; Petrovich & Wells, 2005; Renzulli & Evans, 2005; Warnock, 2006). When examining the demographic characteristics of the 21 urban school districts with the largest enrollments in the United States, Saporito and Sohoni (2007) found that high poverty was pervasive and concentrated. They further observed that poverty was more concentrated in schools than the neighborhood demographics would predict.

Even with deliberate intentions to combat historical inequities through enrollment policies, participation and information in unregulated school choice systems continues to be highly associated with class based family characteristics (Hennig, 1999; Schneider, Teske, Roch, & Marschall, 1997; Shapiro & Johnson, 2005). Zimmer, Gill, Booker, Lavertu, Sass and Witte (2009) concluded that families are more likely to self-segregate by enrolling in schools with higher concentrations of students with similar backgrounds. In addition, evidence suggests parent perceptions

of quality, regardless of background, is strongly influenced by perceived homogeneity (Fiske & Ladd, 2000). This motivation to self-segregate may be one way to understand the increasingly segregated demographic trends observed in unregulated school choice systems. While this trend has often been simplified and explained through the lens of White flight (Renzulli, 2005), where White parents that are best able to compete for limited seats in the most sought after schools for their children thrive at the expense of the poorest students, there appears to be a more complex picture (Rapp & Eckes, 2007). For example, unpredictable demographic trends in charter school enrollment force researchers to examine the factors that influence school choice assumptions and the consequences with a more precise lens. Parents of different races and economic backgrounds appear to be participating in self-segregation, further confounding the rational agent assumptions of both free market school choice models and the simplified White flight explanations (Eckes & Trotter, 2007).

Regardless of the system that creates or perpetuates segregated schools there are real and measurable consequences. The correlation between racial segregation and poverty is highly predictable in urban schools throughout the country (Orfield & Lee, 2005; Rothstein, 2004). Academic achievement, graduation rates, attitudes, and many other indicators continue to demonstrate that economically and racially integrated schools benefit the historically underserved (Rumberger & Palardy, 2005) while segregated schools negatively influence numerous quality indicators including: academic achievement, teacher and curriculum quality, dropout rates, and attitudes

about race (Hobday, Finn, & Orfield, 2009). When predicting academic success and controlling for other factors, decades of research has demonstrated that school demographics continue to matter, and poverty concentration continues to be the most significant predictor (Boger, 2005; Burney & Beilke, 2008; Caldas & Bankston, 1997; Colman, 1966). Chubb and Moe (1997) found school economic demographics a stronger predictor of student achievement than race. Meanwhile, charter school enrollment is increasing (Scott & Villavicencio, 2009; U.S. Department of Education, 2012) and in many states like Minnesota, public charter schools are exempt from integration rules (Minnesota Rules, 3535.0110, subp. 8, 2013).

This study drew together two significant phenomena, increasing segregation in public schools and increasing charter school enrollment, and examined if there was a relationship between the two in the limited setting of two urban Minnesota districts. The more specific question this study examined is whether there was a relationship between the increase in charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools .

Research Questions

1. Is there a relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

2. What is the direction of any relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?
3. What is the strength of any relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Significance of the Study

Public schools need to attend to a myriad of values and expectations simultaneously. Compliance with national and state laws, high student achievement, parent and community collaboration, safety, enrollment decisions, public perception, and many other values are constantly competing and cooperating to shape public education policy.

Enrollment policies are one of the tools school districts have used to manage their many obligations. One area of conflict that continues to emerge within the enrollment debate is between the values of school choice and desegregation. Public policy focus has increasingly shifted away from strict legislative and court enforced racial desegregation law while unregulated school choice has become the new vehicle to voluntarily integrate and reform public schools (Warnock, 2008).

Significant changes including choice provisions within No Child Left Behind, the popularity of market-based solutions in popular culture, shifting language of desegregation law, and other factors have contributed to a public school enrollment climate that is becoming progressively more unregulated and high stakes for a greater number of families. Charter school enrollment represents one of those unregulated choices for an increasing number of families. In what Cobb and Glass (2009) termed as a "post desegregation world," how can states and districts balance what often appear to be competing values of unregulated public school choice options like charter schools and desegregation?

Definition of Terms

Charter schools. Charter schools are publicly funded schools in Minnesota that are granted approval by compliance with Minnesota State Statute 124D.10 (2013). Charter schools are organized and operated by teachers and parents and are supported by sponsor organizations, now called authorizers, who establish a three-year renewable contract that describes the terms for managing the school. Charter schools are public schools that receive direct state funding, cannot charge tuition, and cannot levy taxes or issue bonds. Charter schools are exempt from some statutes and rules that apply to traditional public schools, including integration, and individual schools are categorized by the Minnesota Department of Education as independent school districts (Minnesota Rules, 3535.0110, 2013). Subdivision 1 of Minnesota Statute 124D.10 (2013) states the purpose of Charter Schools is to:

- increase learning opportunities for pupils;

- encourage the use of different and innovative teaching methods;
- measure learning outcomes and create different and innovative forms of measuring outcomes;
- establish new forms of accountability for schools; or
- create new professional opportunities for teachers, including the opportunity to be responsible for the learning program at the school site.

Dissimilarity index. The dissimilarity index is a demographic measure used to calculate the relative degree of segregation, or uneven distribution, of identified groups. This study used a dissimilarity index to operationalize economic segregation by comparing the overall difference between two percentage distributions, an economically identified group at the school level and the group mean at the district level.

Economic segregation. Economic segregation is the uneven distribution of one identified family income level group in a geographic unit. This study used student eligibility for the federal free lunch program, eligibility for the federal reduced-price lunch program, and students who are not eligible for either program as the economically identifiable groups.

Elementary level. Elementary level for the purposes of this study is grade levels kindergarten through fifth grade. While there is a variety of grade level configurations that can include different elementary grades at individual sites, the term elementary level in this study was students enrolled specifically in the grade

levels kindergarten through fifth grade (K-5). Prekindergarten, middle school, and high school enrollment data were not included in this study.

Enrollment. Enrollment is the number of students who attend a specific school as reported by individual districts to the Minnesota Department of Education by October 1. The October 1 date was established to enable the state of Minnesota to comply with the federal funding reporting requirements of Title 1 programs.

MARSS. The Minnesota Automated Reporting Student System collects student data required by the Minnesota Department of Education and is also the state's official system for reporting data required by the federal government for funding and allocation of Title 1 dollars. The MARSS system was used in this study to collect enrollment and demographic information from the school years 2006-2010.

Assumptions and Limitations

This study examined the relationship between charter school enrollment and economic segregation at the elementary level (K-5) in two urban Minnesota districts, Saint Paul Public Schools and Minneapolis Public Schools. The limitations acknowledged in this study included:

- The time period this study was conducted, the specific school years 2006-2010.
- Changes in policies at the school, district, county, and state level that influenced enrollment during the time period examined in this study.

- The participants in the study were limited to two urban Minnesota districts and the independent charter schools located geographically in the school districts of Minneapolis and Saint Paul.
- Enrollment data being self-reported by schools and collected from the Minnesota Department of Education database.
- This study's use of eligibility for the federal free and reduced-price lunch programs as a proxy for measuring poverty.
- This study's use of a proxy for measuring segregation, the dissimilarity index, to examine the relative unevenness in enrollment distribution of identified economic groups.
- Mobility of student enrollment. The students in Minnesota are eligible to move within, between, into and out of any school or district, including the two districts in this study.

Nature of the Study

This research study used a quantitative historical research design. Information from the Minnesota Department of Education was used to examine the relationship between charter school enrollment and economic segregation at the elementary level in two of the largest Minnesota urban districts, Minneapolis Public Schools and Saint Paul Public Schools. This study utilized methodological designs used in previous research examining the effect of charter school enrollment on public school demographics in Ohio (Warnock, 2008) and the effect of voucher schools in the District of Columbia (Green & Winters, 2006). Economic segregation will be

operationalized using a dissimilarity index score (D) that represents the discrepancy between school level demographic composition and the district mean for all elementary schools for three groups including students who are eligible for the federal free lunch program, students who are eligible for the federal reduced-price lunch program, and students who do not qualify for either program. The change in students enrolled in charter schools was used in a multivariate mixed effects analysis to examine whether it may have a relationship with the segregation of any of the three economic groups measured, and if it might account for any of the direction or strength in the variability. The statistical model was used to examine any potential relationship between the dissimilarity index scores and the change in charter school enrollment from year to year of the study, 2006-2010. Additional demographic variables were used to help build a linear multivariate mixed method model that more accurately represents the complexity of student enrollment phenomena. The null hypotheses were, there is no relationship between charter school enrollment and economic segregation at the elementary level in Minneapolis and Saint Paul Public Schools after controlling for students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color. If the study rejects the null and indicates a relationship, the analysis will be able to measure the direction and determine the strength of the potential relationship.

Organization of the Remainder of the Study

The remainder of this study is organized into four chapters, a reference section, and appendices. Chapter II is an examination of the relevant literature about school choice, free market and stratification theories, segregation, and charter schools. Chapter II also includes a description and discussion of the variables used in the study. Chapter III is an explanation of the methodology, research design, and measurement tools. Chapter IV describes the data analysis, descriptive statistics, findings of the multivariate mixed effect analysis, and a discussion of the findings. Chapter V is composed of a summary of the findings and recommendations for future study. The final sections are the references and appendices.

Chapter II: Review of Literature

Understanding the purpose and significance of this study requires a brief summary of previous research literature framing the language of school choice, the legal and educational policies that historically influence school choice and charter schools, and the potential demographic implications associated with charter schools.

Defining the Language of School Choice

Experience and research about the integrative effects of school choice enrollment in public schools should be enabling educators to inform policy decisions using empirical data. However, isolating and measuring the contribution of specific enrollment systems and options has proven difficult (Jones-Sanpei, 2006). The constantly shifting legal, political, and cultural landscape that surrounds public education policy makes confidently evaluating the efficacy of enrollment systems complex. Even before considering the research challenges, there is little consensus about the fundamental purpose of enrollment policies. Parental choice, integration, efficiency, student achievement, and many other value driven motives all compete to shape enrollment policies, each using different language and criteria for success. School choice, segregation, and charter schools were the focus of this study and each requires more explanation.

It may be helpful to describe school choice enrollment systems along a continuum separated into the two basic categories, controlled and unregulated (see Appendix A). There are wide varieties of policies within each system but using the degree of regulation to categorize enrollment systems is useful because it enables

researchers to examine, and then communicate, the implications of specific policy interventions. The language of school choice is often complex and understanding it requires historical context that evolved from two opposing directions, strictly controlled state mandated desegregation plans and the unregulated choice systems that accommodate charter schools today.

Controlled Choice Enrollment Systems

Controlled choice systems are defined by a governing authority directly regulating student placement (Cobb & Glass, 2009). Under controlled choice systems, parents have choices but geography, family income, parent education, language, residence, sibling preference, until recently race, and other characteristics may be considered to determine school placement. For the purpose of this study, controlled enrollment systems were defined as enrollment systems that control student placement with the explicit purpose of managing specific student demographics.

There is a long history of parent control over schools and student enrollment (Brouillette, 2002) but the legal demands placed upon states and districts after *Brown v. Board of Education* (1954) requires that legislators, administrators, and school boards attend directly to the demographic influence of enrollment policies. When those institutions fail to initiate policies that reflect the values of integration, the legal system may act as a surrogate and play a role in establishing enrollment systems.

Court ordered desegregation plans are the most strictly regulated examples of controlled enrollment systems. While conventional wisdom holds that these explicit

race-based desegregation attempts failed, demographic studies demonstrate that until the mid 1980s, increased levels of racial and economic integration for most groups were being achieved under strictly controlled enrollment policies (Frankenberg & Lee, 2002; Orfield & Lee, 2004). In "After Brown: The Rise and Retreat of Desegregation," Clotfelter (2004) documented the demographic gains made during desegregation and the positive consequences of integration in the context of achievement and more equitable resource allocation. In 1952 Mississippi, three times as much was spent per pupil on White students as African American students and teachers in all White schools were paid 42% percent more than their colleagues in African American schools (Clotfelter, 2004). The resource discrepancy based strictly on race has receded and the achievement gap between African American students and White students, while still significant and unacceptable, closed nearly 30% from 1975 to 2000 (Orfield, 2001). In addition, the sharp rise in racial and economic segregation after court ordered plans were replaced demonstrates that they were having a positive influence on integrating student populations (Orfield, 2001).

Many studies that show a positive relationship between court ordered desegregation and increased levels of racial and economic segregation use as participants the urban centers most effected by the court decisions. The picture is more complex because court ordered desegregation is also associated with White flight to suburbs. This is important because while desegregation may have been effective at integrating student groups in cities, many White families simply left. Historical research has clearly documented the lending policies, taxes, housing

districting, and other policy incentives and disincentives based on race, both de facto or de jure, which aided in the phenomenon of White flight during the height of court ordered desegregation (Erickson, 2011). The reality of this tumultuous time period requires more context than many of the research studies attempt or are able to capture. This does not undermine the significance of any one study or reduce the importance of court ordered desegregation, but it does mean that the success of court ordered desegregation is often measured by a limited sample, those students left behind.

Controlled systems, including court ordered desegregation plans were often unpopular and sometimes inefficient, but they did appear to be attending to the problem they were created to address, racial segregation in urban centers. Until the courts began challenging the practice, over 1,000 districts nationwide employed race as at least one of the factors used to regulate student enrollment (Greenhouse, 2006). Despite the racially integrative progress that controlled enrollment systems encouraged, the last three decades have produced court opinions that increasingly limit the specific policy tools districts used to influence student placement, creating an environment that promoted unregulated choice systems (Orfield & Lee, 2007).

Unregulated Choice Enrollment Systems

School choice systems that do not control student placement based on student characteristics to manage school demographics are considered less regulated and are often described in research literature broadly as unregulated (Cobb & Glass, 2009). For example, voucher programs represent the least regulated enrollment system on the continuum because per pupil funding directly follows students to public or private schools (Coulson, 2009; Dudley-Marling & Baker, 2012; Friedman, 1955, 1962). It is important to note that the term unregulated is not an absolute on the continuum. Unregulated in this context is relative to controlled and most often implies two characteristics, high level of parent choice and per pupil funding that follows the student directly to the school (Peterson, 2001). Charter schools are most often accommodated under this broad category of unregulated choice systems (Holme & Wells, 2008). With the exception of language in strict libertarian literature regarding school choice, the term unregulated does not imply an absence of all regulation (Peterson, 2001).

For the purpose of this study, unregulated enrollment systems were defined as systems that do not use student demographic characteristics to control student placement, where a high degree of parent choice exists, and where per pupil funding follows the student directly to public schools. Charter schools in Minnesota exist in this unregulated enrollment system. This is in direct contrast to controlled enrollment systems which are defined as enrollment systems that control student placement with the explicit purpose of managing specific student demographics.

Changing Legal Perspective

The rise of unregulated choice enrollment systems in public schools is connected to the tide of legal decisions, including the Meredith Cases (2007), that have restricted the power districts and universities have to control student placement. In *Parents Involved in Community Schools v. Seattle School District* (2007) the Supreme Court, in a 5-4 opinion, concluded that diversity and combating segregation are still compelling government interests, but using race as a factor in student enrollment decisions is unconstitutional. Ma and Kurleander (2005) described the imprecise message the courts send when appearing to uphold precedent regarding forms of diversity as a compelling interest, including in previous higher education enrollment decisions (*Gratz v. Bollinger, 2003; Grutter v. Bollinger, 2003*), while simultaneously striking down the specific policies used to integrate student populations at the K-12 level. Enrollment policies aimed at creating diverse student bodies continues to be under scrutiny by the courts (*Fisher v. University of Texas, 2013).* Former Supreme Court Justice Stevens commented on this changing legal perspective regarding enrollment priorities in his concurring dissenting opinion in the *Meredith v. Jefferson Board of Education* decision (2006), "No Member of the Court I joined in 1975 would have agreed with today's decision." (p.5) Mickelson (2004) documented the courts' pattern of backtracking from educational policies that are sensitive to race and class in depth, describing the change as a "judicial retreat."

Integration Policy Changes in Minnesota

The policy momentum created by this shifting legal perspective appears to have discouraged states like Minnesota from employing controlled enrollment policies designed to tackle racial and economic segregation. Instead, these decisions appear to have encouraged unregulated choice systems where integration decisions are driven by political rhetoric, public opinion, and parent choice (Hobday, Finn, & Orfield, 2009).

Before the legal shift, fighting segregation in Minnesota was deliberate and evidence of intentional desegregation attempts can be found in the State Board of Education language from as early as 1967 (Minnesota Department of Education, 1967) and in Minnesota State Rules as early as 1973 (3535.0300). Individual districts were required to turn in a specific desegregation plan, if they had any schools where the percentage of minority students was 15% greater than the district average, the district could be penalized financially (Minnesota Rules, 1973, 3535.0400). This empowered school boards to make difficult policy decisions despite often strong public opposition and required any new construction and attendance boundaries plans to be reviewed by the Commissioner of Education to ensure they did not contribute to or increase segregation (Minn. Rules, 1973, 3535.1100).

In 1988, the Minnesota Department of Education (MDE) conceded that significant demographic changes occurring in St. Paul, Minneapolis, and some inner ring suburbs required it to redefine the way racial segregation was identified. MDE charged the Minnesota State Board of Education with working toward integration

solutions statewide (Hobday, Finn, & Orfield, 2009). After several years of conversations, task forces, and recommendations a strong tone was set by the Minnesota Legislature to tackle segregation in the state with intra-governmental responsibility and a metro wide plan using a combination of district reporting mandates and penalties for noncompliance, including the loss of state education dollars (Minnesota Laws, 1994, chapter 647, article 8, section 1). The move drew sharp criticism from conservative organization questioning the benefits and costs of integrated schools, but also drawing on the changing court perspective they claimed the state was doing more than the law required, opening Minnesota up to future litigation (Kersten, 1995). Hobday, Finn, and Orfield's 2009 paper titled, "A Missed Opportunity: Minnesota's Failed Experiment with Choice-Based Integration" detailed the political firestorm that ensued including death threats to the head of Minnesota's Department of Children, Families, and Learning, the dissolution of the Minnesota State Board of Education, and ultimately successful opposition to the integrative course set by the Legislature in 1994. The paper described how this resulted in significantly weakened Minnesota State integration policy. The new direction was based on parent choice and while it did include incentives for districts submitting plans and reporting, no monetary or practical consequences for noncompliance were put in place. Hobday, Finn, and Orfield (2009) pointed out that even with increased racial and economic segregation and several cases of what appear to be egregious school board actions, no Commissioner of Education has used the current rules to find even one district in violation of intentional segregation.

> The rules effectively make the Department (MDE) a perfunctory bureaucracy, dutifully collecting data and noting whether schools and districts are racially isolated. The rules do not provide the Department with any mechanism for supporting positive, integrative action by school boards, and they do not give the Department any power to prevent decisions that effectively increase racial segregation in its schools. (p. 965)

New Rules adopted and amended in 1999 (3535.0100-3535.0170) reflect Minnesota's reaction to the courts' increasing skepticism toward controlled integration policies, choosing to move toward an unregulated choice enrollment system. While integration as a goal is still present in the language of Minnesota Rules, it is clearly driven by the values of unregulated choice:

The purpose of parts 3535.0100 to 3535.0180 is to:

- recognize that the primary goal of public education is to enable all students to have opportunities to achieve academic success;
- reaffirm the state of Minnesota's commitment to the importance of integration in its public schools;
- recognize that while there are societal benefits from schools that are racially balanced, there are many factors which can impact the ability of school districts to provide racially balanced schools, including housing, jobs, and transportation;
- recognize that providing parents a choice regarding where their children should attend school is an important component of Minnesota's education

policy;

- recognize that there are parents for whom having their children attend integrated schools is an essential component of their children's education;
- prevent segregation, as defined in part 3535.0110, subpart 9, in public schools;
- encourage districts to provide opportunities for students to attend schools that are racially balanced when compared to other schools within the district;
- provide a system that identifies the presence of racially isolated districts and encourage adjoining districts to work cooperatively to improve cross-district integration, while giving parents and students meaningful choices; and
- work with rules that address academic achievement, including graduation standards under chapter 3501 and inclusive education under part 3500.0550, by providing equitable access to resources. (Minn. Rules 3535.0100, sub. A-I, 2013)

The Minnesota Rules language reflects the shifting legal framework and documents a state moving toward an unregulated school choice system. The Rules are of importance to this paper because they framed the enrollment policy environment that existed during the years selected for this study. In addition, charter schools fit neatly into this unregulated choice framework because they can be described as both an educational reform model and a vehicle to integrate students through parent choice.

Free Market and Stratification Theories

Legal decisions, including at the Supreme Court level, are often a reflection of the public's changing value systems (Toobin, 2007) and it appears the school choice issue is no exception. School choice has become an embedded cultural perspective linked to the assumed benefits that a Milton Friedman (1955, 1962) inspired free market model brings to public life. Charter schools appear to be benefiting from their place in this marketplace perspective with favorability numbers that continue to rise (Bushaw & Lopez, 2012). There is extensive debate about free market driven assumptions, language, policies, and the role they should play in the context of public education (Chubb & Moe, 1990a, 1991b; Rosenberg, 1991; Shannon, 1991; Willie, 1991). While the debate about the role of the free market may appear politically charged and divorced from direct application, it connects with this research because advocates from a contrasting perspective, stratification theory, would make opposite predictions about the outcome of this study.

Stratification theory is a reactionary concept created in response to the increasing popularity of free market theory and the early school choice movement (Archbald, 2000). Stratification theory suggests that because parents do not start with or have the same resources to engage and compete in school choice marketplaces, and do not act like predictable rational agents, free market enrollment systems will further stratify student demographic characteristics along race and class lines (Wells & Crain, 1992). Pearson (1993) details the consequences of free market stratification in schools where students and involved parents with the most resources flee what they

perceive to be failing schools, increasing the concentration of the highest need students in schools with fewer resources.

Advocates for charter schools and the free market choice perspective would predict that as the number of students enrolled in charter schools increases, economic segregation will decrease in the traditional public schools (Berends, 2009; Forster 2009; Peterson, Wolf, Howell, Campbell, & Harvard Univ., Cambridge, MA. Kennedy School of Government, 2002). In contrast, stratification theorists would predict that as the percent of students enrolled in charter schools increases, economic segregation will also increase in the traditional public schools (Bifulco, Ladd, & Ross, 2008; Helig, Williams, McNeil, McSpadden, & Chrisopher, 2010; Warnock, 2008).

Increasing evidence suggests that stratification theorists continue to compile research studies using a variety of methods that support their claims (Archibald, 2000). Advocates of the theory perceive school choice policies and options to be segregation devices. As early as 1990, Moore coined the phrase "the new improved sorting machine" (p.153) to describe the results of increasing school choice in the 1980s Chicago Public Schools. Research evidence that examines school options across the school choice continuum demonstrates that unregulated options appear to result in increasingly segregated student populations by race, ethnicity, and socioeconomic status (Arcia, 2006; Holme & Wells, 2007; Mickelson et al., 2008; Reardon & Yun, 2002; Rickles & Ong, 2005). One unregulated school choice option that does not at first appear to fit neatly into either the free market or stratification

theory's predicted demographic trends is public charter school enrollment. Stratification and free market advocates both recognize examples of charter schools that are more and less racially and economically segregated than the surrounding public schools (University of Minnesota, 2012).

Charter School History

The history of charter schools in the United States is rooted in the national school reform movement and political landscape of the 1980s. The movement has evolved significantly from the original idea outlined by Ray Budde in Education by Charter (1986) and supported publicly by the President of the American Federation of Teachers (AFT) speech to the National Press Club in 1988 (Shanker, 1988a).

A Nation at Risk (1983) is often heralded as a landmark in the history of the school reform movement and is credited with igniting the 1980s culture of educational change (Ravitch, 2003). Commissions recommending education reform were not new, but the unique political and cultural landscape of the times elevated the disillusionment with public education to prominent national attention (Ravitch, 2003). In a now famous speech to the National Press Club in 1988, Albert Shanker describes the first wave of reforms implemented after A Nation at Risk as legislatively driven, top down, and therefore, ultimately limited. He argued that while new standards and rigorous academic requirements were necessary a new wave of bottom up, teacher-based reform was also necessary. Shanker (1988b) described the creation of schools within schools that were created by a few motivated teachers and were free of bureaucratic constrains. That idea was then connected with the term "charter" in a

New York Times article written by Shanker titled, Convention Plots New Course-A Charter for Change (1988). The idea was picked up by a Minnesota policy advocacy group called the Citizen's League who published, Chartered Schools = Choices for Educators + Quality for All Students (1988).

The Citizen's League report inspired the creation of a bill by two Democrats in the Minnesota House of Representative who pushed through a compromise version to the Minnesota Senate and ultimately to the desk of Governor Arne Carlson. In 1991, the first public charter school legislation in the country was signed into law (Laws of Minnesota 1991, chapter 265, article 9, section 3). The following year, The City Academy in St. Paul, Minnesota opened and is credited with being the first authorized charter school in the nation (Schroeder, 2004).

Immediately after the charter legislation passed in Minnesota, Democratic senators from Minnesota and Connecticut attempted, without success, to create a structure for federal startup funding for charter schools called the Public School Redefinition Act of 1991. Even without federal dollars in the early years, charter schools have expanded. During the years selected for this study all but six states had charter legislation with charter schools enrolling over two million students nationwide (Center for Education Reform, 2013; Wixom, 2018).

Charter school support and opposition has evolved through time. As Kahlenburg (2013) pointed out, supporters of the charter school idea, originally teacher unions and Democrats, and opponents in the Conservative movement have both reversed their positions. Charter schools are now inseparable from the

Conservative movement's relationship with the free market model of school choice in public education while the view of the Democratic Party and teacher unions toward charter schools remains more difficult to generalize (Kahlenburg, 2013).

The partnership between teacher unions and charter schools ended quickly in 1996 after the AFT withdrew support for charters (Hill, Rainey & Rotherham, 2006). Since then, several national teacher unions have shifted support numerous times and while the AFT now supports inclusive charter schools the relationship remains volatile (Hill, Rainey, & Rotherham, 2006). Organizations like the National Association for the Advancement of Colored People (NAACP) have also switched positions after initial support. In a 2016 resolution by their National Task Force on Quality Education, they now flatly oppose any for-profit charter schools funded by public dollars and allow exceptions only for district sponsored schools.

One of the issues that continues to divide teacher unions is the emergence of segregated student bodies at charter schools (Miron, Urschel, Mathis, & Tornquist, 2010; Rapp & Eckes, 2007). Opponents of charter schools in teacher unions perceive the current state of segregated student populations as a violation of Shanker's (1988) original idea outlined in a speech to the National Press Club. In that speech, he explicitly described his vision of public charter schools as a reflection of the composition of the entire student body to avoid creating a segregated group of students.

Charter Schools Enrollment

The research about the influence of charter schools on segregated student

populations is difficult to generalize when examining the relevant literature on school choice demographic factors. Methodological issues like self-selection and parental advocacy in charter school enrollment potentially confounds measurement techniques (Goldhaber & Eide, 2003). Henig (2008) explored the difficulty of finding objective information and how the intensity of political values and motivations that surround the charter school issue on all sides contributes to a manufactured fog that obscures the kind of meaningful generalizations necessary to moving a conversation based on empirical evidence forward. While accurate information free of political influence may be difficult to find, there is a growing body of peer reviewed research available that describes the demographics of charter schools.

There are examples of charter schools that are more and less racially and economically segregated than the surrounding traditional public schools (Cobb & Glass, 1999; Eckes & Rapp, 2005, University of Minnesota, 2012). However, the growing body of literature appears to demonstrate that enrollment at charters schools nationally are deeply and consistently segregated along racial and poverty lines (Miron, Urschel, Mathis, & Tornquist, 2010; Orfield & Frankenberg, 2014; Rapp & Eckes, 2007).

When examining economic demography around the country, research appears to consistently demonstrate that charter schools exacerbate racial and economic segregation (Wells, Holme, Lopez, & Cooper 2000). Using a dissimilarity index over time, Warnock (2008) found a strong relationship between charter schools and economic segregation among students who qualify for free lunch in traditional Ohio

public schools. In addition, the group differences within free and reduced-price lunch are becoming more distinct. Charter schools appear to enroll relatively more advantaged families from disadvantaged populations (Carnoy, 2005; Henig, 1999). Using NAEP data, Carnoy, Jacobsen, Mishel, and Rothstein (2005) found that fewer Black, Hispanic, and White students that qualified for free or reduced-price lunch enrolled in charter schools when compared to district schools. Miron and Nelson (2002) examined Michigan charter schools and found they enrolled significantly different populations than the local school district when disaggregated by family income, ethnic background, and children with disabilities. A longitudinal study that examined over 900 charter schools and examined their enrollment demographic trends found that between 70% and 73% of the charters were income segregated in the extreme category of the scale when compared to the sending district (Miron, Urschel, Mathis, & Tornquist, 2010). The 2010 UCLA Civil Rights Project reported strong findings about the segregated student compositions of public charter schools, labeling the charter movement a "civil rights failure" (Frankenberg, Siegel-Hawley &Wang, 2010, p. 1). They published a series of reports analyzing charter school enrollment trends across the country and found:

> data show that we are in the process of subsidizing an expansion of a substantially separate — by race, class, disability and possibly language — sector of schools, with little to no evidence that it provides a systematically better option for parents or that access to these schools of choice is fairly available to all. (p.16)

Effect of Charter Enrollment on Public Schools

When examining the effects nationally of charter school enrollment on specific student groups in the context of the public school enrollment as a whole, charter schools appear to exacerbate student stratification (Bifulco & Ladd, 2006; Warnock, 2008). But it appears to be more complicated when examining the enrollment influence because demographic trends often do not fit into easy to generalize predictions (Arsen & Ni, 2011). There is little disagreement whether charter schools are segregated, but the composition of that segregation appears to be less predictable. For example, charter opponents who predicted White flight and skimming do not appear to be wholly supported by demographic evidence (Archibald, 2000; Miron, 2012). Few charter schools until recently are disproportionally White (Eckes & Rapp, 2005) and many enroll higher percentages of students of color and in poverty than the schools in their geographic locals (Green, 2001; University of Minnesota, 2012). At the same time, charter supporters who predicted diverse student enrollments as the result of free market parental choice are also finding the preponderance of evidence does not support their expectations (University of Minnesota, 2012). In spite of the emerging complexity around the demographic characteristics and influence of charter school enrollment, the impact of that enrollment on specific student populations continues to be more precisely dissected by researchers. For example, several studies have concluded that market oriented charter schools were less likely to serve students who are more costly to educate because of poverty, special education, and language needs (Fiore, 2001; Frankenberg,

Siegel-Hawley, Howe & Welner, 2002; Lacireno-Paquet, Holyoke, Moser, & Henig, 2002; Wang, 2010; Welner & Howe, 2005).

Minnesota Charter Enrollment

Minnesota charter schools appear to fit the national student profile, enrolling during the years selected for this study an average of 20% more students of color than the demographics of their surrounding districts would predict (Lake & Hill, 2005). In addition, during the years of this study Minnesota charter schools enroll a higher percentage of students who qualify for free lunch than traditional public schools and that discrepancy appears to have increased over time (Frankenberg, Lee, and Orfield, 2003; University of Minnesota, 2008). The Institute on Race and Poverty at the University of Minnesota (2008) found charter schools in Minnesota to be more segregated than traditional districts when examining race and income while simultaneously performing worse academically on average than schools with similar demographics. Minnesota's Office of the Legislative Auditor also conducted a study with the participation of the Minnesota Department of Education and found similar achievement results as the University of Minnesota study (Randall, Connelly, Piehl, & Minnesota, 2008). Despite negative publicity around racial segregation, low student performance, and fiscal mismanagement at charter schools in Minnesota, charter school enrollment continues to grow (MDE, 2014). The Minnesota Department of Education's publication of Education Statistic and Summary for the 2013-2014 school year reported over 35,000 students are enrolled across the state with 72 charter schools found within the Minneapolis and St. Paul school district

boundaries (MDE, 2014).

Enrollment evidence suggests that demographic and achievement challenges do not appear to be a limiting factor as charter schools nationally, and in Minnesota, continue to expand with little oversight to monitor civil rights and desegregation goals (Frankenberg, Siegel-Hawley, 2009). One of the areas of greatest growth within the charter movement are schools often described as "niche" charter schools that advertise a specialized program, often targeted at specific student groups (Fox, Buchanan, Eckes, & Basford, 2012). The specificity of the program often has direct outcomes on the demographic composition of the student body, particularly when the program caters to language or cultural programming. For example, in Minnesota the line between ethnic, cultural, and religious programming in charter schools has become a hotly contested issue sparking fierce first Amendment debates when the American Civil Liberties Union of Minnesota sued a charter school, Tarek ibn Ziyad Academy, and their sponsor for promoting religion at public schools (Furst & Lemagie, 2009). In addition to suing the school, the lawsuit also named the Minnesota Commissioner of Education for inadequate oversight for allowing public tax dollars to support a religious institution. While the definition of an ethnic niche charter school and its legal place in the public school arena will most likely continue to be examined for some time, there is little doubt that ethnic niche charter schools have contributed to more segregated school environments in Minnesota (University of Minnesota, 2008). Adding to the racial and economic divide, traditional school districts appear to have responded by opening ethnic niche programs of their own to

compete for students, deepening segregation through programming offerings in a variety of settings (University of Minnesota, 2008).

Review of Literature Summary

Two phenomena are occurring in most large urban districts, increased racial and economic segregation and an increasing reliance on unregulated school choice enrollment systems. Charter schools emerged in the era of shifting legal perspectives about how states and districts balance desegregation and more unregulated school choice enrollment systems. This unique time period enabled charter advocates to successfully argue that their public schools could be a model for that balance, and could simultaneously attend to numerous issues on the table including segregation. While charter school enrollment increased, the delicate balance between parent choice and desegregating schools was being played out in the court system and in specific policy debates at school district board meetings. One issue that had not changed was the obligation of states and school districts to attend to the demographic implications of their enrollment policies, including segregation. But charter schools grew outside and parallel to that tension, moving forward on the theoretical assumption that over time quality schools would attract a diverse student population. Enrollment numbers grew without being checked by the integration accountability requirements that directed traditional public schools funded by public tax dollars. As the balance began to shift toward more unregulated enrollment policies, a fundamental question began to emerge. Should public charter schools, because they are funded by public tax dollars, be as accountable as traditional public schools to

integrating student populations?

A review of relevant research literature makes it increasingly clear that student groups at most charter schools are highly segregated both racially and economically, even more segregated than the traditional schools in their geographic areas would predict. While examining these trends may at first be straightforward, the details also demonstrate a more complicated enrollment picture than both opponents or advocates of charter schools anticipated.

Opponents of charter schools asserted that the free market model would produce more segregated school environments. While this aligns with the preponderance of evidence, the specific demographic compositions of that segregation do not appear to fit their broad generalizations. For example, concerns over White flight and "cream skimming" do not describe most charter school populations. While demographic composition ranges greatly from school to school and city to city, during the years of this study most charter schools have evolved to enroll more students of color and more students in poverty than the traditional school counterparts in their geographic area. Concerns over segregated charter schools that were mostly comprised of wealthy White students leaving schools that parents perceived as failing do exist but did not by in large come true during the years selected for this study. A more accurate description of the segregation of charter schools during the time of this study is that they are disproportionably comprised of a high percentage of students of color who live in poverty

Advocates of charter schools accurately predicted that there is a market for

more choices available to families, especially for poor families of color. This is evident in the large growth in charter school enrollment. However, decades of research literature appear to demonstrate that charter school growth has reproduced institutional segregation, but with more intensity and generally worse academic performance results than traditional public schools. Predictions from charter advocates that the free market system of unregulated choice would work to diminish already segregated traditional public schools is not supported by demographic evidence.

Minnesota is a state with every opportunity to support free market theory predictions about charter schools. It has the longest history with charter schools, one of the most liberal open enrollment policies in the country, and until recently consistent bipartisan political support for a wide variety of public school choice options (Mazzoni, 1991; Schroeder, 2004). With all those foundational components for success in place, the outcomes of the charter school movement do not meet the demographic expectations that advocates predicted (University of Minnesota, 2008, 2012). The segregated reality of charter school populations is clear. This study extends that knowledge by taking a vital next step, examining if and how the growth of charter school enrollment influences the demographic composition of traditional public schools.

Chapter III: Methodology

Philosophy and Justification

A variety of tools and approaches are used to explore the potential influence of charter school enrollment on racial and economic integration in traditional public schools. This study extended that research by examining the changes in economic segregation measures for three specific student populations over a five-year period in Minnesota's unique school choice environment. The purpose of this study was to examine whether there is a relationship between charter school enrollment and economic segregation at the K-5 elementary level in two urban Minnesota school districts, Saint Paul Public Schools and Minneapolis Public Schools . This chapter provides an overview of the research design, procedures, and a description of the variables included in the study.

Research Questions

1. Is there a relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?
2. What is the direction of any relationship between charter school enrollment between and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of

students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

3. What is the strength of any relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Theoretical Framework

Policy makers need empirical evidence to begin to understand the complex enrollment implications of different school choice options. Connecting the mission to integrate schools, the important role of economic demographics in predicting academic success, and the rapid expansion in charter school enrollment, this study examined whether there is a potential relationship between charter school enrollment and economic segregation at the elementary level in two districts, Saint Paul Public Schools and Minneapolis Public Schools.

Researchers have already begun to examine how different state and district enrollment options that are available in a variety of different choice systems influence student demographic trends (Cobb & Glass, 2009; Hobday, Finn, & Orefield, 2009; Holme & Wells, 2008; Koedel, Betts, Rice & Zau, 2009; Miron, Urschl, Mathus & Turniquist, 2010). The full spectrum of choice models and school options including magnet, charter, voucher, and non-public have been examined and scrutinized in an

attempt to determine what students they attract and how well they perform. This study extended that research by asking the next question, is there any influence from enrollment in these educational options on student populations in the traditional public school systems? The more specific question this study examined was whether there is a relationship between one of these options, increase in the charter school enrollment, and economic segregation at the elementary level (K-5) in two urban Minnesota districts, Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color. The null hypothesis was there is no statistically significant relationship between the number of students enrolled in charter schools and economic segregation at the elementary level (K-5) in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

The dynamic nature of education policy presents many research challenges. The relationship between school choice enrollment policies, specific choice options, and the demographic effects on student populations in public schools is difficult to examine for a variety of reasons. For example, enrollment policies range widely from district to district and state to state making generalizations about the contribution of any one approach difficult to isolate and measure (Jones-Sanpei, 2006). Even more complex than measuring the contribution of a specific policy is accounting for other

influential but moving variables like the radically changing student demographics occurring in many urban public school districts.

Without clear analysis examining the relationship between specific choice options and the resulting student demographic outcomes, educators and policy makers will be unable to confidently use empirical evidence to guide crucial decisions. Generalizing the contribution of evidence into practice will continue to be a challenging process but researchers have begun the difficult task of dissecting various state and district approaches with the intention of building consensus about the outcomes of specific enrollment options.

The purpose of this study was to use a historical research design and a multivariate mixed effect model to examine whether there was a relationship between charter school enrollment and economic segregation at the elementary level (K-5) in two of Minnesota's largest urban districts, Saint Paul Public Schools and Minneapolis Public Schools.

Minnesota appears to be an excellent place to investigate public school options because it holds a unique place in the school choice arena and it is perceived to be a leader in market-based school alternatives (Mazzoni, 1991). Minnesota was the first state with a charter school law and has one of the least restricted public open enrollment systems (Schroeder, 2004). This setting enabled the study to examine specific student populations over time in an environment where school choice has become a cultural norm. Being a leader in school choice models also enables other states to learn from the lessons Minnesota experiences over time as it forges a path

into unknown enrollment territory.

In addition to contributing to the general understanding of school choice policy outcomes, this study took advantage of gaps in research that indicate the need to explore the potential influence of school choice options on more specific student populations (Warnock, 2008). For example, measuring different student groups in choice systems has historically been limited to a few broad categories like race and broad census based socioeconomic indicators. Research design techniques and improved databases have evolved to allow researchers to collect, disaggregate, and measure increasingly specific student populations over time. For example, this study separated students who qualify for free lunch, students who qualify for reduced-price lunch, and students who do not qualify for free or reduced-price lunch instead of using broad categorizations in past research that may unintentionally distort conclusions with important policy implications.

The ability to measure specific student populations is particularly important in the school choice discussion because evidence suggests that families in disadvantaged groups that are relatively advantaged, like students who may qualify for reduced-price lunch, may participate in choice enrollment systems differently than families who qualify for free lunch (Archibald, 2000; Carnoy, 2005; Henig, 1999; Warnock, 2008). The increasingly precise examination of student populations is essential to a more comprehensive understanding of enrollment outcomes and this study's ability to account for the differences within groups may be a significant opportunity to contribute toward more informed policies targeted at populations most in need.

Variables

The dependent variable for this study was economic segregation. Economic segregation was measured for three demographic groups including students who qualify for the federal free lunch program, students who qualify for the federal reduced-price lunch program, and students who do not qualify for federal free or reduced-price lunch programs. This study utilized a dissimilarity index (D) to operationalize the dependent variable of economic segregation for the three demographic groups measured.

The number of students enrolled in charter schools as a percent of the traditional school enrollment was the independent variable for this study. This was calculated by measuring the total number of students enrolled in Kindergarten through 5th grade at charter schools out of the total public enrollment, Kindergarten through 5th grade, in each district for each year over the five years selected for this study. The percentage of students enrolled in charter schools out of total public enrollment will be used in the statistical analysis to examine whether it may have a relationship with segregation at the elementary level of any of the three economic groups measured, and if it might account for any of the direction or strength in the variability.

Hypotheses

1. Is there a statistically significant relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students

enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

(H_0:) There is no statistically significant relationship between charter school enrollment and economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

(H_1:) There is a statistically significant relationship between charter school enrollment and the level of economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

2. What is the direction of any statistically significant relationship between charter school enrollment between and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

   (H_0:) There is no statistically significant directional relationship between charter school enrollment and economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools,

students eligible for special education, English Language Learners, in school variability, school size, and students of color.

(H_1:) Charter school enrollment is statistically significant and directionally related to the level of economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

3. What is the strength of any statistically significant relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

   (H_0:) There is no statistically significant relationship, therefore, no directional strength to correlate to the level of charter school enrollment and economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

   (H_1:) Charter school enrollment is statistically significantly related and is correlated to the level of economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students

eligible for special education, English Language Learners, in school variability, school size, and students of color.

Research Design Strategy

This study used a quantitative historical research design and multivariate mixed effect model to examine whether there is a relationship between charter school enrollment and economic segregation at the elementary level (K-5) in Saint Paul Public Schools and Minneapolis Public Schools. Enrollment data from the October 1 reporting date was used to calculate the change in dissimilarity index scores from 2006-2010 for three student populations in each of the sample schools. The three student populations examined in this study will be grouped and analyzed by socioeconomic status and coded as follows, students who qualify for free lunch (F), students who qualify for reduced-price lunch (R), and students who do not qualify for free or reduced-price lunch (SDNQ). School level data was used to create a dissimilarity index (D) across schools for each demographic group, district, and year of the study. The dissimilarity index represents the difference in school level demographic data for elementary students compared to the district mean for all elementary level students, grades Kindergarten through 5^{th} grade.

Dissimilarity indices were then used in a multivariate mixed effect model to examine whether there is a statistically significant relationship between charter school enrollment and economic segregation for each demographic group in the two districts participating in the study. In addition to examining if there was a statistically significant relationship between charter school enrollment and economic segregation

in the sample districts, this study examined the direction and strength of any potential relationship.

This study used a historical research design and a multivariate mixed effect model and analysis to examine the potential relationship between charter school enrollment and economic segregation at the elementary level over a five-year time period. The final version of the model design used in this study was constructed through a process of trials and modifications with the goal of arriving at a statistically justified best fit model. The process began with testing using the most simple statistical procedure, linear regression and then was changed to fit the data being examined and the purpose of the study.

Using a historical research design required looking at the same school's changing data over time, for this study five years. Longitudinal measurement of the same observed term, repeated measure, created issues for other statistical procedures like simple regression (Singmann & Kellen, 2019) and was one factor in the decision to use a multivariate mixed effect model. The data points that fell into the repeated measure category, like examining enrollment and demographic data at the same school, could not be assumed to be independent and were found to create correlated data, violating some of the basic assumptions of more simple statistical procedures. Mixed modeling is a complex but well established procedure (Anderson, 1958) and enabled the researcher to confidently perform multiple measurements on school level data for each year they were represented in the study.

The decision to use a multivariate mixed effect approach carried several other benefits for the purpose of the study. In addition to the repeated measures consideration already discussed, the size of the data sets suggested that a more simplistic approach would have a high probability of resulting in Type I errors and too narrow standard errors (Singmann & Kellen, 2019). The final approach attended to a variety of obstacles by adjusting to the size of the data sets, enabling a more accurate description of data that had the potential of being highly correlated, and provided a graphic representation of large data sets that indicated uncontrolled variance issues with the research design model. Running trials and then letting the results drive the design model was an essential process for deciding what appeared to be a best fit model for this study. While the multivariate mixed effect approach helped overcome obstacles and created opportunities for higher degrees of confidence, the model is complicated and requires transparency in describing the process used to justify its use.

Measuring fluid terms as complex as public school enrollment and economic segregation over time requires research design models that account for a variety of covariates that have the potential to both inform and confound potential relationships between primary variables. The decision to implement a multivariate approach created several opportunities but also identified the burdens of examining each potential covariate in the context of the overall model design. Problems identified through trial runs led to the use of the final multivariate mixed modeling approach used for this study.

Mixed modeling and the use of residual or restricted maximum likelihood (REML), the criterion used for fitting them, was used as it became clear that one or more of the variables and their residuals for this study were likely to represent random variation. Mixed modeling allowed the use of both fixed and random effects. Each term was examined through the lens of deviations to determine appropriate use. Galloway (2006) described the benefit of the mixed model approach, if the decisions and assumptions used to construct the model are correctly made, as providing a broader validity than standard regression analysis or ANOVA.

As stated earlier, the decision to employ a multivariate mixed effect design for this study was arrived at through a process beginning with simple regression models and then adding layers, known as a step up approach as opposed to beginning with a more complex model and gradually narrowing it down (Zuur, 2009). The next course of action was to run multiple but separate linear regressions, but results indicated the approach began to narrow the available data, did not explicit account for correlated data, created multiple overlapping comparisons, and made estimating parameters inconsistent. More traditional regression analysis uncovered obstacles like unexplained noise the model did not account for, including unexpected factors like the wide variance of within school differences. A variety of strategies were employed to examine data and allow the model to evolve to best fit the specific research questions and context of this study. For example, Box Plots of Dissimilarity Index Scores (see Appendix C and H for examples) were examined to identify unexplained variance unrelated to the relationship between the independent and the dependent

variable and resulted in identifying the need to introduce, and ultimately include, school enrollment as a covariate. A preliminary analysis uncovered a potential problem, that using a model that assumed all school have the same N, weight, would have skewed the results (see Appendix D). This is an example of a covariate, raw enrollment, that was not included until trials and preliminary analysis uncovered an opportunity to improve the model.

Variances that were not intentionally controlled for made it challenging to perform a clear analysis of the relationship between the dependent and independent variable. Trials were used and the findings dissected to establish a justification for using a mixed effects model, and ultimately assigning covariates to function as both random and fixed effects, thus mixed modeling. The categorical random effect variable for this study's model design was a grouping factor, school. The purpose of the study was not to examine how a specific school influenced the dependent variable, but instead to use available data to attain better estimates.

A process of running trials and then examining specific difference between coefficients, standard errors, and t-statistics was used to establish which control variables needed to be accounted for to construct a best fit model. After a model was trialed, the REML criterion was used to estimate parameters. This process also confirmed which covariates played an important role and need to be controlled for when interpreting any potential relationship between charter school enrollment and dissimilarity scores for each of the three demographic groups being examined for the purposes of this study. For example, initial trials for Minneapolis appeared to show a

coefficient for students who qualified for free lunch and students of color of 0.919 and standard error of only 0.044, demonstrating a high confidence level for including it as a covariate in the study to help inform the relationship between the dependent and independent variables.

The two covariates that were not part of the original model were, within school variability and school size. Controlling for the variability of the dissimilarity indices within each school and school size, as measured by raw enrollment counts, were arrived at and ultimately used in the mixed effect model.

Measures

This study utilized a dissimilarity index (D) to operationalize the dependent variable of economic segregation for the three demographic groups measured at the elementary level. The dissimilarity index score represents how far each student group in each school deviates from the elementary level district mean. D scores were calculated for traditional schools and were determined by the difference between the percentage of students at the school level and the elementary level district level mean. Each demographic group at the school level generated an index score scaled between 0 and 100, 0 representing complete economic integration and 100 representing complete economic segregation. The scaled score theoretically represents the percent of students from one group that would have to move to another school to achieve the distribution represented by the elementary district mean. It is important to note that for the purpose of this study, D = 0 when it matches the district mean and not the percentage of student groups who would be in each school as a result of a random

distribution. This essential difference is discussed in more detail in the delimitation section. The discrepancy between the school level percentage and the district mean was analyzed for the school years 2006 through 2010 to create dissimilarity scores for each student group, and at each school in both districts.

The dissimilarity index was selected to operationalize segregation because it appears to best match the purpose of the research questions and level of measurement this study examined. There is extensive debate about the appropriate use of different forms of segregation measures but relatively fewer threats to the dissimilarity index are raised when examining differences across schools, as in this study, compared to using it to examine within school integration patterns (Clotfelter, 1978; Coleman, 1975; Conger, 2005; Zoloth, 1976).

The dissimilarity index is a straightforward measure of the relative discrepancy between student populations at different levels, in this study the measured levels are individual school sites and the elementary level district mean. Using the dissimilarity index also works well for this investigation because it utilizes percentages instead of raw numbers, this is particularly important in a longitudinal study because it self-controls for the constantly changing school and district demographics characteristics and populations over time. Different measures fit different research purposes but many of the commonly used segregation measures from information theory, sociology, and geography are strongly correlated with the dissimilarity index as used in this study, $r \approx$ ranging from 0.96 to 0.98 (Massey &

Denton, 1988; Reardon, 1998; Reardon & Firebaugh, 2002). For the purposes of this study, there were three separate dissimilarity indices for each group being examined. For free lunch the dissimilarity index can be represented as:

$$D = 100 * |f_i / e_i - F / E|$$

where,

f_i = the school enrollment at the elementary level of students' eligible for free lunch i

e_i = the total school elementary level enrollment i

F = the total elementary level district enrollment of students eligible for free lunch

E = the total elementary level district enrollment

For reduced-price lunch the dissimilarity index can be represented as:

$$D = 100 * |r_i / e_i - R/E|$$

where,

r_i = the school enrollment at the elementary level of students eligible for reduced-price lunch i

e_i = the total school enrollment at the elementary level for school i

R = the total elementary level district enrollment of students eligible for reduced-price lunch

E = the total elementary level district enrollment

For students who do not qualify for free or reduced-price lunch the dissimilarity index can be represented as:

$$D = 100 * |sdnq_i / e_i - SDNQ / E|$$

where,

$sdnq_i$ = the school enrollment at the elementary level of students who do not qualify for F or R i

e_i = the total elementary level school enrollment for school i

SDNQ = the total elementary level district enrollment of students who do not qualify for F or R

E = the total elementary level district enrollment

The number of students enrolled in charter schools at the elementary level as a percent of the total elementary level public enrollment in each district was the independent variable for this study. The percentage of students enrolled in charter schools was used in the mixed effects analysis to examine whether it may have a relationship with economic segregation of traditional schools at the elementary level and if it might explain the direction or strength in the variability.

The percentage of students enrolled in non-public schools out of total student enrollment in each district was a covariate in this study. It is important to note that the denominator used to calculate the non-public covariate represents all public and non-public students in each district to correct for changing demographic populations across time. Like charter school enrollment, non-public school enrollment was included in the district sample based on the geographic location of their school or main offices. In the 2008-2009 school year, non-public K-12 enrollment represented almost 10% of the total school enrollment in Minnesota, over double the number of

students enrolled in charter schools (MDE, 2010). Accounting for non-public enrollment changes was essential to understanding any potential relationship between charter school enrollment and economic segregation in public schools. Fairlie (2002) found that increased enrollment in private schools may exacerbate economic segregation in traditional public schools overall but Warnock (2008) found that increased private school enrollment may have decreased public school segregation in Ohio. Warnock (2008) explored the possibility that students who attend private schools would have otherwise attended higher income public schools and when these students leave for private schools, they may open spots for other student groups at high income schools. The open seat opportunity created by students moving to private schools may provide the potential for a distribution in the high-income public schools to more closely match the district mean, and therefore, decreases the dissimilarity index. There is little research available that directly examines the influence of private schools on traditional public school enrollment but the raw enrollment numbers of non-public schools were significant enough in this setting to account for in this study.

The percent of students eligible for special education, English language learners, and the percent of students of color at the elementary level were also used as covariates in this study. Saint Paul Public Schools and Minneapolis Public Schools reported these raw numbers for the October 1 deadline, making the collection procedure consistent with the other variables used in the model design. This study utilized the data in percentage form in the analysis where the numerator is the total

students enrolled in each category and the denominator is the total public students enrolled that year at the elementary level. These additional variables were necessary to control for when examining the potential influence of charter school enrollment on the demographic composition of public schools. In addition, each of these covariates has been correlated with both income and charter school enrollment making them potentially helpful explanatory variables.

The percentage of home schooled students was explored as an additional covariate. After a preliminary investigation it was determined that enrollment over the time period examined in this study was small enough and consistent enough to be accounted for without formally introducing the variable into the study. MDE (2010) reported the total number of students who were home schooled represents less than 2% of total state enrollment and only changed about 2 tenths of one percent, 1.4% to 1.6%, during the five years included in this study.

Sampling Design

To examine whether there is a relationship between charter school enrollment and economic segregation, data was gathered using the Minnesota Department of Education (MDE) database, Data and Analytics, Education Statistics Summary. Five data points were collected at the elementary level (K-5) from public school districts in two urban districts, Saint Paul Public Schools and Minneapolis Public Schools, for the school years 2006 through 2010. The school and district level N count are listed before the Descriptive Statistics section for each district. All targeted data was managed using an electronic spreadsheet. Public, including charter, student

enrollment data was collected in each district using the October 1 reporting deadline data set. The benefit of using these data was that each year is reported consistently across districts and schools with each student population separated by socioeconomic status: Total KG-5 Enrollment, Free Meal Eligible KG-5, Reduced-Price Meal Price Eligible KG-5, and KG-5 not eligible for Free or Reduced-Price lunch. Non-public enrollment numbers were also collected using the MDE Education Statistics Summary.

Data Collection Procedures

Data were collected from traditional public schools coded 01and public charter schools coded 07. Using this limited data set excluded non-traditional schools like those run by the Minnesota Department of Corrections. Limiting the data set also addressed some of the redundancy that would appear if the study included schools that are part of Minnesota Integration Districts. It is important to note that charter schools were reported by MDE as individual school districts, coded 07, not as individual schools.

To ensure consistency, data was collected only from the annual October 1 enrollment count that districts are required to report to the Minnesota Department of Education (MDE) using the Minnesota Automated Reporting Student System (MARSS). The reporting format changed slightly in the 2002-2003 school year because MDE updated to MARSS from the Minnesota Civil Rights Information System (MINCRIS) but is consistent across the years of this study.

In addition to collecting and using data from public schools, non-public school enrollment as a percent of total school enrollment were collected for each of the five years and in each district participating in the study. These data were used as covariates in the statistical analysis. It is important that this study accounts for changes in non-public enrollment in the participating districts to better inform any potential relationship between the dependent and independent variables.

The study was conducted using data from Minnesota public schools limited to two urban districts. Rural and suburban districts were excluded from the data set because charter school enrollment did not appear significant enough in these areas to include in the analysis. Outside the metro counties, there appear to be fewer public alternatives while the metro area school districts have robust choice systems. Most students who enroll in charter schools during the years of this study live in the metro region, almost 70%, and nearly half are enrolled in the two participating districts in this study, Minneapolis and St. Paul (Schroeder, 2004, MDE, 2010). Conversely, even in the few rural districts that have school choice policies, students overwhelmingly attend the geographically nearest school, making charter schools or other alternative educational choice enrollment numbers proportionally insignificant during the time period of this study.

Data was collected using the Minnesota Department of Education's Data and Analytics, Education Statistics Summary section. This section is available to the public and represents the information districts are required by Minnesota State Statute to report. With the exception of the change in the reporting system, from MINCRIS

to MARSS, the information reporting system is consistent across time and district. Data was crosschecked using individual district databases to ensure MDE information is consistent. There were two opportunities for each of the student group numbers to be crosschecked during the calculation of the dissimilarity process. In addition, the longitudinal nature of this study enabled the researcher to identify any anomalous data. Early examination of graphics like bivariate scatterplot graphs and boxplots in the design stage were used to help identify any data entry inconsistencies, outliers, or data points that required more detailed examination.

Data Analysis

Data was analyzed using a trend analysis and a multivariate linear mixed effects analysis. The analysis for this study was separated into two sections, Descriptive Enrollment Statistics and the Multivariate Mixed Effect Analysis. First, the researcher methodically checked and accounted for missing data, distribution of residuals, outliers, and then analyzed the Enrollment Descriptive Statistics data sets to describe trends in student populations, relative segregation, and special case information that influenced the mixed effect analysis. Traditional schools were included in the analysis for each year they are present in the sample. Schools with an enrollment cell < 50 were not included in the study to avoid inclusion of special case education settings not representative of the general sample of school enrollment. Examples of special case education settings for traditional schools may include short-term transitional language settings or temporary enrollment at an alternative school.

Schools that fit the assigned category for four of the five years of the study were included, the mean from the existing four years of data represented the missing year.

After completing the Enrollment Descriptive Statistics analysis, a multivariate mixed effects analysis was performed to examine whether there is a statistically significant relationship at the 95% confidence interval (Sig. < 0.05) between the dependent and independent variables. If the relationship was found to be statistically significant, the model enabled the study to examine the direction and strength of the relationship.

R^2 values enabled the researcher to describe the strength of any potential relationship by describing any variation in the dependent variable, economic segregation, which can be accounted for by the independent variable, charter school enrollment at the elementary level. The R^2 values further informed the relationship by enabling the researcher to describe any variation explained by the multiple covariates and the dependent variable. The unstandardized coefficient value for each data set described the percentage of change in the dissimilarity score that can be predicted for every one unit increase in the percent of charter school enrollment at the elementary level, after controlling for the percent of students in non-public schools, eligible for special education, English Language Learners, in school variability, school size, and students of color.

Limitations of Methodology

Historical research design, like all research designs, is associated with several limitations. First, data collection is not done by the researcher, which raises concerns about the validity and authenticity of data sources. To address the problem, this study only used data from the official Minnesota Department of Education Data and Analytics section. While the separation between data collection and researcher that is inherently present in historical research design raises concerns, it simultaneously provides the benefit of an objective disconnect between the collection source and analysis process. This is particularly important in the politically loaded debate around segregation, charter schools, and the comprehensive mission of public schools.

Historical research design has the additional burden of accounting for policy changes over time. Court ordered desegregation programs, legislative changes, shifting judicial perspectives, transportation dollars, and many more dynamic factors directly influence enrollment policies for all schools in Minnesota. This study attempted to account for these shifts by selecting a time frame with relatively little systemic change in traditional or charter school policy changes and by using covariates to reduce confounding variables that may interfere with a clear picture of the potential relationship between the dependent and independent variables. The time frame was also limited to avoid significant changes to enrollment policies that were implemented in Minneapolis Public Schools and Saint Paul Public Schools after the 2010 school year. The two participating districts independently enacted strategic plans after 2010 that moved the enrollment focus away from citywide magnets and

towards neighborhood school models. By selecting this limited time frame, the researcher reduced some of the influences of specific legal, transportation, and policy changes on the enrollment and demographic characteristics that may have potentially confounded the variables included in this study. While it is difficult to control for change over time, the burdens of longitudinal research need to be weighed next to the benefits of observing two different districts over an extended time span of five years.

The complexity of selecting and examining variables to include in a historical research study is also limited to the data that is available. While this study included a wide variety of variables that may influence the relationship between charter school enrollment and economic segregation at the elementary level, the potential for not including a variable that may have influenced the findings is a limitation that increases the risk of omitted variable bias.

This study defined and grouped students for economic segregation measurement by using their eligibility for federal free and reduced-price lunch programs. The assumption is that eligibility for the program is an indicator of family socioeconomic status. Archibald (2000) discusses that using free and reduced-price lunch qualification as a proxy indicator for poverty raises several problems. Free and reduced-price lunch definitions only identify families who voluntarily apply and self-identify their household income, opening the indicator up to non-response bias. This is problematic because of the commonly associated mobility and communication limits on families living in poverty. Harwell and LeBeau (2010) raised the problem of eligibility inconsistency across grade levels, where elementary students are much

more likely than high school students to apply, and therefore, qualify for receiving free, or reduced-price lunch. In addition to limiting eligibility to only those families that self-identify and complete the application process, free and reduced-price lunch definitions use a combination of income and family size as part of the qualification formula. This is an important factor when defining who is and who is not eligible under the federal definition. In practice, research suggests that across the K-12 range the number eligible for free and reduced-price lunch may be underestimated (Gleason, Hulsey, & Burghardt, 2004). This study did not account for this underestimation, but it did improve upon gaps in previous research by clearly identifying and isolating students who qualify for free lunch from students who qualify for reduced-price lunch instead of treating them as one group. While no single indicator for poverty is perfect, eligibility for free and reduced-price lunch is considered the primary research proxy for examining socioeconomic groups in public schools. Other poverty indicators are also problematic and because free and reduced-price lunch is the federally recognized definition regarding public school funding, the researcher is confident that it was an appropriate and consistent proxy for classifying the broad level of socioeconomic groups for the purposes of this study.

The use of the dissimilarity index (D) to operationalize segregation also carries several limitations (Clotfelter, 1978; Zoloth, 1976). These limitations range from theoretical assumptions to policy applications but even critics of the dissimilarity index agree, the shortcomings are most apparent when examining

relative segregation at the micro level, classroom level or within school units of measurement (Clotfelter, 1978).

This study delimited the data level analysis problem associated with the dissimilarity index by examining a broader unit, across school to district elementary level deviation data, which evidence suggests is less susceptible to the potential limitations observed at the within school level examination of integration (Clotfelter, 1978; Conger, 2005). For example, using a broader level of measurement enabled this study to attend to two important theoretical assumptions, and potential limitations, often associated with the use of D at the within school level. First, D is often criticized for assuming students can transfer across schools and grade levels. Second, the dissimilarity index assumes the relative ease of transfer between schools, and grade levels, is the same for all student groups. The two assumptions are not realistic in practice but did not compromise this study because the researcher delimited the unit of measurement to across school deviation scores and controlled for smaller schools and districts (< 50 students) where this problem presents itself with observed statistical influence (Zoloth, 1976).

It is important to note that the dissimilarity index is different from other commonly used segregation measures because of its linearity. Both Clotfelter (1978) and Zoloth (1976) suggested that the dissimilarity index's incremental representation makes it a poor tool for setting policy targets because the desegregation incentives appear to be less desirable than using other measures of segregation that represent change in the more realistic form of diminishing marginal returns. Once again, this

study's examination was delimited to trend analysis and exploring potential relationships, not setting specific policy goals or enrollment quotas. The results are intended to inform broad policy direction and discussions, not to be used directly to set specific demographic targets. The linearity of the dissimilarity index does have statistical and interpretation consequences (Zoloth, 1976) but for the purposes of this study, D fits the broad unit of measurement needed to examine any potential relationship between students enrolled in charter schools and economic segregation across schools, districts, and time.

Finally, critics of the dissimilarity index suggest that the scale of 0 to 100, complete integration vs. complete segregation, is not a realistic outcome of any choice enrollment policy, controlled or unregulated (Conger, 2005). The benefit of using D is that while the maximum and minimum may be unattainable through any intentional policy, the more simplistic definition, school level deviation from the district mean, served the purpose of this study by describing relative segregation trends. The full range of 0-100 is theoretical and not likely to be observed in practice but once again, the application of D is a descriptive tool useful in examining trends over time and presents less threats than if used for specific or micro examination. D was used for the purposes of this study to simply describe change over time and does not imply specific school level integration successes or failures, decreasing the importance of the discrepancy between the likely observed limits and the theoretical and pragmatic, maximum and minimum. One alternative to using the district mean to represent complete integration is projecting random distribution of student groups

across the district and using that as the benchmark for achieving complete integration, creating a different definition of a dissimilarity score of 0. In the end, explicit definitions of what represents the theoretical 0 and 100 is what is required for a clear and confident interpretation of both the instrument and the results. For the purposes of this study, D scores were represented by 0 when a student group in a school equals the district mean at the elementary level for that specific year. With clear definitions, the dissimilarity index provides the benefit of a "straightforward intuitive interpretation" (Zoloth, 1976, p. 280).

Finally, the model selection choices made throughout the process of building a best fit design requires some humility. Seltman (2017) summed up the challenge and opportunity of using mixed modeling, "Specifying a mixed model requires many steps, each of which requires an informed choice. This is both a weakness and a strength of mixed model analysis." (p. 368) While there is considerable debate among statisticians about how to interpret and even how valuable using p values is when enlisting more complex mixed models, the guiding principles for this study have always been to use straightforward tools that fit the research questions and context. Fortunately, improved software packages including the one used for this study generated markers of statistical significance along with a variety of models used to interpret and analyze the goodness of fit of the model.

Ethical Considerations

There was minimal threat for the participants in this study. Only school and district level information were collected and used in this study. No individual student

information was identified, collected, or measured. All data was collected from sources that are available to the general public through the Minnesota Department of Education.

Chapter IV: Results

This chapter includes the three research questions and hypotheses, enrollment descriptive statistics, the mixed effects results, a comparative analysis of the findings, and concludes with a summary. The purpose of this study was to use a historical research design and a multivariate mixed effects analysis to examine whether there is a relationship between charter school enrollment and economic segregation at the elementary level (K-5) in the Saint Paul Public Schools and Minneapolis Public Schools in the years 2006-2010. Data for the study were collected from the Minnesota Department of Education using the official annual October 1 enrollment count reported from each school district. Economic segregation is measured using a dissimilarity index to score each school for three demographic groups. The demographic groups include students who qualify for free lunch, students who qualify for reduced-price lunch, and students who do not qualify for free or reduced-price lunch.

Data Analysis Approaches

Data analysis is separated into two sections for each district, descriptive enrollment statistics and the mixed effect findings and analysis for each research question. The descriptive enrollment statistics section will use data tables and descriptions that inform the context of the mixed effect model analysis. The mixed effect model section will list the research questions, the related hypotheses, findings, and end with discussions. Each school district was examined individually and will be described separately. Comparisons between the two districts conclude this chapter.

Descriptive Enrollment Statistics for Saint Paul

The number of charter schools with students at the elementary level used to calculate the percentage of enrollment to traditional enrollment ranged from 21 to 27 during the years selected for this study. The Saint Paul Public Schools N for the purposes of this study was 235, calculated using 47 elementary schools observed over five years, 47(5) = 235. This N represents the number of observations being measured to examine the variability of economic segregation at the elementary level in Saint Paul Public Schools.

Comparing broad demographic compositions of the charter schools in Saint Paul to traditional Saint Paul schools at the elementary level is essential to understanding the different populations targeted in this study.

Table 1

Percentage of Elementary Level Saint Paul Charter Enrollment to Saint Paul Traditional Enrollment 2006-2010

Year	Charter	Traditional	% Charter to Traditional
2006	2814	20246	13.9%
2007	3215	19971	16.1%
2008	3531	19729	17.9%
2009	3978	19789	20.1%
2010	4233	20350	20.8%
Change			+6.9%

During the time period of this study at the elementary level in Saint Paul, charter school enrollment grew by about 33 % while enrollment at traditional schools

remained relatively unchanged. The percent of charter school students to traditional school students increased by about 7% at the elementary level. For the five years selected for this study, charter school enrollment made up an average of about 18% of traditional enrollment at the elementary level.

Table 2

Percentage of Elementary Level Students Who Qualify for Free Lunch, Saint Paul Charter to Traditional Saint Paul Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	54.84%	61.83%	6.99%
2007	52.77%	62.75%	9.98%
2008	58.66%	61.74%	3.08%
2009	57.38%	67.61%	10.23%
2010	61.02%	65.04%	4.02%
Mean	56.93%	63.79%	6.86%

Over the time period examined in this study at the elementary level, the percentage of targeted Saint Paul traditional schools enrolling students qualifying for free lunch exceeded that of the targeted Saint Paul charter schools by about 7% percent. During the same time period, the percent of students who qualify for free lunch at traditional public schools grew 3.21% while the percent of students who qualify for free lunch at charter schools grew at about twice that rate at the elementary level. One note of historical context that helps inform the interpretation of the table above was the economic downturn of 2007-2009 known as the Great Recession.

Table 3

Percentage of Elementary Level Students Who Qualify for Reduced-Price Lunch, Saint Paul Charter to Traditional Saint Paul Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	10.15%	9.60%	0.55%
2007	6.58%	9.62%	3.04%
2008	6.50%	10.14%	3.64%
2009	7.68%	7.44%	0.24%
2010	6.24%	8.70%	2.44%
Mean	7.43%	9.10%	1.67%

Over the time period examined in this study, the difference in the percentage of students enrolled at Saint Paul charter and traditional schools that qualify for reduced-price lunch was less than 2% at the elementary level.

Table 4

Percentage of Elementary Level Students Who Do Not Qualify for Free or Reduced-Price Lunch, Saint Paul Charter to Traditional Saint Paul Enrollment 2006-2010

Year	Charter%	Traditional%	Difference %
2006	35.01%	30.28%	4.73%
2007	40.66%	29.18%	11.47%
2008	37.95%	30.01%	7.94%
2009	34.60%	26.80%	7.80%
2010	32.74%%	28.09%	4.65%
Mean	36.19%	28.87%	7.32%

Saint Paul charter schools enroll about 7% more students who do not qualify for free or reduced-price lunch than in the traditional Saint Paul Public Schools at the elementary level.

Table 5

Percentage of Elementary Level Students Who Qualify LEP,
Saint Paul Charter to Traditional Saint Paul Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	31.12%	41.39%	10.27%
2007	26.84%	39.53%	12.69%
2008	23.27%	41.01%	17.74%
2009	24.13%	38.00%	13.87%
2010	26.45%	37.59%	11.14%
Mean	26.36%	39.50%	13.14%

Saint Paul charter schools enroll about 13.14% fewer students who qualify as Limited English Proficiency compared to traditional schools at the elementary level.

Table 6

Percentage of Elementary Level Students of Color,
Saint Paul Charter to Traditional Saint Paul Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	71.62%	74.46%	2.84%
2007	69.40%	75.28%	5.88%
2008	69.66%	75.45%	5.79%
2009	68.31%	75.86%	7.55%
2010	68.28%	75.97%	7.69%
Mean	69.45%	75.40%	5.95%

Over the time period examined in this study, the percentage of Saint Paul traditional schools enrolling students of color exceeds that of the targeted charter schools by about 6% at the elementary level.

Table 7

Percentage of Elementary Level Students Who Qualify for Special Education Services, Saint Paul Charter to Traditional Saint Paul Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	11.46%	13.55%	2.00%
2008	11.36%	13.95%	2.59%
2009	11.17%	14.04%	2.87%
2010	14.56%	14.50%	0.06%
Mean	12.05%	14.02%	1.97%

During the time of the study the difference between students who qualify for Special Education services at charter schools and traditional schools in Saint Paul was about 2% at the elementary level.

Research Questions for Saint Paul

Question one. Is there a relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Question one null hypothesis. (H_0:) There is no statistically significant relationship between charter school enrollment and economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question one hypothesis. (H_1:) Charter school enrollment and economic segregation at the elementary level are statistically significantly related after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question two. What is the direction of any relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Question two null hypothesis. (H_0:) There is no directional relationship between charter school enrollment and economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question two hypothesis. (H_1:) Charter school enrollment is statistically significantly and directionally related to the level of economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question three. What is the strength of any statistically significant relationship between charter school enrollment and economic segregation at the

elementary level in Saint Paul Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Question three null hypothesis (H_0:) There is no statistically significant relationship, therefore; no directional strength between charter school enrollment and economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question three hypothesis (H_1:) Charter school enrollment is statistically significantly related and is directionally correlated to the level of economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Findings.

Table 8

Results of Linear Mixed-Effects Model Fit by REML for Saint Paul Public Schools

	Free	Reduced	Do Not Qualify
Charter School Enrollment	[a]0.247*	0.063	-0.051
	[b](0.106)	(0.053)	(0.099)
Percent Students Limited English Proficiency	0.026	0.005	-0.052
	(0.082)	(0.028)	(0.077)
Percent Students Special Education	0.041	0.004	0.055
	(0.132)	(0.064)	(0.124)
Percent Students of Color	-0.042	0.008	0.036
	(0.097)	(0.027)	(0.092)
Non-public Enrollment	-0.567*	-0.049	0.144
	(0.280)	(0.0149)	(0.262)
Enrollment Size	-0.020	0.002	0.014
	(0.005)	(0.002)	(0.005)
Constant	13.723	-2.093	-8.328
	(8.578)	(2.899)	(8.262)
Random Effects	School	School	School
Random Effects Intercept	23.17	3.29	23.77
Random Effects Residual	3.47	1.87	3.24
Observations	235	235	235
Log Likelihood	-758.071	-558.489	-746.805
Akaike Information Criteria	1,534.141	1,134.978	1,511.610
Bayesian Information Criteria	1,565.005	1,165.842	1,542.474

(a) coefficient (b) standard error *p < 0.05

The multivariate linear mixed effect analysis and findings table above was created using the statistical package R and formatted using HTML. The labels at the top of the table list the demographic groups that were independent variables in the study, represented by the abbreviations Free, Reduced, and Do Not Qualify. The first row contains the dependent variable, Charter School Enrollment, followed by the coefficients[(a)] and the standard errors listed below each in parentheses[(b)]. The next 5 rows list the fixed effects covariates included in this study followed by the constant. The bottom section of the table describes the Random Effects information including Intercepts and Residuals, then the number of Observations, and is followed by three descriptors of model fit.

The coefficient represents the model's estimate of how much variability in the independent variable can be explained by the dependent variable. This allowed the study to estimate how much change the model would predict for the independent variable being tested, given a one unit change in the dependent variable. For example, the first row and column coefficient estimate of 0.247 and a standard error of (0.106) represents the variability of students who qualify for Free lunch for every 1unit change in Charter School Enrollment at the elementary level.

The coefficient is positive, indicating the direction of any potential relationship is positive and an increase in the dependent variable would predict an increase in the independent variable. In practice, the first positive coefficient 0.247 indicates the model estimates that every 4% increase in charter school enrollment results in about a one percent (0.988) increase in economic segregation for students

who qualify for Free lunch at the elementary level. Determining if that relationship is statistically significant is a separate but related step.

The asterisks next to the coefficients represent relationships that are statistically significant with p-values less than 0.05. The p-value for this study were determined by Likelihood Ratio Tests and supported by parametric bootstrapping. Although there are rigorous discussions in the statistical community about the use of p-values for determining significance in linear mixed effects models and the best tools for determining significance, the sample sizes in this study overcome many of the assumptions and error rate problems raised by researchers (Bates, 2015; Luke 2016). In addition to p-values being marked for readers with an asterisks, the standard error rate under each coefficient is provided so the reader can compare the difference. For this study, using the p-values and examination of coefficients and standard errors was consistent in the findings, and either confirmed statistical significance or did not. Generally, a high coefficient, low standard error, and high t-statistic represents a higher degree of confidence in significance. R software can be programmed to determine effects that meet p-value criteria and labels each with an asterisk. Using the example above, Charter School Enrollment and students who qualify for Free lunch with a coefficient 0.247 and the standard error (0.106), the model indicates that criteria for statistical significance was met at the threshold of $p<0.05$ at the elementary level. The next column on the first row, Charter School Enrollment and Reduced with a coefficient of 0.063 and a standard error of (0.053) did not meet that criteria and, therefore, is not estimated to be statistically significant

at the elementary level. In addition to not meeting the p-value threshold for statistically significant, further indication of this lack of significance in the second column is found by examining both the levels and lack of difference between the coefficient 0.063 and the standard error (0.053).

It should be noted, asterisks next to covariates that may appear to meet the criteria for statistically significant ($p<0.05$) need to be interpreted differently than asterisks for the independent variable. The purpose of including covariates in the model design was to increase confidence in hypothesis testing between the independent variable and dependent variable by reducing unexplained variability. Caution is necessary when examining p-values for covariates because it does not demonstrate the same relationship as between the dependent and independent variable. For example, the covariate in the table above for Nonpublic Enrollment with an asterisk, coefficient -0.567 with a standard error of (0.280), requires a different conclusion. An asterisk, $p<0.05$, for one of the covariates is better interpreted as justification that the decision to include that effect as a covariate was a good choice in the model design process. The asterisk signifies that because the covariate explains some of the variability, its inclusion enables the model to focus more precisely on the relationship between the variability that can be explained in any potential relationship between the dependent and independent variable.

Question one. Is there a statistically significant relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools after controlling for the percent of students enrolled in non-public

schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Table 9

Research Question 1 Findings for Saint Paul Public Schools

Demographic Group	Hypothesis Result	Conclusion
Free Lunch	Reject the null hypothesis	There is a statistically significant relationship between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for the covariates*
Reduced-price Lunch	Fail to reject the null hypothesis	There is no statistically significant relationship between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates*
Students who do not qualify for free or reduced-price lunch	Fail to reject the null hypothesis	There is no statistically significant relationship between charter school enrollment and economic segregation of traditional public school at the elementary level after controlling for covariates*

*the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Discussion question one. The results of this study demonstrate a statistically significant relationship between charter school enrollment and the level of economic segregation at the elementary level for students who qualify for free lunch after

controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color. This indicates that a statistically significant variability in the dissimilarity index for students who qualify for free lunch at the elementary level, which is the proxy for economic segregation, can be explained by the change in enrollment of charter schools at the elementary level. The results for students who qualify for free lunch reject the null hypothesis (H_0:) and appear to align with hypothesis (H_1:). Charter school enrollment is statistically significantly related to the level of economic segregation at the elementary level for students who qualify for free lunch after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

The results of this study do not demonstrate a statistically significant relationship between charter school enrollment and the level of economic segregation at the elementary level for students who qualify for reduced-price lunch or students who do not qualify for free or reduced-price lunch. The results for students who qualify for reduced-price lunch and students who do not qualify for free or reduced-price lunch fails to reject the null hypothesis (H_0:). The results of this study found that charter school enrollment is not related to the level of economic segregation at the elementary level for students who qualify for reduced-price lunch or students who do not qualify for free or reduced-price lunch after controlling for the percent of students

enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question two. What is the direction of any relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Table 10

Research Question 2 Findings for Saint Paul Public Schools

Demographic Group	Hypothesis Result	Conclusion
Free Lunch	Reject the null hypothesis	There is a statistically significant and positive relationship between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates*
Reduced-price Lunch	Fail to reject the null hypothesis	There is no statistically significant relationship; therefore no directional relationship between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates*can be determined
Students who do not qualify for free or	Fail to reject the null hypothesis	There is no statistically significant relationship; therefore no directional relationship

reduced-price lunch	between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates* can be determined

*the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Discussion question two. After controlling for covariates, there was a statistically significant and positive relationship between students who qualified for free lunch and charter school enrollment at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color. The results of this study appear to demonstrate a positive connection between the variability of segregation for students who qualified for free lunch and charter school enrollment at the elementary level. The statistically significant and positive direction of the relationship estimates that as charter school increases, so does economic segregation for students at traditional Saint Paul schools who qualify for free lunch at the elementary level.

There were no directional statistically significant relationships between charter school enrollment and students who qualified for reduced-price lunch or students who do not qualify for free or reduced-price lunch at the elementary level. Thus, because there is no relationship, no directional measure of the variables being examined can be determined.

Question three. What is the strength of any relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Table 11

Research Question 3 Findings for Saint Paul Public Schools

Demographic Group	Hypothesis Result	Conclusion
Free Lunch	Reject the null hypothesis	There is a statistically significant positive relationship at the 0.241 coefficient level between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates*
Reduced-price Lunch	Fail to reject the null hypothesis	There is no statistically significant relationship; therefore no directional relationship to measure the strength between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates* can be determined
Students who do not qualify	Fail to reject the null hypothesis	There is no statistically significant relationship; therefore no directional relationship to measure the strength between charter school enrollment and economic segregation of traditional public schools at the

	elementary level after controlling for covariates* can be determined

*the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Discussion question three. After controlling for covariates, there was a statistically significant and positive relationship between students who qualified for free lunch and charter school enrollment at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color. The coefficient for charter school enrollment 0.247 suggests how much the segregation measure for students who qualify for free lunch would change given a one unit change in charter school enrollment. The coefficient is positive, and suggests that for every 4% increase in charter school enrollment there is about a 1% increase in the segregation measure for students who qualify for free lunch for students in traditional Saint Paul schools at the elementary level. The use of coefficient estimates enabled the model to measure the variability of the dissimilarity index that that can be explained by changes in charter school enrollment.

There were no statistically significant relationships between charter school enrollment and students at the elementary level who qualified for reduced-price lunch or students who do not qualify for free or reduced-price lunch. Thus, because there is no relationship, the strength of the relationship between variables being examined cannot be determined.

Descriptive Statistics for Minneapolis

The number of charter schools with students at the elementary level in Minneapolis used to calculate the percentage of charter enrollment to traditional enrollment ranged from 27 to 35 during the years selected for this study. The Minneapolis Public Schools N for the purposes of this study was 210, calculated using 42 elementary level schools observed for five years, 42(5) = 210. This N represents the number of observations being measured to examine the variability of economic segregation at the elementary level in Minneapolis Public Schools.

Comparing broad demographic compositions of the charter schools in Minneapolis to traditional Minneapolis Public Schools at the elementary level is essential to understanding the different populations targeted in this study.

Table 12

Percentage of Elementary Level Minneapolis Charter Enrollment to Minneapolis Traditional Enrollment 2006-2010

Year	Charter	Traditional	% Charter to Traditional
2006	2897	20401	14.2 %
2007	4068	19843	20.5%
2008	4247	19848	21.4%
2009	4627	19607	23.6%
2010	4483	19579	22.9%
Change			+8.7%

During the time period of this study at the elementary level, Minneapolis charter schools comprised an average of about 21% of traditional Minneapolis Public

Schools enrollment and the proportion of enrollment grew by about 9%. While traditional Minneapolis enrollment declined slightly, charter school enrollment in Minneapolis increased by about 35% at the elementary level from 2006-2010.

Table 13

Percentage of Students of Color at the Elementary Level,

Minneapolis Charter to Traditional Minneapolis Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	85.7%	72.92%	12.78%
2007	86.3%	72.38%	13.92%
2008	88.66%	71.90%	16.76%
2009	84.69%	71.32%	13.37%
2010	88.85%	69.89%	18.96%
Mean	86.84%	71.68%	15.16%

Over the time period examined in this study, the percentage of Minneapolis charter schools enrolling students of color exceeds that of the traditional schools by 15% at the elementary level.

Table 14

Percentage of Students at the Elementary Level Who Qualify for Free Lunch,

Minneapolis Charter to Traditional Minneapolis Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	73.88%	60.82%	13.06%
2007	77.40%	60.47%	16.93%

2008	79.52%	59.82%	19.70%
2009	77.17%	61.87%	15.30%
2010	80.34%	62.08%	18.26%
Mean	77.66%	61.01%	16.65%

Over the time period examined in this study, the percentage of Minneapolis charter schools enrolling students qualifying for free lunch exceeded that of the traditional Minneapolis public schools by almost 17% at the elementary level.

Table 15

Percentage of Students at the Elementary Level Who Qualify for Reduced-Price Lunch, Minneapolis Charter to Traditional Minneapolis Enrollment 2006-2010

Year	Charter%	Traditional	Difference
2006	7.40%	7.40%	0.00%
2007	6.60%	6.67%	0.07%
2008	5.77%	6.72%	0.95%
2009	5.42%	5.76%	0.34%
2010	6.04%	6.00%	0.04%
Mean	6.25%	6.51%	0.26%

Over the time period examined in this study, the difference in the percentage of students enrolled at Minneapolis charter and traditional schools that qualify for reduced-price lunch was less than 1% at the elementary level.

Table 16

Percentage of Students at the Elementary Level Who Do Not Qualify for Free or Reduced-Price lunch, Minneapolis Charter to Traditional Minneapolis Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	18.71%	36.02%	17.31%
2007	16.00%	37.13%	21.13%
2008	14.72%	37.47%	22.75%
2009	17.48%	36.42%	18.94%
2010	13.93%	35.61%	21.68%
Mean	16.17%	36.53%	20.36%

Minneapolis Public schools enrolled about 20% fewer students who do not qualify for free or reduced-price lunch than Minneapolis Charter Schools at the elementary level.

Table 17

Percentage of Students at the Elementary Level Who Qualify for LEP services, Minneapolis Charter to Traditional Minneapolis Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	26.57%	24.01%	2.56%
2007	26.97%	25.13%	1.84%
2008	26.52%	23.90%	2.62%
2009	29.62%	23.91%	5.71%
2010	31.41%	24.10%	7.31%
Mean	27.62%	24.21%	3.41%

Minneapolis charter schools enroll about 3% more students who qualify as Limited English Proficiency than traditional Minneapolis Public schools at the elementary level.

Table 18

Percentage of Students at the Elementary Level Who Qualify for Special Education Services, Minneapolis Charter to Traditional Minneapolis Enrollment 2006-2010

Year	Charter%	Traditional%	Difference%
2006	13.00%	13.10%	0.10%
2007	11.61%	13.46%	1.85%
2008	12.10%	13.85%	1.75%
2009	13.35%	14.62%	2.27%
2010	14.13%	14.84%	0.71%
Mean	12.84%	13.97%	1.13%

The difference between students who qualify for Special Education services at Charter schools in Minneapolis and the target population at traditional Minneapolis Public schools is about 1% at the elementary level.

Research Questions for Minneapolis

Question one. Is there a statistically significant relationship between charter school enrollment and economic segregation at the elementary level in Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Question one null hypothesis. (H_0:) There is no statistically significant relationship between charter school enrollment and economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question one hypothesis. (H_1:) Charter school enrollment is statistically significantly related to the level of economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question two. What is the direction of any statistically significant relationship between charter school enrollment between and economic segregation at the elementary level in Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Question two null hypothesis. (H_0:) There is no statistically significant directional relationship between charter school enrollment and economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question two hypothesis. (H_1:) Charter school enrollment is statistically significantly directionally related to the level of economic segregation at the

elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question three. What is the strength of any statistically significant relationship between charter school enrollment and economic segregation at the elementary level in Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Question three null hypothesis (H_0:) There is no statistically significant relationship, therefore; no directional strength between charter school enrollment and economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question three hypothesis (H_1:) Charter school enrollment is statistically significantly related and is directionally correlated to the level of economic segregation at the elementary level after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Findings.

Table 19

Results of Linear Mixed-Effects Model Fit by REML for Minneapolis Public Schools

	Free	Reduced	Do Not Qualify
Charter School Enrollment	[a]0.086	-0.041	0.097
	[b](0.141)	(0.040)	(0.084)
Percent Students Limited English Proficiency	0.001	0.051*	-0.087
	(0.053)	(0.024)	(0.070)
Percent Students Special Education	-0.042	0.077	-0.040
	(0.154)	(0.049)	(0.108)
Percent Students of Color	0.919*	0.011	0.103
	(0.044)	(0.202)	(0.062)
Non-public Enrollment	-0.395	-0.196	0.856
	(0.740)	(0.211)	(0.440)
Enrollment Size	-0.009	-0.0004	0.036
	(0.005)	(0.003)	(0.025)
Constant	2.676	7.404*	1.284
	(11.675)	(3.633)	(14.477)
Random Effects	School	School	School
Random Effects Intercept	5.40	3.15	26.68
Random Effects Residual	4.63	1.32	2.73
Observations	210	210	210
Log Likelihood	-669.055	-439.664	-644.838
Akaike Information Criteria	1,356.110	897.329	1,307.677
Bayesian Information Criteria	1,385.929	927.147	11337.495

(a) coefficient (b) standard error *p < 0.05

Question one. Is there a relationship between charter school enrollment and economic segregation at the elementary level in Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Table 20

Research Question 1 Findings for Minneapolis Public Schools

Demographic Group	Hypothesis Result	Conclusion
Free Lunch	Fail to reject the null hypothesis	There is no statistically significant relationship between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates*
Reduced-price Lunch	Fail to reject the null hypothesis	There is no statistically significant relationship between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates*
Students who do not qualify for free or reduced-price lunch	Fail to reject the null hypothesis	There is no statistically significant relationship between charter school enrollment and economic segregation of traditional public school at the elementary level after controlling for covariates*

*the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Discussion question one. The results of this study do not demonstrate a statistically significant relationship between charter school enrollment and the level of economic segregation for students at the elementary level who qualify for free lunch in Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color. The results for students who qualify for free lunch fail to reject the null hypothesis (H_0:). Charter school enrollment is not statistically significantly related to the level of economic segregation at the elementary level for students who qualify for free lunch after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

The results of this study do not demonstrate a statistically significant relationship between charter school enrollment and the level of economic segregation at the elementary level for students who qualify for reduced-price lunch and students who do not qualify for free or reduced-price lunch. The results for students at the elementary level who qualify for reduced-price lunch and students who do not qualify for free or reduced-price lunch failed to reject the null hypothesis (H_0:). The results of this study find charter school enrollment is not related to the level of economic segregation at the elementary level for students who qualify for reduced-price lunch or students who do not qualify for free or reduced-price lunch after controlling for the

percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Question two. What is the direction of any relationship between the change in charter school enrollment between and economic segregation at the elementary level in Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Table 21

Research Question 2 Findings for Minneapolis Public Schools

Demographic Group	Hypothesis Result	Conclusion
Free Lunch	Fail to reject The null hypothesis	There is no statistically significant relationship; therefore no directional relationship between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates* can be determined
Reduced-price Lunch	Fail to reject the null hypothesis	There is no statistically significant relationship; therefore no directional relationship between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates* can be determined
Students who	Fail to	There is no statistically

do not qualify for free or reduced-price lunch	reject null hypothesis	significant relationship; therefore no directional relationship between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates* can be determined

*the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Discussion question two. After controlling for covariates, there were no statistically significant relationships at the elementary level between charter school enrollment and students who qualified for free lunch, reduced-price lunch, or students who do not qualify for free or reduced-price lunch. Thus, because there is no relationship, the directional measure of the variables being examined cannot be determined.

Question three. What is the strength of any relationship between charter school enrollment and economic segregation at the elementary level in Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Table 22

Research Question 3 Findings for Minneapolis Public Schools

Demographic Group	Hypothesis Result	Conclusion
Free Lunch	Fail to reject the	There is no statistically

	null hypothesis	significant relationship; therefore no directional relationship to measure the strength between the charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates* can be determined
Reduced-price Lunch	Fail to reject the null hypothesis	There is no statistically significant relationship; therefore no directional relationship to measure the strength between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates* can be determined
Students who do not qualify for free or reduced-price lunch	Fail to reject the null hypothesis	There is no statistically significant relationship; therefore no directional relationship to measure the strength between charter school enrollment and economic segregation of traditional public schools at the elementary level after controlling for covariates* can be determined

*the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

Discussion question three. There were no statistically significant relationships between charter school enrollment and students at the elementary level who qualified for free lunch, reduced-price lunch, or students who do not qualify for free or reduced-price lunch after controlling for the percent of students enrolled in

non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color. Thus, because there is no relationship, the strength of the relationship between the variables examined cannot be determined.

Table 23

Summary of Findings Comparison, Charter School Relationship with Saint Paul and Minneapolis Public Schools at the Elementary Level

	Free	Reduced-Price	Do Not Qualify
Saint Paul	Reject the null hypothesis	Fail to reject the null hypothesis	Fail to reject the null hypothesis
Minneapolis	Fail to reject the null hypothesis	Fail to reject the null hypothesis	Fail to reject the null hypothesis

Discussion of Summary Findings for Saint Paul and Minneapolis

During the years of this study, 2006-2010, the enrollment of charter schools had a statistically significant relationship at the elementary level with the segregation measure of one demographic group, students who qualify for free lunch, only in Saint Paul Public Schools. The variable of charter school enrollment had no significant explanation at the elementary level of the variability of students in the reduced-price or for students who do not qualify for free or reduced-price in Saint Paul Public Schools. In addition, no statistically significant relationship was found at the elementary level after controlling for covariates between charter school enrollment and segregation measures for all three demographic groups in this study in the Minneapolis Public Schools.

The demographic groups enrolled in charter schools appears to differ between the two cities at the elementary level. In Saint Paul, charter school enrollment differed from the economic demographic groups enrolled in the traditional public schools at the elementary level, especially in the category for students who do not qualify for free or reduced-price lunch. In general, the traditional public schools at the elementary level in Saint Paul enrolled a higher percent of students that qualify for free or reduced-price lunch than charter schools. In contrast, charter schools in Minneapolis appear to enroll a higher percentage of students that qualify for free and reduced-price lunch than students enrolled in traditional Minneapolis Public Schools at the elementary level. In both cities, charter school enrollment during the years selected for this study, 2006-2010, expanded by over 30% while the enrollment in traditional public schools remained stagnant or declined slightly at the elementary level. The findings between the enrollment in charter schools and the economic segregation of students in both Saint Paul and Minneapolis Public Schools at the elementary level will be discussed further along with implications and recommendations for future research in Chapter V.

Chapter V: Discussion, Implications, and Recommendations

This chapter will present an overview of the study, summary of the findings, and conclusions from Chapter IV. The discussion of the findings will include implications for practice, recommendations for future research, limitations, and concluding remarks.

Overview of the Study

The purpose of this study was to use a historical research design and a multivariate mixed effects analysis to examine whether there is a relationship between charter school enrollment and economic segregation at the elementary level (K-5) in the Saint Paul Public Schools and Minneapolis Public Schools for the school years 2006-2010. Data for the study were collected from the Minnesota Department of Education using the annual October 1 enrollment count reported by each school district for the purposes of federal funding. Economic segregation was measured using a dissimilarity index to score each school at the elementary level in each district for three demographic groups.

The dependent variable for this study was economic segregation. Economic segregation was measured for three demographic groups at the elementary level including students who qualify for the federal free lunch program, students who qualify for the federal reduced-price lunch program, and students who do not qualify for federal free or reduced-price lunch programs. This study utilized a dissimilarity

index (D) to operationalize the dependent variable of economic segregation for the three demographic groups measured.

The number of students enrolled in charter schools was the independent variable for this study. The variable was calculated by measuring the number of students enrolled at the elementary level in charter schools geographically located in each school district out of the total traditional public enrollment in each district at the elementary level over time. The number of students enrolled in charter schools was used in the statistical analysis to examine whether it may have a relationship with the segregation of any of the three economic groups measured, and if it might account for any of the direction or strength in the variability at the elementary level.

Covariates were included in this study to contextualize the relationship between the dependent and independent variable. Covariates for each district included: the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color.

A benefit of the multivariate approach for the purposes of this study were that the covariates included in the final version of the research design were arrived at through a process of trial and adaptation. Examining relationships, coefficients, errors, residuals, and other statistical landmarks throughout the design process enabled the study to utilize a model based on best fit.

Research Questions

RQ1: Is there a relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

RQ2: What is the direction of any relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

RQ3: What is the strength of any relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools and Minneapolis Public Schools after controlling for the percent of students enrolled in non-public schools, students eligible for special education, English Language Learners, in school variability, school size, and students of color?

Table 24

Summary of Findings , Charter School Relationship with Saint Paul and Minneapolis Public Schools at the Elementary Level

	Free	Reduced-Price	Do Not Qualify
Saint Paul	Reject the null hypothesis	Fail to reject the null hypothesis	Fail to reject the null hypothesis
Minneapolis	Fail to reject the null hypothesis	Fail to reject the null hypothesis	Fail to reject the null hypothesis

Summary of Findings

The research questions for this study examined if there was a relationship between economic segregation and charter school enrollment at the elementary level. The model design enabled the study to measure if there was a statistically significant relationship, including the direction and strength of any potential relationship. While this model examined each city and demographic group separately, comparing and contrasting the findings is essential to understanding the research design, process, and findings.

It is important to note that of the research questions examined in this study, three for each city, only one research question in one city demonstrated a statistically significant relationship. With the exception of students who qualify for free lunch in traditional Saint Paul schools, the variability in economic segregation does not appear to be explained by charter school enrollment at the elementary level for students who qualify for free lunch in Minneapolis, reduced-price lunch in Minneapolis and Saint

Paul, or for students who do not qualify for free and reduced-priced lunch in Minneapolis or Saint Paul Public Schools.

The research question that demonstrated a statistically significant relationship was specifically for Saint Paul students in traditional schools at the elementary level who qualify for the federal free lunch status. The relationship was positive. The coefficient of 0.247 would suggest that for about every 4% increase in charter school enrollment in the city of Saint Paul, students who qualify for free lunch at the elementary level in the Saint Paul Public School District would experience about a 1% increase in segregation. While this increase may appear minimal at first glance, the expansion of charter school enrollment during the time period selected for this study appears to have contributed to increased segregation of students who qualify for free lunch for one of the six demographic groups examined in this study. Charter school enrollment at the elementary level increased in Saint Paul by about 33% during the five years selected for this study, growing from about 14% to 21% of total Saint Paul Public School enrollment during the years 2006-2010. Based on the findings from this study, the resulting influence on segregation for students who qualify for free lunch in traditional Saint Paul Schools would be estimated to be an increase of about 8%.

In contrast, there was no statistically significant relationship found in Minneapolis Public Schools at the elementary level for any of the demographic groups measured, including free lunch. The increase in charter school enrollment in Minneapolis was similar to that in Saint Paul. Charter school enrollment in

Minneapolis increased by 35% and as a share of Minneapolis Public Schools, charter school enrollment grew from 14% to 23% at the elementary level during the years of this study. The charter school expansion across the two districts at the elementary level is strikingly similar while the results of the findings are not. Like many issues surrounding charter schools and segregation, the complexity requires looking deeper.

Examining enrollment numbers is often not enough to understand the variety of competing issues involved in where students attend school, but the differences between charter schools at the elementary level in Saint Paul and charter schools in Minneapolis may illustrate different demographic enrollment trends between the cities. One helpful tool for examining these differences is looking at how charter school enrollment is concentrated economically because it may explain the segregation of students who remain enrolled at traditional public schools.

Evidence from the Minnesota Office of the Legislative Auditor in 2008 documented the difference between the two cities, finding charter schools in Saint Paul enroll more students who do not qualify for free lunch than their counterparts across the river in Minneapolis (Randall, Piehl, & Minnesota, 2008). From a free market share perspective, charter schools in Saint Paul appear to appeal and attract a different demographic target than Minneapolis charter schools.

This trend also appears when examining the variable, students of color and examining its relationship with poverty indicators like free lunch eligibility at the elementary level. Examining raw enrollment numbers at the elementary level indicates that charter schools in Saint Paul, on average, enroll more White students

than Minneapolis charter schools, on average, who are more likely to enroll more students of color. In addition to examining the raw numbers, linear regression models run during the planning phases of the study revealed that the variable, students of color, looked very different at the elementary level for each city (see Appendix E). The variable, students of color, drove the model in Minneapolis and were highly correlated with free lunch eligibility; having an unstandardized coefficient of 0.9337 with a standard error of 6.763 on 208 degrees of freedom. This factor accounted for 93% of the variability in dissimilarity index scores. While across the river in Saint Paul, the unstandardized coefficient was only 0.001923 with a standard error of 23.8 on 233 degrees of freedom. It is important to note this regression did not include other covariates but may, in part, explain the difference in results for this study between the two cities. The findings from this study do not clearly answer why charter school enrollment influenced the public schools at the elementary level in Saint Paul and Minneapolis in different ways, only that it did. While there appears to some evidence based on variables like students of color, it is important to limit the scope of this study to the specific research questions examined.

From a research perspective, the differences between the two cities highlight the importance of understanding the basic descriptive statistics that influence complex research models. For this study, descriptive statistics aided not only the construction of the multivariate mixed effect analysis but also helped inform the findings. While the statistical analysis did not reveal a relationship between charter school enrollment and economic segregation at the elementary level in Minneapolis, it did indicate that

the student groups that attend charter schools in that city reflect a different target group than in Saint Paul at the elementary level. This will be discussed later in the Recommendations for Future Research section.

Conclusions

The findings for the study examined the influence of increasing charter school enrollment during the school years 2006-2010 at the elementary level in two Minnesota public school districts, Minneapolis and Saint Paul Public Schools. The findings include a significant and positive relationship between charter school enrollment and economic segregation at the elementary level in Saint Paul Public Schools for students who qualify for free lunch. The model suggests that about 24% of the variability in the segregation of students who qualify for free lunch in Saint Paul can be explained by the increase in charter school enrollment. The findings did not demonstrate a statistically significant relationship between charter school enrollment and segregation of students who qualify for free lunch in Minneapolis Public Schools at the elementary level. The findings also do not support a statistically significant relationship between charter school enrollment for students who qualified for reduced-price lunch or did not qualify for free or reduced-price lunch in both Minneapolis and Saint Paul charter Schools at the elementary level.

The mixed findings of this study in some ways reflect the complex relationship between charter school enrollment and traditional public schools at the elementary level. It appears that charter school enrollment does influence segregation in their traditional school counterparts at the elementary level but in a more limited

and nuanced manner than charter school opponents would predict, and it may depend on the demographics of those who enroll in charter schools.

This aligns with a study done by the Civil Rights Project at the University of North Carolina published in 2018, examining how charter schools have contributed in complicated ways, both directly and indirectly, to resegregating traditional public schools in (CMS) Charlotte-Mecklenburg School District (Ayscue, Nelson, Mickelson, Giersch, & Bottia, 2018). The direction CMS student demographics changed is parallel to the changing perspective experienced by many urban districts across the country, the result in part of a judicial shift away from explicit desegregation systems and towards school choice driven free market models. CMS was often held up as an example of the success of desegregation policies and effective enrollment policies which resulted in measurable desegregation until the 1990s. When judicial language began to limit the tools the district used to distribute students, parent choice emerged as the prevailing value, and data suggests there was a rapid resegregation both economically and racially (Ayscue, Nelson, Mickelson, Giersch, & Bottia, 2018). The lack of court-ordered values removed political cover for the school board to make tough enrollment boundary and policy choices, often opposed by wealthy families. This resulted in an exodus of students, both real and threatened, by parents with privilege that used charter schools as a tool to entrench systemic inequities (Ayscue, Nelson, Mickelson, Giersch, & Bottia, 2018) .

It is clear that the increase in economic segregation in both charter and traditional public schools does not fit the free market prediction that an expansion of

school choice would serve as a desegregation tool. The stratification theory predicts that inequities built into the way parents act in an increasingly free market model will serve to reinforces and exacerbate economic segregation. This appears to be supported by the findings of this study at the elementary level in Saint Paul, and increasingly by researchers using a broad variety of measures (Orfield & Frankenberg, 2013). But one element of stratification theory that charter school opponents claimed, that charter schools would attract mostly students from wealthy White families does not appear fully supported by the findings of this study at the elementary level or data from studies of districts in other parts of the country. In fact, the results of this study indicate that Minneapolis charter schools at the elementary level work in the opposite direction. A reasonable conclusion is that families in different cities respond differently, and the wide range of charter school enrollment trends just between the two districts in the "Twin Cities" are a reflection of that range and the difficulty of generalizing.

The results of this study do not make it clear why charter school enrollment did not have a statistically significant relationship with economic segregation at the elementary level in any of the three demographic categories measured in Minneapolis. Data regarding the demographic differences between charter school enrollment in the two cities at the elementary level may hold some explanatory clues but conclusions would not be supported by the limited scope of this study.

Charter schools are only one factor in the choice environment but their role in the public school choice debate is forcing people to clarify deeply held values around

parent choice and segregation and prompting the most basic of questions, like what is the fundamental purpose of public education and what values do both parents and the government act upon when they choose where students attend school?

Implications for Practice

Evidence is needed to guide policy makers but often school choice research creates as many questions as it answers. This study proved to be no exception. But even before evaluating the evidence that is available, there is a need to acknowledge the conflicting message about desegregating public schools. There does not appear to be a general consensus about the ideals that underlie the purpose of public education regarding integration or academic success (Frankenberg & Jacobsen, 2011; Phi Delta Kappan, 2016). The charter school movement, while only one of many factors, in this debate has forced educators, parents, judges, and policy makers to question their fundamental values. Currently there is not consensus. Civil Rights leaders fought to desegregate schools and advocated for the state to be involved in desegregation policies to combat systemic inequities that were created and maintained to serve White children. But even the underlying assumptions have changed. The Executive Director of a charter school in Saint Paul where according to the Minnesota Department of Education in 2020, 100% of students were Black and 95% qualified for free or reduced-price lunch, in an interview with the Star Tribune dismissed state integration policies describing "choice as a civil right, choice is democracy" (p. 3) (Raghavendran & Webster, 2015). The families of wealthy White students have through a variety of means always had school choice, so it is not unreasonable that

when families that have been historically marginalized have now achieved some element of choice, they are skeptical of that being taken away even if the purpose of that system is to achieve integration goals.

Even without that consensus, educational researcher can provide some direction to the conversation. With more, and increasingly complex, research available there are generalizations that should enable the kind of decisions that can influence the connection between enrollment systems and public values.

Courts, at a variety of levels, have shifted priorities away from forced integration. But in addition to not taking a proactive role in integrating schools, the court has limited the tools that districts previously used to shape enrollment policies to explicitly decrease segregated school settings. Based on three decades of decisions, it does not appear that courts will be the institution to shape integrated schools.

Two phenomena appear to be occurring simultaneously, uncontrolled school choice systems and socioeconomic segregation. Segregation, as measured by raw percentages and by levels of concentration, is increasing. Researchers are attempting to measure how different options within the uncontrolled school choice movement result in the increase of economic and racial segregation. The role of charter schools, because of their dramatic increase in enrollment, public funding, and generally unimpressive academic results, are under the microscope (University of Minnesota, 2013).

The preponderance of evidence is that charter schools overall enroll a more highly segregated student population, as measured by both socioeconomic status and

race than traditional public schools in the same geographic area. What influence the increase in charter school enrollment and their tendency for more highly concentrated student groups has on the traditional public schools is less clear. While it appears that charter school enrollment reflects, reinforces, and exacerbates existing inequities, the degree of influence they are having on traditional public schools appears to be more complex. School choice and segregation do not exist in a vacuum, but within the highly complicated set of values and agendas that public schools have to balance every day the conversation about the value of integrated schools appears to have shifted to the background with the surge in other public school choice options like charter schools. The mandate of *Brown vs Board of Education* (1954) is now couched within a free market value system, where parents of all backgrounds feel entitled to have a broad range of educational choices for their children. A symbol of this paradox is Civil Rights language that has been claimed by both advocates for desegregation and school choice. Integration was a stated value, enforced by the courts, but the tools used to create and sustain those educational environments have been disrupted by the rise of free market values through school choice. A Harvard project, Making Caring Common (2020), appears to quantify what has played out across the country by documenting that even though parents consistently, across socioeconomic status, race, and political party, claim to value integrated schools on surveys, the choices they make when enrolling their own children do not appear to reflect those values (Frankenberg & Jacobsen, 2011; Torres & Weissbourd, 2020). Given this pattern, it

should not be surprising that in enrollment systems where parents have more choice, there is more segregation.

Data demonstrating the academic benefits for students living in poverty who attend integrated schools is clear, but it is also becoming increasingly clear that the benefits of integrated schools go beyond one demographic group (Lubienski & Lubienski, 2008). Interestingly, data supports the same values that parents claim in surveys, that integrated school are beneficial for children from a wide variety of backgrounds and across many outcomes (Century Foundation, 2019). But if parents acting in increasingly unregulated choice systems are choosing to self-segregate, what is the role of educational options like public charter schools that are funded by tax dollars with a mandate to integrate public schools? Traditional public school districts are left with increasingly segregated student groups, fewer tools to assign students to schools with the intent of combating segregation, and are competing against more school options that do not have the same level of access or accountability. This convoluted environment exists under the umbrella of parent choice.

Consider this statement from a parent, "I want my child to go to school where they fit in and their cultural background is valued." This could have easily been a White parent in Alabama in the early 1960s advocating for the continuation of segregated public schools. But it could also be a parent of a child who is Black or Hmong in Minnesota in 2020, advocating for parent choice and charter schools. One parent comes from entrenching the status quo and existing privilege while the other parent comes from a place of searching for options that will better serve their children

than the traditional public schools, which have historically marginalized students who are poor and not White. While the statement comes from different perspectives, both have the same outcome, increasing segregation. Both scenarios require value-based decisions around the role of taxpayer funding for public schools, the role of government, and the role of parents when choosing a school for their own child.

Policy makers, school administrators, and teachers have some degree of influence on the demographic composition of schools. The lens of integration needs to remain centered in every decision as long as the data to support positive outcomes are supported. Integrated schools are a positive for the common good and supported by evidence in a wide variety of domains, ranging from academic to socioeconomic success. But the increasingly dominant role of parent choice appears to have outcompeted other values. Charter schools are playing a role in that segregation but the extent and proportion of that role is still being examined.

Recommendations for Future Research

The evolving process to design the model used in this study attended to many of the goals of the project. Throughout, the study remained focused on the purpose of the research questions. While the researcher is confident in the study, there are several recommendations for future research that emerged during the process.

First, the choice to disaggregate the proxy for poverty, students who qualify for free lunch from students who qualify for reduced-price lunch appears in hindsight to be unnecessary. While there was some indication that families in each of the two groups may behave differently when engaging in school choice, there were limiting

factors that reduced the usefulness of separating the two low income groups. The most substantial factor was that the income range for qualification for reduced-price lunch is so narrow. In addition, because income and the number of family members living in a household both contribute to the qualification process, the window for families who qualify in that range were substantially fewer than anticipated. There is no evidence that the decision to separate free from reduced-price was detrimental to the study, in the end it was probably just unnecessary. But the question remains, would this study have found different results had free and reduced-price been pooled as is the case for most studies?

Another area for future research that may be important is to include more informative variables that were not used in this study. The influence of explanatory covariates on the design of a mixed method study are limited in part to the data available in public databases. But actively searching out data that may potentially inform or confound any relationship between charter school enrollment and traditional public schools is necessary. Factors like geographic proximity, parent education, immigration status, religious affiliation and many more demographic descriptors could be used. In addition, school level data including variables like facility quality, transportation options, and also staffing characteristics like background, education, and race could be utilized. The other factor that could be included in future studies is the grade level being examined.

Historically, the largest proportion of charter school enrollment, both in Minnesota and nationally, is at the elementary level (Snyder, De Brey, & Dillow,

2019). While this study was limited to the elementary level, future research that examines different grades and grade configurations would be useful for policy makers. It is not clear if the same enrollment trends and patterns that exist at the elementary level also appear at schools that serve students at the middle or high school level, or more comprehensive schools that enroll students from kindergarten through 8th grade, or kindergarten through twelfth grade. Conclusions based on elementary patterns may or may not be generalizable across the spectrum of grade level configurations at both charter and traditional schools.

One pattern that appears in the research around charter schools is the use of averages to describe student demographic compositions. After examining the data in several cities, future researchers should avoid or be cautious about using averages to examine or describe charter school enrollment and their demographic compositions. The variations were often extreme, therefore, pooling many data points and using the mean as a data landmark to describe them did not account for that variation. There are times when describing a data set by using the mean has value, but it appears that in the case of charter school enrollment some of the context was lost when using the mean. This is especially the situation when examining segregation, concentrations of segregation, and specific demographic composition trends over time. While this generalization may appear to apply to all school level data, not just charter, the range of variation in charter school enrollment appears uniquely large. Even averaging across the cities of Minneapolis and Saint Paul appears to hide real differences in charter school student populations.

There is a need for mixed method research in the field of enrollment. The quantitative component is essential but there is a need for qualitative data to help researchers inform questions and build variables around issues like parents' perceived quality of schools and fill in the gap describing why parents commit to integration in theory but make different decisions when participating in enrollment decisions. Qualitative research in this area is helpful but throughout work on this subject, the qualitative studies that would have helped inform the researcher would have benefited from incorporating a mixed model approach. For example, interviews with parents who are selecting schools for their child are helpful, but a quantitative approach that incorporates those interviews would help future researchers generalize information that may be useful. One area of opportunity for mixed modeling is to examine the specific families who attend the charter schools that appear to be outperforming other public schools. Data is especially needed from families that leave traditional public schools for charter schools. The specific reasons why families choose to move from one form of public school for another, including charter, is difficult to generalize and researchers would benefit from a mixed modeling approach to data analysis.

Examples of charter schools that outperform other schools are consistently used to counter examination of the charter movement as a whole. While it would not be prudent to condemn the movement because of a few schools that failed or shut down, it also does not appear to be reasonable to point to a few specific examples to justify a movement. An opportunity for future research is to examine the specific demographic compositions of those schools that are excelling. For charter opponents,

there is some evidence that screening including parent involvement, discipline policies, parent contracts, and other barriers to entry may separate the population of those schools from other charter and traditional schools. For charter advocates, there is the opportunity to understand the specific families and factors that are enabling the schools to succeed and then replicate programs that are working and close programs that are not.

Finally, mixed effects studies that focus on economic variables from different cities around the country would help inform this study and future researchers. There is no doubt that examining racial segregation is essential and that, unfortunately, it can be a factor used to predict academic success. But because most districts cannot use race explicitly as enrollment criteria, researchers also need to investigate other demographic characteristics that may be used to desegregate students in public schools. Economic indicators appear to fill that need because they are, unfortunately, accurate predictors of academic success.

Concluding Comments

The findings of this study that focused on two Midwest cities appear to mirror evidence from research studies across the United States that demonstrate charter schools exacerbate economic segregation in the traditional public schools in a limited way, but are only one of many factors that influence that segregation. Some of these factors are rooted in a widely accepted belief that free market benefits, through the vehicle of parent choice, will in some way attend to a wide variety of outcomes including better educational quality through competition and integrated schools.

While there is little evidence to support this belief, the cultural norm has been established and most parents now feel entitled to have choices for where their child will attend public school. In some cases, traditional school districts have responded by offering more choices within their systems as a strategy to offset the competition offered from outside by charter schools. Unfortunately, these appear to lead to more segregated educational environments even within schools.

Parent choice has become a central theme for both national political parties, expanding during both Republican and Democratic controlled congresses and administrations. Given the complexity of the argument, few politicians want to be positioned against parent choice. Attempts to constrain that choice at the state and district level have proven difficult, leaving what appear to be a contradictory set of values existing simultaneously in public school policy, parent choice and segregation.

It is important to acknowledge historical context as this realization is increasingly recognized and supported by evidence. Parents who are wealthy and White have always had choices. Charter schools just added to those options that now include private schools, moving to the suburbs, creating gifted and talented magnets, constructing specialty language immersion programs that appeal to specific populations, and even determining which neighborhoods new schools and programs are placed.

Traditional public school districts have reacted to this new free market reality and attempted to meet the competition by replicating what they believe parents want, including segregated specialty programs within school districts, and even within

buildings. This within district, within school, segregation can be at least partially attributed to the market pressures created from the rise of increasing charter school enrollment. But the responsibility also lies directly at the feet of parents, administration, and school boards who reacted to declining enrollment by replicating niche charter programs, trading out the value of integration for more parent choices and enrollment dollars. For example, creating language immersion schools within a "struggling" elementary building creates two parallel but discrepant tracks for students. As discussed in the Recommendation for Future Research section, this micro level segregation is complex, and measurement techniques are going to have great difficulty capturing the full influence of the charter school movement on the segregation of students in traditional public schools that reacted by replicating programs. In Minnesota, traditional public school districts lost enrollment to charter schools, and because funding from the state follows the students in an uncontrolled choice model, that resulted in lost revenue for the districts. While free marketers may see this as a net positive, a result of a functioning market where competition drives change, those outcomes are consistent with the predictions of stratification theory and appear to play out in this study in Saint Paul. In Minneapolis, the demographic composition also supports the stratification theory but not within the simplistic interpretation often voiced by charter opponents.

Meanwhile, the budget implications of falling enrollment for both traditional public school districts in this study were devastating. A 2013 report by the Institute of Metropolitan Opportunity at the University of Minnesota documented the

consequences. From 2000-2011, Saint Paul Public Schools (K-12) lost approximately 16% of its student enrollment, 58% of those losses were to charter schools. During the same time period, Minneapolis Public Schools enrollment (K-12) fell 29%, with approximately 47% of those losses to charter schools. While the losses at the elementary level were not as severe, the fiscal consequences of that enrollment loss district-wide cannot be overstated. This was compounded by falling state funding to school districts. In addition to the loss of revenue from decreasing enrollment, per pupil dollars to the districts, adjusted for inflation from 2007-2012, Saint Paul Public Schools experienced a 5.5 % decrease and Minneapolis Public Schools experienced a 12.5% decrease in funding. Once again, free market theorists may argue that is evidence of a functioning market and will ultimately lead, at least in the long term, to improvements within the districts by adapting to the competition. But the Brookings Institute by measuring externalities, described the fundamental flaw in that argument, pointing out that free market assumptions no not apply to large school districts because much of their costs are fixed, they simply do not have the flexibility to adapt to declining enrollment in the short term (Ludd & Singleton, 2018).

In addition to the fiscal consequences of increased charter enrollment and decreasing traditional school enrollment, the University of Minnesota report (2013) goes a step further and documents that most students who left either district left for charter schools that were both more segregated and performed worse on achievement measures. There are examples of charter schools that do outperform traditional schools, but they are few enough to be outliers and cannot overcome the

preponderance of evidence that charter schools are underperforming their traditional school counterparts, after adjusting for income (Institute on Metropolitan Opportunity, 2017; University of Minnesota, 2013). In the context of free market and stratification theory, this outcome is difficult for advocates of charter schools to overcome. But falling enrollment given these facts, should also force the sending districts to ask some hard questions about why families are choosing to leave.

Stratification theory suggests that free market systems exacerbate existing inequities (Bifulco & Ladd, 2006; Warnock, 2008). It is important to step back and acknowledge that those inequities always existed, and that the discussion for this study is to what degree do specific school options play a role in increasing those inequities. There never was a blank slate. For example, both racial and economic segregation existed long before school choice as we know it today became a cultural norm. After the courts intervened, there was positive movement toward the goal in regions and states where districts were forced to change. But cities in the north, like Minneapolis and Saint Paul, for the most part were outside those kind of direct court-ordered interventions and remained highly segregated. The exception is the NAACP lawsuit filed successfully against Minneapolis in 1972 (Heilman, 2017).

Schools are a reflection of the wealth and racial disparities in a variety of community measures. For example, Minneapolis and Saint Paul have historically had some of the most extreme disparities between income levels and race in the entire nation (Jargowsky, 1994). It should; therefore, not be surprising in a school system that is still geographically organized, that schools reflect that disparity. In some

ways, the lack of movement to desegregate schools in the northern cities like Saint Paul and Minneapolis is just as insidious as the explicit segregation of the south. Housing segregation perpetuated by red lining, racial home covenants, single family house zoning, federally subsidized loan programs, and a variety of other factors have and do actively create opportunity gaps that keep families and ultimately students separate, and not equal. Worse, the Twin Cities appears to be becoming more segregated, even when compared with demographically similar cities like Seattle and Portland (University of Minnesota, 2015)

In Minnesota, segregation in public schools has a reciprocal history with segregation in housing. The University of Minnesota documents the connection between housing and public schools in their 2015 report titled, "Why Are the Twin Cities so segregated?" The two cities experienced a rise and fall of priorities related to segregated housing, seeing real gains made in the 1970s being erased after interest convergence of Republicans in the suburbs and entrenched Democrats in urban centers led to the construction of more affordable housing being pushed exclusively in already highly segregated neighborhoods. The public schools mirrored those increasingly segregated neighborhoods. The report described the decade after 2000, when the concentration of high poverty neighborhoods in the Twin Cities tripled alongside with the number of highly concentrated segregated schools, which grew more than seven-fold. The perceived failure of those segregated public schools was a major talking point in the rise of school choice reformers, including the charter school movement.

Interestingly and optimistically, the actual ingredients for racially integrated schools are more available than ever as the country becomes more diverse. This creates a demographic potential for integrated schools that has never been greater. The old dichotomous ideas of majority and minority racial groups are being upended in terms of race in both Saint Paul and Minneapolis Public Schools. According to the websites of Minneapolis Public Schools (2019) and Saint Paul Public Schools (2019), both report multiple self-identified racial groups that comprise 20% to 30% of the student enrollment. The rise of more diverse populations in urban and rural areas makes the conditions for integrated schools, at least along racial lines, more possible. Using U.S. Department of Education data, Meckler and Rabinowitz (2019) found that four out of 10 districts, that serve over two thirds of public school students across the country, have the demographic potential to integrate schools, if the political will existed to demand it. Yet White students continue to be the racial group least likely to attend school with children who are not White (Roda & Wells, 2013). Charter schools appear to be playing a disproportionate role in public school segregation in Minnesota, of the 50 most racially segregated schools in the Twin Cities, 45 of them are charter schools (Institute on Metropolitan Opportunity, 2017).

While the opportunity for racial diversity is present in the data, the economic stratification and inequity gaps in both Minneapolis and Saint Paul appears to be growing (University of Minnesota, 2015). In 2020, both school districts report about 60% of their students qualify for free or reduced-price lunch (MDE). So, while real

racial diversity may be more possible than ever in public schools, the economic divide does not share the same optimistic opportunity to integrate schools.

Even if public pressure to desegregate schools existed, if current trends persist it appears courts will continue to restrict the tools that states and districts use to shape integration policy. If legal mandates and public policy are not actively pushing for integrated schools, the only path that exists is deliberate decisions by parents as consumers to act when choosing a school for their child. But the gap between theory and personal decisions persists. The difference between public opinion and public actions, just like school choice and desegregation, appear to be growing. According to survey data, integration is a high priority in principle but in the free market sphere of public school choice it does not appear to translate into school enrollment decisions (Torres & Weissbourd, 2020). More families are choosing charter schools despite their academic performance and their increasingly segregated student demographic populations. But the families who choose not to send their child to a charter school may also pay a price for those decisions. The results of this study reflect the reality that students in traditional public schools may be becoming more segregated as a result of increased charter school enrollment. But the limited scope and differing results found between the two cities in this study also reflects the deep complexity that surrounds publicly funded school choice options like charter schools.

As more and better information becomes available to the public regarding increasing segregation and the stratification associated with school choice systems, everyone is left with difficult decisions about the future of public education. School

choice is both a theoretical and practical concept for a family that is choosing a school for their child right now. It appears that families make decisions about where their child will attend school using the immediate and local information they have access to in their community. It is difficult to blame a family for wanting to make the best choices for their child. But all parents, educators, school administrators, policy makers, judges, universities, businesses, charter school authorizers, and anyone else who influences public education have an obligation to ensure that the systems they support do not perpetuate and exacerbate the long-term inequities associated with segregated schools.

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Appendix A: School Choice Language and Policy Continuum

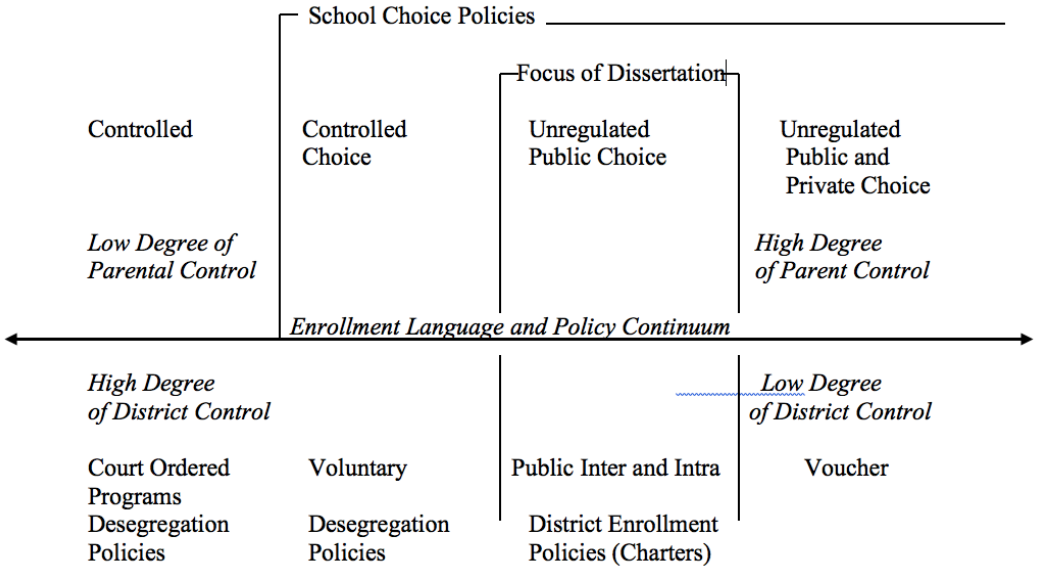


Figure Caption

Figure 1. Enrollment language and policy continuum arranged from greatest to least degree of district control.

Appendix B: Minnesota State Statute (3535.0100) Integration Language

A. Recognize that the primary goal of public education is to enable all students to have opportunities to achieve academic success;

B. Reaffirm the state of Minnesota's commitment to the importance of integration in its public schools;

C. Recognize that while there are societal benefits from schools that are racially balanced, there are many factors which can impact the ability of school districts to provide racially balanced schools, including housing, jobs, and transportation;

D. Recognize that providing parents a choice regarding where their children should attend school is an important component of Minnesota's education policy;

E. Recognize that there are parents for whom having their children attend integrated schools is an essential component of their children's education;

F. Prevent segregation, as defined in part 3535.0110, subpart 9, in public schools;

G. Encourage districts to provide opportunities for students to attend schools that are racially balanced when compared to other schools within the district;

H. Provide a system that identifies the presence of racially isolated districts and encourage adjoining districts to work cooperatively to improve cross-district integration, while giving parents and students meaningful choices; and

I. Work with rules that address academic achievement, including graduation standards under chapter 3501 and inclusive education under part 3500.0550, by providing equitable access to resources.

Appendix C: Example of Dissimilarity Index Scores for Saint Paul

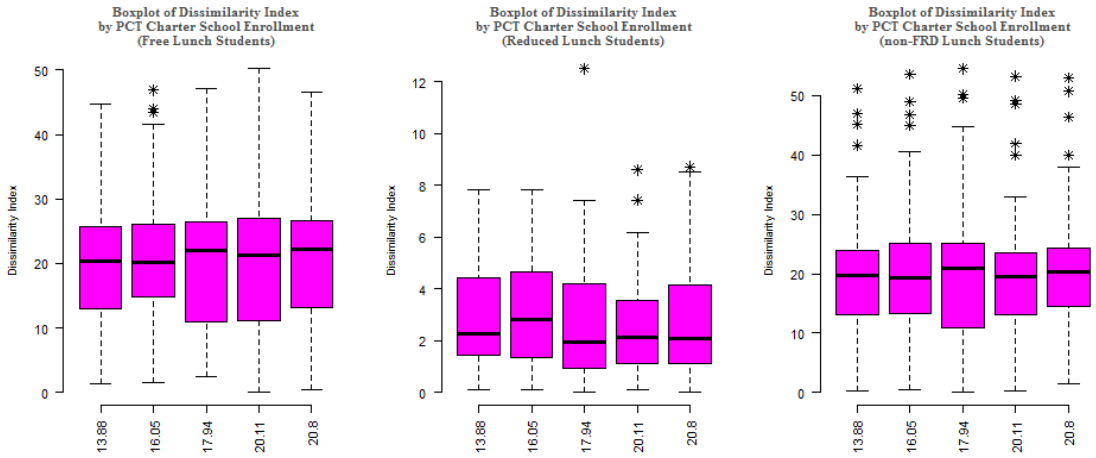


Figure Caption

Figure 2. Example Boxplot of Dissimilarity Index Scores example for Saint Paul Public Schools

Appendix D: Boxplot Illustrating Potential Problem of Assumed Equal School Level N Counts

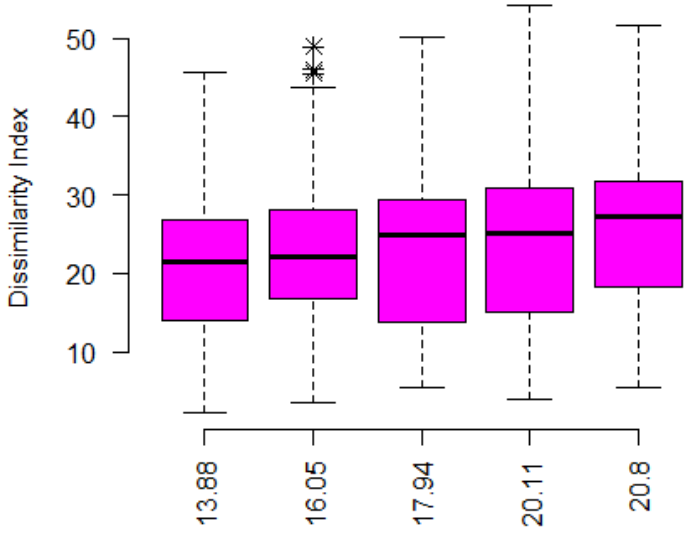


Figure Caption

Figure 3. Early linear regression results uncovered unexplained variance as the result of the assumption of equal N counts at the school level.

Appendix E: Contrasting Dissimilarity Scores and Percent Students of Color Between School Districts

```
Call:
lm(formula = d$Diss_Free ~ d$PercSOC)

Residuals:
     Min       1Q   Median       3Q      Max
-24.6137  -3.7190   0.6999   3.8884  18.7100

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -10.4740     1.3568  -7.719 4.82e-13 ***
d$PercSOC     0.9964     0.0184  54.142  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 6.763 on 208 degrees of freedom
Multiple R-squared:  0.9337,    Adjusted R-squared:  0.9334
F-statistic:  2931 on 1 and 208 DF,  p-value: < 2.2e-16
```

Minneapolis Dissimilarity Index Scores and Percent Students of Color

```
Call:
lm(formula = d$Diss_Free ~ d$PercSOC)

Residuals:
    Min      1Q  Median      3Q     Max
-49.364 -22.278   7.052  20.792  31.974

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  3.14804    5.55827   0.566    0.572
d$PercSOC   -0.04164    0.07225  -0.576    0.565

Residual standard error: 23.8 on 233 degrees of freedom
Multiple R-squared:  0.001423,  Adjusted R-squared:  -0.002863
F-statistic: 0.3321 on 1 and 233 DF,  p-value: 0.565
```

Saint Paul Dissimilarity Index Scores and Percent Students of Color

Figure Caption

Figure 4. Early linear regression results for free lunch dissimilarity index scores and percent students of color demonstrating contrasting demographic relationships across the two districts.

Appendix F: Examples of Boxplot Comparison for Minneapolis Public Schools

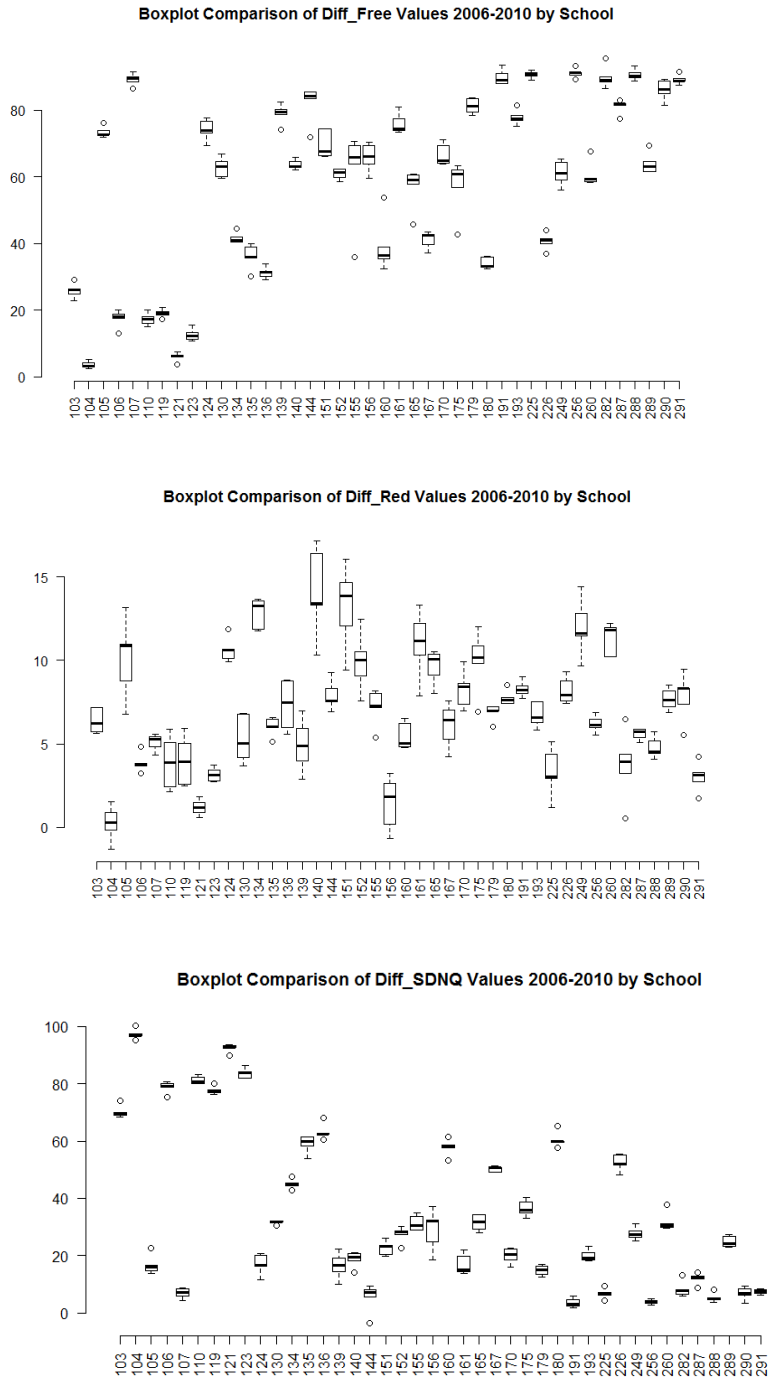
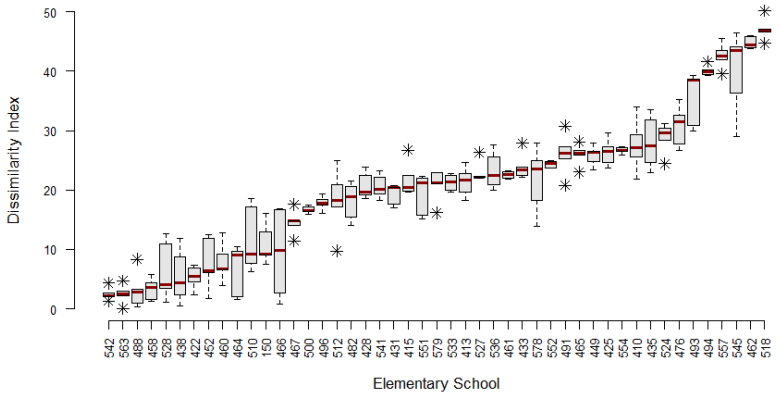


Figure Caption

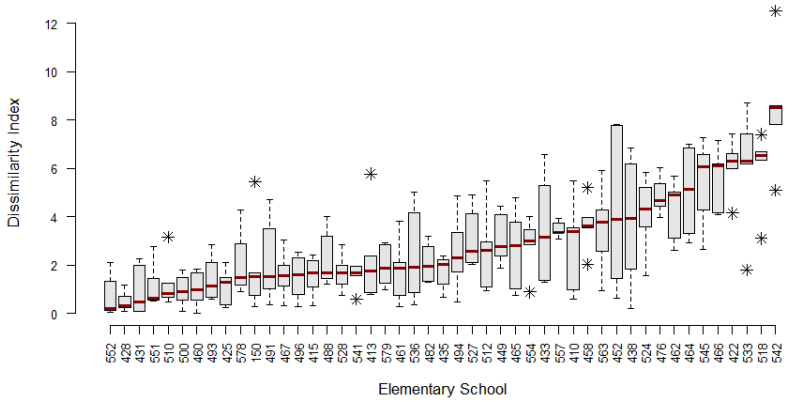
Figure 5. Boxplot Comparisons for three demographic groups in Minneapolis

Appendix G: Dissimilarity Index Scores Across Saint Paul Public Elementary Schools

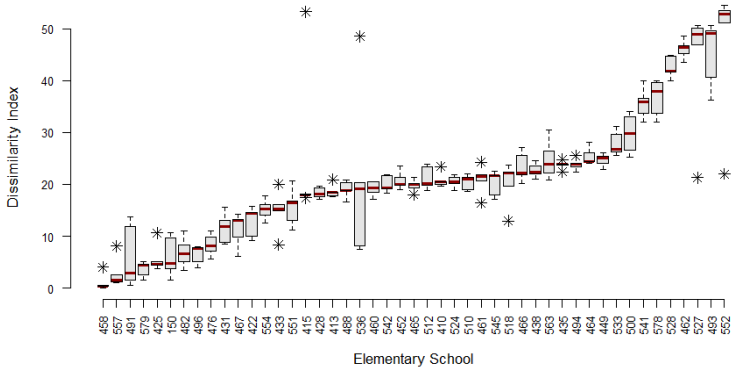
2006-2010 Dissimilarity Index for Free Lunch Population



2006-2010 Dissimilarity Index for Reduced Lunch Population



2006-2010 Dissimilarity Index for Non-FRD Lunch Population



Appendix H: Justification for Within School Variability, Saint Paul Public Schools