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The Role of Neighborhood Factors in School Choice Decisions

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THE ROLE OF NEIGHBORHOOD FACTORS IN SCHOOL CHOICE DECISIONS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ARA	Annual Regional Analysis
CPS	Chicago Public Schools
NWEA	Northwest Evaluation Association
SQRP	School Quality Rating Policy

ABSTRACT

In the last several decades, Chicago Public Schools has steadily increased the quality of seats in every region, as measured by the district's School Quality Rating Policy (SQRP). This improvement has also occurred in the city's lowest income neighborhoods, specifically on the South and West Side. At the same time that SQRP-measured school quality has increased, choice patterns among students have remained constant, with a large number of students choosing not to attend their high-performing zoned schools. In other words, although neighborhood schools have improved academically as measured by the district's SQRP, that improvement, and the corresponding increased availability of "high quality" seats, has not been accompanied with a higher number of students attending their neighborhood school. The purpose of this study was to understand (a) are students in low-income regions are more likely enroll in a non-Level 1+/1 school outside of their community area (SY18-19) than students in high-income regions; (b) what other neighborhood factors contribute to K-8 students enrolling in a non-Level 1+/1 school outside their community area (SY18-19); and (c) does access to a specific type of elementary school (e.g., charter, magnet, neighborhood or selective enrollment elementary) contributes to students enrolling in a non-Level 1+/1 school outside their community area. I found that students in low-income regions are more likely to enroll in a non-Level 1+/1 school outside of their community, that other neighborhood factors contribute to students attending a non-Level 1+/1 school outside of their region and that access to a charter, magnet, neighborhood or selective enrollment elementary does not contribute to this phenomenon.

CHAPTER ONE

INTRODUCTION

The opportunity gap, or the inequitable distribution of resources between students of different racial and socioeconomic groups has been explored in depth. This gap exists, in part, because families with socioeconomic means exercise their privilege to attend the strongest academically performing schools. Consequently, the opportunity gap is often associated with differences in academic opportunities between those groups (Card & Rothstein, 2007; DeLuca & Rosenblatt, 2010). Proponents of choice theory aim to address how districts could close the opportunity gap specifically by increasing school choice for low-income families. They assert that parents presented with the choice between an academically lower performing school and an academically higher performing school (as measured by key accountability metrics) will choose the higher performing option (Chubb & Moe, 1990; Friedman, 1955; Ravitch, 2010). That belief is rooted in Rational Choice Theory, which is that buyers make choices that help them achieve their objectives (Green & Shapiro, 2012). Specifically in education, Rational Choice Theory leads us to anticipate that educational decisions (for example, whether a student attends his or her zoned neighborhood school or a different school) would be made pursuant to a cost-benefit analysis (Gabay-Egozi et al., 2009).

The rational choice model of school choice has been drawn into question with Chicago Public Schools' Annual Regional Analysis (ARA) report. The ARA shows that in the 2018-19 school year, (i) 42% of elementary students chose to attend a school other than the one they were zoned; and (ii) 35.7% of those students chose to leave a high-performing zoned school as defined by the district's SQRP. The rates of students choosing a "high-performing school" according to district standards is even lower in predominantly low socio-economic neighborhoods. For the purposes of this study, "high-performing" was defined as a Level 1+/1 school measured by the district's SQRP. The SQRP is the district's policy for assessing annual school performance and is broken into five-tiers. The Elementary School Quality Performance Rating considers growth on the NWEA Reading and Math Assessment, growth of certain subgroups, attendance and other key metrics (Chicago Public Schools, 2021). The SQRP was developed based on best practices including research from the University of Chicago Consortium on School Research (Sutter, 2016). A Level 1+ school is the highest performing school and is a "nationally competitive school with the opportunity to share best practices with others." A Level 1 school is a high performing school that is a "good school choice with many positive qualities [where] minimal support is needed."[1] This study built on previous research by trying to understand why parents in Chicago Public Schools leave their neighborhoods to attend a school that isn't deemed "high-performing" according to the district's definition and whether neighborhood characteristics have anything to do with choice making. No known studies look at parents leaving their neighborhood to attend a school that isn't "high performing" and this study sought to inform the research by understanding what neighborhood factors might be contributing to this phenomenon. These findings may help districts and cities address school quality from a more holistic approach rather than focusing on school quality in isolation.

[1]As noted above, the SQRP is a five-tiered performance system based on a broad range of indicators of success, including, but not limited to, student test score performance, student academic growth, closing of achievement gaps, school culture and climate, attendance, graduation, and preparation for post-graduation success.

This study drew heavily on Chicago Public Schools' Annual Regional Analysis (ARA). The ARA is a set of facts, in the form of a report, released by the district annually the last four years. The data contained in the ARA are broken into 16 regions created by the City of Chicago's Department of Planning and Development as shown in Figure 1 below. The regions are defined by natural boundaries and reflect how people make choices regarding housing and jobs. The ARA looks at the quality, quantity, choice and variety of schools in each of the 16 regions. Quality concerns how many Level 1+/1 seats are in the region. Quantity considers how many seats, measured by the district's space utilization formula, there are for the student population. Choice considers whether students are choosing to attend their zoned school, another school in their region or whether they leave their region entirely for school. Finally, variety considers the diversity of school types and programs offered in regions. The intent of the ARA is to provide data with which to inform community dialogue and district planning.

According to the Districts' ARA, in the 2018-2019 school year, 45% of African American students attended their zoned school, compared to 66% of Hispanic students, 70% of White students, and 66% of Asian students. Only 14% of African American high school students attended their zoned school compared to 31% of White students. Around 52% of African American students left their region entirely to attend school. The report uses Google Maps travel time, specifically looking at public transportation, to determine the distance students who leave their regions travel to get to school. In the 2018-2019 school year, elementary students traveled 1.4 miles on average with an average commute time of 15 minutes. Elementary student distance traveled varied significantly among regions with commutes time being highest in the Greater Stony Island region (2.4 miles, 21 minutes) and lowest in the Pilsen/Little Village region (0.7

miles, 9 minutes). High school distance traveled to school and commute time are highest in the Far Southwest Side and Greater Stony Island regions (4.6 miles, 35 minutes) and lowest in the Pilsen/Little Village region (2.4 miles, 22 minutes).

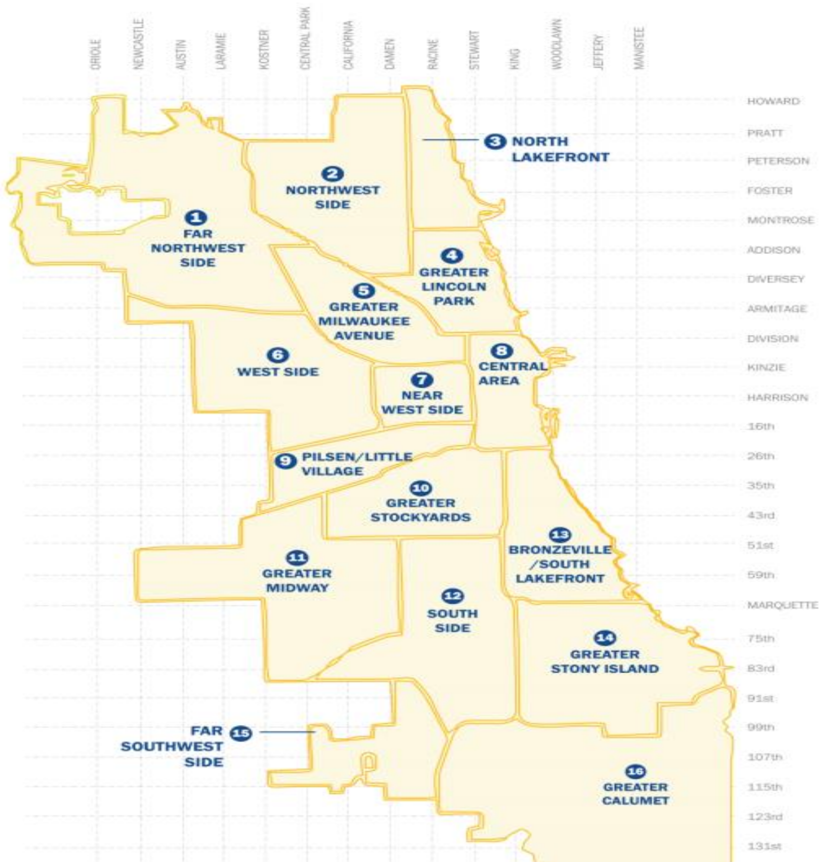


Figure 1. Map of the Annual Regional Analysis 16 Geographic Regions

For this study, I focused on K-8 students in each community area that enrolled in a non-Level 1+/1 school outside their community area. I did not explore this phenomenon in high school students. I made this distinction for several reasons. First, parents tend to be much more involved in selecting and participating in their child's elementary school selection (El Nokali et al., 2010). Second, specifically in Chicago, there are many more Level 1+/1 elementary schools than high schools in each region. In more than half of the 16 regions, the majority of elementary seats are Level 1+/1 and for the most part, these seats are accessible to the general public with 95% of them having no admissions criteria. In other words, it's much more likely a student is leaving a Level 1+/1 school in their region when enrolling in a non-Level 1+/1 school out of region. The narrative is quite different in the high school space. Only a few regions have a majority of high school seats that are Level 1+/1 and only 26% of those seats have no admissions criteria, meaning that even if a high performing high school is located in a region, students from that region may not even have access to those seats. This is often because some sort of admissions criteria exists. Because the range of school choice options available to these students is geographically limited, meaning they have less access to these seats, there was less benefit to examining what community factors correlated with students leaving their region because it is very unlikely that they are leaving a Level 1+/1 neighborhood seat. In other words, high school students are more likely to leave their region regardless of other factors because there is a more limited set of options available to them. What is also interesting about the elementary space is that in Chicago, a district that has experienced a drastic annual decline in the number of students, there exists an overabundance of high-quality open neighborhood elementary seats. In the 2018-2019 school year, the ARA showed that there were 99,000 open elementary seats. Of those 99,000, 48,500 were Level 1+/1 seats (98% of which had no admissions criteria).

Significance of the Study to the Field of Educational Policy

Chicago in particular provides an excellent venue for this study because Chicago Public Schools is simultaneously undergoing enrollment declines and academic improvement. In the last several years, the district has lost about 10,000 students annually (Chicago Public Schools 20th Day Membership Report, 2019). At the same time, a 2017 Stanford study showed that over the last two decades, Chicago's students have learned at a faster rate than 96% of all school districts in the country, including more well-resourced districts (Reardon & Hinze-Pifer, 2017). This matters because nationally, other districts are facing similar challenges in working to improve the academic quality of neighborhood schools while concurrently losing enrollment. It is critically important for scholars and districts nation-wide to understand how local context might shape parental choices as districts attempt to retain families.

However, there also exists a need for this study in the broader field of sociology of education. While studies have explored parent choice making, those studies often focus on parent choice making among non-zoned schools (Whitehurst, 2016). No known studies look at parents leaving their neighborhoods to attend lower performing schools. Moreover, although the broader research indicates that additional factors may be at work in explaining certain parent choices regarding schools (such as geography or safety), this study will be useful because the presence of a high-performing neighborhood school within a neighborhood in particular should remove certain of those additional factors (such as geography) from consideration, because those criteria should have already been met. The exploration of other neighborhood factors is a useful contribution to the field, specifically because districts may be trying to solve for the wrong problem. In other words, if other factors, such as the availability of parks, grocery stores and crime data influences whether a student leaves their neighborhood to attend a non-high-performing school, it will enable cities to focus on the most important factors to families..

Chapter two focused on school choice research, specifically priorities parents pursued and constraints they faced when selecting a school. The research revealed that both geography and perception of geography mattered when it came to school choice. The reputation about the neighborhood in which a school is located strongly impacted whether a student ultimately chose it. Academic performance was also an important factor although researchers noted that the definition of academic performance varied among parents from different socio-economic and racial subgroups. School type, for at least a subset of parents, mattered when selecting a school. In terms of choice constraints, researchers noted that the availability of information was a major barrier for parents, specifically low-income parents.

The set of concepts that informed my study is the Geography of Opportunity, which establishes that geography and factors pertaining to geography may positively or negatively impacts resident's lives. This framework was selected as my study examined various neighborhood factors and their impact on the number of all K-8 students in each community area that leave their community to enroll in non-Level 1+/1 schools. Applying this concept to my research helped explore the idea that parents may consider other neighborhood factors when de-selecting their neighborhood school.

Chapter three focused on my data methodology plan. I chose a quantitative study because both school and community numerical data were readily available, which allowed for the ability to study and find patterns, make predictions and test causal relationships using statistics. This research quantitatively analyzed the 2018-2019 enrollment data of K-8 students in Chicago Public Schools comparing that data to other neighborhood characteristic data. The data were collected from 411 elementary schools across Chicago's 77 community areas for the 2018-2019 school year.

Chapter four examined key findings. In response to my first research question, "whether students in low-income regions are more likely enroll in a non-Level 1+/1 school outside of their community area (SY18-19) than students in high-income regions," I found that the percent of low-income students played a role both independently and as part of the composite variable in students leaving their region for non-Level 1+/1 schools. In response to my second research question, "what other neighborhood factors contribute to K-8 students enrolling in non-Level 1+/1 schools outside their community area (SY18-19)," there were several "neighborhood factors" that contributed to students leaving their region to enroll in a non-Level 1+/1 school including the average number of violent criminal incidents per 1,000 residents (2015-2019) and the percentage of African American students (SY18-19). My third and final research question, I asked whether access to a specific type of elementary school (e.g., charter, magnet, neighborhood, or selective enrollment elementary) has a measurably stronger or weaker association to students enrolling in non-Level 1+/1 schools outside their community area than any of the measured relationships found while analyzing the second research question. To answer this question, I filtered for school type and ran the analyses over again, allowing me to determine whether the relationships discovered in the other hypotheses were impacted by school type. The analysis revealed that school type does not change the relationships found in any meaningful way.

CHAPTER TWO

LITERATURE REVIEW

In the three decades that researchers have studied school choice, their focus has typically centered on three major topics: (i) the history and development of school choice, (ii) the priorities parents pursue when selecting a school (parent choice making), and (iii) the constraints around school choice policy. Researchers have spent a considerable amount of time discussing priorities parents pursue when selecting a school and the constraints they faced and concluded that factors such as geography and academic performance mattered to some extent for parent decision making. What is less known, and what this study seeks to understand, is how parents, specifically elementary school parents in this case, considered other factors when choosing to leave their community to attend school as is the situation with the present study's focal case in Chicago.

History and Development of School Choice: Why Parents Have to Choose?

Choice is exercised when parents can actively choose what school to send their child (Teske & Schneider, 2001). School choice has always existed in the form of residential location; however, a wide variety of choice policies, including voucher programs and charter schools have emerged in the last two decades to provide alternatives to the traditional system. Specifically, the reforms noted below are intrinsically tied to the belief that low-income students are zoned to "failing" neighborhood schools and as such, must have expanded options. They are also tied to the belief that parental preference should be a driving factor in school selection.

The 1980s Education Act included key components aimed at expanding parent choice making, specifically providing authority for local education authorities to "enable the parent of a child to express a preference as to the school at which he wishes education to be provided" (Education Action, 1980). Since the late 1980s, a belief in the prevailing power of competition and marketization in providing that parent choice has emerged (Bagley, 2006) and several market mechanisms launched in response to the perceived failings of the public school system. The first of these market mechanisms, school vouchers, has its basis in Milton Friedman's 1962 book, *Capitalism and Freedom,* which defended the power of market-based thinking. In it, Friedman stated that "if present public expenditures on schooling were made available to parents regardless of where they send their children, a wide variety of schools would spring up to meet the demand" (p. 91). Specifically, he believed that vouchers would lead to the improvement of the school system by promoting competition (Ravich, 2010). In the early 1990s, Milwaukee implemented voucher programs that enabled parents to take the funds otherwise allocable to their assigned public schools and use that money to send their children to private schools. The voucher system has continued to expand over the last decade (Berends, 2013).

Another reform championed by school choice advocates was the charter school. Charter schools, often considered the "jewels" of the choice movement, are privately managed, publicly funded schools that are granted a charter, typically by a state-authorized agency and, as such, are exempt from some local regulation and oversight (Ravitch, 2010, p. 126). The basic tenet of the charter school movement is that making the public school system a semi-public marketplace increases the quality of services by allowing outside entities to make public schools more innovative and flexible which allows teachers the ability to tailor their approach to produce stronger student outcomes (Bagley, 2006; Eastman et al., 2017). While most researchers acknowledged the positive impact some charters schools have had on a subset of students, the charter system as a whole has produced mixed results (Center for Research on Education Outcomes National Charter School Study, 2013).

At the core, the assumption made by school choice proponents is that parents choose because they are rational actors who have preferences about what they want from a school for their child, often based on their own preferences about education. Choices made by parents are essentially the choices that best help them achieve their objectives (Green & Shapiro, 2012). Byrne and De Tona (2019) explained that choices parents make for their children are nuanced and often emerge out of their own relationship to the education system and are shaped by where they live and how they see school spaces. In short, parent choice is much more complicated than school choice proponents claim.

Priorities Parents Pursue

As noted above, researchers have been addressing which factors parents consider when choosing schools for decades and have found that in narrowing their set of school options, parents use various indicators in addition to academic performance to determine the best school choice for their child (Mavrogordato & Stein, 2016). In terms of race and socioeconomic status, some researchers have found that there is very little difference in some factors, like location, considered by parents among different racial and socioeconomic groups (Brewer & McEwan, 2010), while others have found varying parental preferences among these groups (Hamilton & Guin, 2005). Below is an overview of some of the key research regarding what factors parents consider when choosing a school including academic performance, school type, and geographic proximity.

Academic Performance

While academic performance is often assumed to be synonymous with school quality, that assumption is worth questioning as it applies to what priorities parents pursue when selecting a school. Districts operating choice models often purport that parents operate with an agreed-upon idea of what constitutes academic performance. However, research is mixed on whether academic performance is a leading indicator for parents choosing a school (Prieto et al., 2019). Higher-income parents seem to be more concerned with academic quality in terms of test scores. In one study of parent choice patterns in Charlotte-Mecklenburg, higher neighborhood income was strongly associated with higher mean preference for school scores, with the effect holding constant for both Whites and non-Whites (Hastings et al., 2005). In addition, when it comes to private school selection, parents listed academic quality as the top factor in their selection (Cohn, 1997).

Other studies have noted that academic performance is not the key driver in parent choice. In New Orleans and Chicago, two major cities that experienced drastic changes in the portfolio of school options and as a result allowed parents access to higher performing options, found that academic performance was not the key factor for many parents. Prior to Hurricane Katrina in New Orleans, 53% of students were already attending a non-zoned school; however, given changes in the schools available to parents, that percentage jumped to 86% after the storm. When schools were reopened, parents had greater access than before to schools with higher academic performance as defined by test scores. Despite this, they were less likely to choose the schools with higher test scores (Harris & Larsen, 2015). In 2013, when Chicago closed nearly 50 schools, approximately 30% of parents did not choose the designated and higher performing welcoming school according to the districts' SQRP. De la Torre et al. (2015) noted that while parents choosing a lower performing according to the district's performance policy rating may be perceived a "poor choice," it may actually be a nuanced choice based on the needs of the family (p. 36). In this specific study, parents defined academic performance using criteria beyond the schools' SQRP and test scores. Academic performance for these families

> meant anything from schools having after-school programs, to having certain curricula and courses, small class sizes, and one on-one attention from teachers in classes… only a few of the families that enrolled into lower rated schools talked about 'official' markers of academic quality. (p. 32)

Parents noted other accountability metrics when selecting a school, citing other "academic" attributes including available after-school programs, certain courses and course offerings, small class sizes, and one-on-one attention from teachers in the classroom. Only a few of the families that enrolled in lower rated schools talked about academic performance in terms of standardized assessments (De la Torre et al., 2015, p. 32).

The research around choice making as it pertains to different subgroups is also mixed. In terms of academic performance as the major factor, some studies have found that African American and Latino communities equally consider school performance when constructing their choice set, while other studies aimed at understanding how parents choose schools have identified differing factors, outside of academic outcomes, that various subgroups consider when constructing these choice sets (Kleitz et al., 2000). For example, Bell (2007) surveyed parents of differing socioeconomic status in one Midwestern city and found that they did not consider schools of similar academic quality because they valued different things when choosing schools.

When faced with the decision, parents gave 102 different reasons for choosing their child's school (p. 198). In his interviews with the parents, choice making was much more nuanced than just determining a set of criteria and selecting a school. For example, one African American mother determined the best schools academically for her son but many of them were mostly White. She reflected on her own experiences attending a majority White school and determined that she did not want that same experience for her son (Bell, 2007).

School Type

For at least a subset of parents, school type matters when selecting a school. Large urban districts often offer "choice" between non-neighborhood schools such as magnet, charter and other specialty programs and neighborhood assigned schools. Magnet schools have operated in many large urban districts for decades and are generally public schools with specialized curriculum focused on specific subject areas like the Arts or Science, Technology, Engineering and Mathematics (Linkow, 2011). Magnet schools often have some sort of full or partial admissions or audition criteria. In Chicago, of the district's 420 elementary schools, 160 either have full magnet status or magnet cluster programs, a designation given to schools with a specific academic focus area that has a neighborhood boundary but allows students who live outside of the neighborhood attendance boundary to submit an application to be considered for acceptance to some of the school's seats. Other major cities, like Tampa, have a large distribution of magnet schools, with over 50% of the student population attending (Prieto et al., 2019). The original aim of magnet schools was to achieve voluntary desegregation; however, the model has shifted to provide parents with a wide array of specialty programming to choose from (Prieto et al., 2019). While less research exists around parent choice and magnet schools, researchers have observed that parents want to identify impactful educational programs and that strong academic reputation and special programs, like those often offered by magnet programs are desirable to parents (Teske & Schneider, 2001; Hamilton & Guin, 2005). Goldring and Hausman (1999) distributed anonymous surveys to over 1,200 parents in two large urban school districts in which magnet schools are an integral part of parent choice and found that higher income parents were more likely than lower-income parents to select magnet programs (Goldring & Hausman, 1999). Parents reported choosing these schools because of academic reasons, noting aspects such as special programs and smaller class sizes.

Charter schools are most often run by non-governmental agencies and are autonomous from most district policies and oversight. Since the mid-1990s, the prevalence of public charter schools grew substantially in urban districts across the country. In Chicago, at the time of this study, 117 of the 642 schools were charters and approximately 60,000 K-12 students attended these schools. Research is conflicted on whether charter parents are more informed when it comes to school selection. In choosing charters, parents cite small class sizes, higher standards, greater opportunity for parental involvement, specialty programs and better performing teachers (Vanourek et al., 1998). Other researchers have found that charter parents report being more interested in key components of their child’s education and perceive charter schools as able to deliver outcomes for their child. Over 90% of parents participating in one survey rated their charter school favorably in several categories including: academic programming, school environment, student supports, school culture, teachers and administrators (Wohlstetter et al., 2008). A more recent study conducted in 2016 found similar results (Barrows et al., 2017). Charter parents were generally more satisfied with teacher quality, and school discipline than parents of students attending district managed schools. Specifically, charter parents noted satisfaction around the level of communication with their child's school, more than parents of district managed schools. However, Buckley and Schneider (2007) found that charter school parents are no more informed in the choice process and are generally no more advantaged or involved than traditional public-school parents.

Geography

School districts manage public schools within their own geographical purviews and wealthier individuals are ultimately able to choose their public schools by choosing where to live (Saiger, 2013). In other words, cost prohibits low-income individuals from accessing high-performing schools in regions where they can't afford to live. Advocates of school choice policy argue that choice specifically diminishes geographical disparities among African American and Latino communities by providing choices outside of the zoned neighborhood public school. The theory is that neighborhood schools are not performing and that situating schools in a market-based environment positions parents as consumers who operate as highly rational actors able to effectively navigate the options available and as such, will ultimately choose a higher-performing option. Critics of school choice argue that these policies may cause lasting harm, ultimately exacerbating geographic inequities by leaving already disinvested communities behind and potentially even further widening the gap between low- and high-performing schools (Harris & Larsen, 2015).

While school choice advocates tout that choice diminishes geographical barriers; geography, and, more specifically, the perception of distance, does indeed matter in a child's ability to access high-quality educational opportunities (Cashin, 2014). Researchers have found that, in many cases, parents will opt for lower performing schools nearby rather than traveling a farther distance to access a higher performing school. One study, comparing the decisions of New Orleans families before and after the post-Katrina reforms, found that three-quarters of a mile in distance was equal to a letter grade for parents choosing schools. For example, a C grade school within three-quarters of a mile was preferable to parents over a higher performing school located farther away (Harris & Larsen, 2015). A study of Charlotte-Mecklenburg school district found similar results; however, noted differences in racial demographics when it comes to geography impacting school choice. The study found that each additional mile of distance reduced the chances of a parent choosing a school by roughly 35% among Whites and 27% among non-Whites (Hastings et al., 2005).

Within a neighborhood a certain set of institutions, individuals and issues exist (Lareau & Goyette, 2014). A substantial amount of research attempts to question whether the conditions of neighborhoods (e.g., physical environment, economic health, employment opportunities, crime) as well as the perception of those conditions impact the outcomes of its institutions and residents that reside there (Lens, 2017). The quality of these neighborhood conditions, good or bad, produces localized effects, essentially the idea that where a person lives has a specific effect on their trajectory (Lens, 2017). Some researchers have argued that outcomes often differ for residents of low-income communities, specifically communities of color, because they are often geographically isolated from opportunities and advancement, experience higher rates of crime, decreased academic achievement, various health problems, limited economic mobility and continued generational neighborhood disparity (Sharkey, 2013). Other researchers have argued that the effect of the neighborhood should be observed through a lens that includes both the duration and timing of an individual's exposure to the neighborhood factors and the individual's vulnerability to the effects of the neighborhood (Wodtke et al., 2011). In other words, children that live and attend schools in a specific neighborhood for longer durations are more likely to be vulnerable to the effects of that neighborhood.

School choice also appears to closely relate to the perception of place. While some studies have focused on the tangible effects of neighborhood reputation, such as the likelihood of receiving a home loan (Aalbers, 2005), other studies have focused on the psychological impacts of neighborhood reputation. Bell (2007) found that the reputation of the neighborhood matters and that families consider the characteristics of the neighborhood as well as external school features when selecting a school. Schools located in neighborhoods that were deemed as "bad" are seen as "bad" schools, and therefore not likely to be considered by parents (p. 400). As such, choice patterns are strongly influenced by perceptions of educational opportunities in these neighborhoods (Phillippo, 2019). Having followed a group of students throughout the process of researching, applying and ultimately attending a high school through Chicago's competitive high school application process, Phillippo found that reputation about the neighborhood in which a school was located strongly impacted whether a student ultimately chose it. Given a choice, she found, students often chose to attend a less competitive school perceived to be in a safer neighborhood. In other words, it is very difficult to decouple schools from the neighborhoods in which they reside. While the intention of school choice policy is to minimize geography as a factor in students accessing high performing schools, it does not appear to always achieve this aim.

Considerable research also exists regarding the connection between the neighborhood school and its surrounding community. The assumption, outlined in the research, is that the neighborhood is a powerful source of potential school improvement and quality (Goldring et al., 2006). Several studies have outlined neighborhood environmental factors that have a significant effect on the neighborhood school and the students who attend that school (Sharkey & Faber, 2014). Exposure to poor air quality is thought to be linked with decreased school attendance because students with respiratory problems are more likely to be absent from school (Currie et al. 2009). Noise in the environment may also matter. A study of students in a New York City public school found that students located in a classroom adjacent to train tracks had substantially lower reading levels than students whose classrooms were located on the other, quieter side of the school (Bronzaft & McCarthy, 1975). Literature on violence in communities has suggested that exposure to stressors in the environment, such as gun violence, may be particularly damaging to children's academic performance (Harding, 2009; Sharkey, 2013). Looking at Chicago, Sharkey (2010) found that African American students in a specific community performed significantly worse on a cognitive test after being exposed to violence than their neighborhood peers who had not been exposed to the same level of violence.

Other studies have sought to understand the academic outcomes of similar low-income groups living in differing neighborhoods. Perhaps one of the most famous studies on neighborhood effects came out of Chicago's Gautreaux housing program, which over the course of 20 years, afforded more than 7,000 families the opportunity to move out of the city to surrounding, more affluent neighborhoods. Prior to moving, these housing residents noted issues with crime and violence. However, upon moving, participants indicated they were less fearful of crime and experienced positive employment outcomes (Lens, 2017). Residents that moved to mostly White suburbs were more likely to have attended a rigorous high school, more likely to have attended college, less likely to be on welfare and more likely to be employed (DeLuca et al., 2010). Schwartz (2010) also analyzed outcomes of students living in public housing in which participants were randomly assigned to apartments in different neighborhoods that corresponded to either lower performing or higher performing schools. The students who were assigned to higher performing schools performed much better in reading and math compared to their peers assigned to the lower performing schools.

In the previous sections, I reviewed research regarding parental preferences when choosing schools. Below, I discuss the constraints and outcomes of school choice, noting the established limitations of choice, specifically among certain socioeconomic and racial subgroups.

Constraints Around Choice

In addition to factors considered by parents, researchers have also spent a considerable amount of time noting constraints of the choice system and the consequential outcomes of those constraints. In order for market mechanisms to provide the "best option", consumers must both have access to the same information and opportunities. School districts promoting choice policy make several assumptions. First, as discussed above, school district policies reflect the belief that parents operate with an agreed-upon idea of what constitutes the "best choice," and that "best choice" is directly tied to the academic performance of a school. Second, they reflect the belief that parents have equal access to information and resources and third, that parents have equal buying power in the educational marketplace (Olson Beal & Hendry, 2012, p. 68).

Research is clear that even with districts expanding the choices that families have for schooling options, information gathering is constrained for certain groups and increased choice doesn't necessarily lead to parents obtaining accurate information (Pattillo, 2015). Both formal and information itself varies, as do parents' valuations of different forms of information. In terms of formal information, researchers have found that flow and content is limited (Delale-O'Connor, 2018). In one study of 77 parents of 8th grade students attempting to understand the available school choices in the same Chicago neighborhood, researchers found that parents had difficulty navigating the formal information available (Pattillo, 2015). Each of the parents in the study, juggling multiple jobs and under significant financial constraints, had difficulty navigating the district's resource books for high schools and other information sources that were readily available (Pattillo, 2015). In short, parents' restrictions to incomplete and unclear formal information, constrained their ability to even understand all of the options that were available for their child. Studies exploring the importance of formal information for parents found that providing simplified information increased the likelihood that parents choose higher academic performing schools for their children (Hastings & Weinstein, 2008).

In terms of informal information, Hamilton and Guin (2005) found that parents with lower levels of educational attainment, as well as African American and Latino parents, tend to have social networks that are less informed about school quality in terms of academics and as such, are more likely to rely on visual cues such as the surrounding neighborhood or cleanliness of the school. In addition, specific communities face language barriers when attempting to access information about schools (Mavrogordato & Stein, 2016). Official sources of data such as state department of education websites and school report card documents are "often challenging to decipher for native English speakers, let alone those from different language backgrounds," causing Latino and other parents with language barriers to rely on less formal sources of information when making their decisions (p. 1035).

Because low-income African American and Latino parents have unequal access to information, as noted in the studies above, their ultimate "choice" for their child can be limited (Pattillo, 2015; Bell, 2009). These choice constraints result in a disproportionate number of students of color ending up in lower performing schools. Bifulco and Ladd (2007) found that African American students attending charter schools tended to be enrolled in lower performing schools compared to their White peers. Bell (2009) surveyed groups of parents as they navigated the school choice process and noted that middle-class parents' choice sets contained a greater number of non-failing, selective and tuition-based schools compared to poor and working-class parents' choice sets. In addition,

> just 16% of poor and working-class parents had at least two non-failing schools in their choice sets, whereas 58% of middle-class parents had at least two. The differences between parents' choice sets were consistent with differences between the schools parents ultimately selected. (p. 201)

While low-income families may place a high value on academics, research has demonstrated that they may have more constraints when faced with decisions regarding school choice (Duflo et al., 2006). Those decisions constraints could include transportation or a parent's ability to get their child to school, work schedules that might limit a parent's ability to select a school outside of a geographic area and safety concerns that may lead a parent to eliminate options based on the location of a school.

While school choice advocates argue that choice leads to less inequality because students are afforded the opportunity to move to another school, this is not the case. In the study just noted above, 53% of middle-class parents ultimately chose a non-failing school as compared with 36% of poor and working-class parents (Bell, 2009). Ultimately, they found that working-class parents and more advantaged parents used similarly diverse strategies to choose schools and reasoned in ways similar to more advantaged parents. Working-class parents even considered a greater number of schools and cited academic reasons more often than middle-class parents. Yet both poor and working-class parents' choice sets, and final school selections included a higher number of failing, nonselective schools than those of middle-class parents. There are a lot of factors that limit school access for these student groups as a result, in this study, similar strategies ultimately resulted in varying qualities of school (Bell, 2009, p. 201).

These factors have caused limited schooling opportunities for low-income students in this country, consequently reinforcing school segregation (Lareau & Goyette, 2014; Deluca & Rosenblatt, 2010). While school segregation declined in the 1970s and 1980s, it increased dramatically in the 1990s and has only slightly declined since then. Still, the average White student attends schools where 75% of his or her peers are also White (Lareau & Goyette, 2014). Wealthier, typically White individuals, can decide to move to a certain school district, thus expanding their school choices through residential choice (Lareau & Goyette, 2014). At the same time, low-income African American and Latino parents' choices are often constrained to the neighborhood in which they can afford to reside. While choice policies attempt to provide higher levels of information and ultimately choice to parents, segregated schools remain the status quo.

While researchers have established that school quality isn't necessarily the driving factor in school selection for parents, what is less known about school choice is why parents might deselect a high performing school in their neighborhood, when one is available, and to what extent neighborhood factors such as crime rate and grocery store availability might correlate with the decision to favor schools outside of their community.

Conceptual Framework: Geography of Opportunity

The body of research that informed my study is the scholarship around geography of opportunity, which establishes that geographical spaces are deeply impacted by factors, such as economic opportunity and crime that may positively or negatively impact resident's lives. As noted in the literature review above, geographic location and, more specifically, the perception of distance, does indeed matter in a child's ability to access high-quality educational opportunities. In addition, academic performance, to some degree, matters for parents when selecting a school. Applying these notions to choice policy, the assumption would be that when geographic proximity and academic performance are present, parents would select a nearby high-performing neighborhood school. However, in Chicago, a large number of parents of elementary students are deselecting their academically performing, geographically nearby school and attending out-of-neighborhood schools instead. Knowledge generated by geography of opportunity research may help us understand why low-income families deselect academically performing schools close to home and what influencing factors tied to schools' and families' surroundings may be at play.

This set of concepts has its basis in the idea that geographical spaces are not neutral; rather they are socially constructed and deeply influenced by history and politics (Massey & Denton, 1993; Galster & Killen, 1995; Phillippo, 2019). The central idea is people are situated within a neighborhood and that neighborhoods influence the availability of opportunities, ultimately influencing quality of life (Osypuk & Acevedo-Garcia, 2010). Because of factors like uneven development and discriminatory policy decisions driven by structural racism (i.e., redlining), opportunities are geographically stratified (Green, 2015). This set of concepts repositions urban poverty as a symptom of patterns of inequity (Galster & Killen, 1995).

Scholars who study the geography of opportunity typically use measures of segregation, such as race and income, as variables that help them consider variation in opportunity (Lens, 2017). Lens noted that quantitative research regarding segregation has sought to clarify definitions of race and income. Some basic trends have emerged nationally when looking at these two proxies specifically. First, segregation, in terms of poverty, decreased by the 2000 census but has since increased (Reardon & Bischoff, 2011). Segregation by race, on the other hand, has leveled off in the last decade (Logan & Stults, 2011).

Numerous scholars have applied this concept to education research, looking at the link between education and place (Green, 2015; Phillippo, 2019). Findings from studies using geography of opportunity demonstrated that lower-income neighborhoods are often denied key neighborhood opportunities such as access to grocery stores, adequate health care or community redevelopment. As such, opportunity is reduced. For example, William Tate (2008) explored this theory in two cities – St. Louis and Dallas. In Dallas, students identified 25 problems they believed to be negatively impacting their communities, including the negative influence of liquor stores and other establishments on their school experience. Other studies have found that resource-poor neighborhoods have a direct negative influence on the college-going aspirations of African American students (Stewart et al., 2007).

Another application of this concept comes from Goldring et al. (2006). They found that the lifting of desegregation decrees over the last two decades has led to a renewed focus on neighborhood schools. This focus has been generally met with public enthusiasm because the belief is that neighborhood schools are likely to increase community attachment and support. The neighborhood school is also seen as an impetus for community improvement and revitalization. However, while neighborhood schools are intended to strengthen a community's attachment to schools and drive community improvement, there is little evidence about whether a return to neighborhood schooling benefits students and if benefits are equally distributed among all students (Goldring et al., 2006). One report specifically shows that the growth of racial and economic segregation in K-12 schools that began post-unitary status has gone unchecked for nearly three decades (Frankenberg et al., 2019). This segregation has resulted in African American and Hispanic children suffering from less adequate resources, including less qualified teachers (McArdle & Acevedo-Garcia, 2017).

As mentioned above, the available literature around school choice and geography does not answer the question of what neighborhood factors may lead a parent to leave to attend a non-Level 1+/1 school. Applying the concept of geography of opportunity, specifically the notion that space is socially constructed and tied to past and current opportunities, to elementary school choice among CPS parents will help me explore the idea that parents might be considering other neighborhood factors when choosing not to attend their neighborhood school.

CHAPTER THREE

METHODOLOGY

The purpose of this study was to better understand why students enroll in non-Level 1+/1 schools outside their community area and what other factors, including neighborhood characteristics and school type contribute to this phenomenon.

This chapter describes the methods and procedures used including the research design and research questions. In addition, the study sample, data collection and data analysis are presented. Finally, the chapter discusses the limitations of this study.

This study addressed three research questions: (1) Are students in low-income regions more likely to enroll in a non-Level 1+/1 school outside of their community area (SY18-19) than students in high-income regions? (2) what other neighborhood factors contribute to K-8 students enrolling in non-Level 1+/1 schools outside their community area? (3) does access to a specific type of elementary school (e.g., charter, magnet, neighborhood or selective enrollment) plays a role with respect to whether or not students enroll in a non-Level 1+/1 school outside of their community?

Research Design

This research was conducted using a quantitative study. One situation in which a quantitative study is appropriate is when the goal is to use observed data to examine questions about a sample population (Allen, 2017). Because the purpose of this study was to examine the factors that lead to K-8 students leaving their community area to enroll in a non-Level 1+/1 neighborhood school, a quantitative approach was the most appropriate choice. The reason this approach is appropriate is because both school and community numerical data are readily available, which allowed the ability to count, measure and quantify these metrics. I analyzed the 2018-2019 enrollment data of K-8 students in Chicago Public Schools comparing that data to other neighborhood characteristic data. The data were collected from 411 elementary schools across Chicago's 77 community areas for the 2018-2019 school year. The data specifically reflected the number and percentage of students who lived in communities who enrolled in schools outside the community area that were specifically not Level 1+/1. All other students not in that number were students that attended schools in the community area or attended Level 1/1+ schools outside the community area. A qualitative approach would only be useful for this analysis if the data were subjective and relied on words and meanings, instead of numbers. An example of a qualitative study in this case would be one that analyzes the meaning of survey results that are based on open-ended questions regarding school choice.

To observe what neighborhood factors, if any, are associated with a parent's decision to leave their zoned Level 1+/1 school, I ran a logistic regression analysis. I used the 77 Chicago community areas for this study as they correspond quite closely to neighborhoods that would be recognized by their residents; examples of these are Lake View and Englewood. Chicago provides data at the community area level, allowing for a uniform comparison. Although census tract information is widely available as well, I chose not to use this unit because residents do not recognize what census tract they are in, nor do they know what census tract their zoned school resides in. As Reardon and O'Sullivan (2004) note, census tract data is often arbitrary because the tracts lack social meaning for residents.

It is important to note that all the data I used is separated by community area. For example, the education data (i.e., how many K-8 students from a community travel outside of their community for school) use the same geographic community boundary as other data points (i.e., violent and nonviolent crime rates). Although there are limitations, which are further discussed below, community level data are useful for measuring the relationships between the independent variables (crime rate, poverty level, school type, etc.) and the dependent variable (school selection). Another point is that the schools and community areas they serve are homogeneous in racial and economic terms. Although this misses the nuance in decision-making by individual families, it does allow for the observation of patterns found with respect to school selection at a community area level.

Data Sampling Plan

Chicago Public Schools was the focus of this research study. The first consideration was that the district is a district of "choice," meaning students are allowed, and even encouraged, to consider and attend non-zoned schools. While most urban districts offer some components of school choice, about 42% of Chicago Public Schools elementary students attend a non-zoned school in or out of their region (Annual Regional Analysis, 2020).

Chicago Public Schools also represents a district with an exaggerated stratification of neighborhood factors. The district is highly segregated, both by race and class, allowing for multiple points of neighborhood analysis. Finally, over the years, Chicago has made available numerous datasets allowing for access to government data.

Data Collection Plan

The research obtained available data from all 411 K-8 Chicago Public Schools, reported at the beginning of the 2019-2020 school year for the 2018-2019 school year (known as 20^{th} day data). All variables unless otherwise stated were evaluated on a school year basis for school year 2018-19. The school level data were obtained from Chicago Public Schools' website and the neighborhood data were obtained on the City of Chicago's Data Portal.

There are four school types that I focused on in this study: neighborhood, magnet, selective enrollment, and charter/contract elementary. Selective enrollment and magnet schools typically have admissions criteria while neighborhood and charter/contract schools do not. In order to measure the role that the type of school students attend plays, I first analyzed neighborhood factors and their role in school selection across all elementary schools, regardless of school type. After analyzing these relationships, or lack thereof, I went through the same steps again but restricted the analysis by school type. The intention was to root out whether there were stronger or weaker correlations between school selection in and outside the community area based upon both neighborhood factors as well as the type of school where the students enroll.

Research Questions

For my first research question, I asked whether students in low-income regions are more likely to enroll in non-Level 1+/1 schools outside their community area than students in high-income regions.

For my second research question, I asked whether neighborhood factors related to crime, economics, race and class, grocery store access, or park access contribute to students enrolling in non-Level 1+/1 schools outside their community area.

In terms of analysis, for my third and final research question, I asked whether access to a specific type of elementary school (e.g., charter, magnet, neighborhood or selective enrollment elementary) contributes, in a measurable way, to a stronger or weaker association than any of the measured relationships found while analyzing the second research question. To do this, I ran the analysis two additional times. First, I created a filter that included charter, magnet and selective enrollment elementary schools. The hypothesis was that charter, magnet and selective enrollment elementary schools does have a stronger effect on out of area enrollment, when controlling for each variable analyzed above. I then ran the analysis including only neighborhood schools and a handful of citywide options.

Data Analysis Plan

My data analysis plan began with the collection of student and community data. As discussed above, I relied on a quantitative approach and a common unique identifier, which is community area. Next, I defined the key variables for the analysis. Each variable was separately analyzed by way of mathematical functions such as frequency, minimum, maximum, median, etc. Additionally, I presented the variables in histograms allowing for a visual representation of how each variable is distributed across communities. Conducting these tests also ensured data integrity and identified potential outliers.

Once the variables had been exhaustively analyzed independently from one another, I examined the Pearson correlations to see the relationships among the independent variables. The correlations provided better insight into how to proceed with the statistical modeling portion of the analysis, specifically whether to consider using a composite variable to represent the community stressor variables.

Then I ran a logistic regression analysis to determine whether there was a statistical relationship between the dependent variable (also known as the response variable) and each independent variable (also known as the explanatory variables). These statistical models were run to answer my research questions.

Response Variable

The response variable, or the number of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area (SY18-19), is summarized in Appendix A. To determine the proportion of students attending a non-Level 1+/1 school, I needed to know the proportion of all students who traveled outside the community area as well as the type of school they attended (i.e., charter, magnet, selective, or neighborhood school). This helped determine if students attended lower-rated schools outside the community area because the parents, for instance, preferred charter schools over higher ranked, nearby non-selective neighborhood schools. All variables in this study were measured against this variable to determine if they had a positive impact, negative impact or no impact on the number of students that enrolled in lower-rated schools outside their neighborhood. As described at the outset of this dissertation, the issue I was attempting to address was why students might enroll in these lower-rated schools even though there were highly rated schools nearby.

As discussed above, in order to better handle the limited sample size (77 community areas), the response variable was converted to a categorical variable designated by either a “yes” or a “no.” In this case, the response variable (RV) was the number of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area (SY18-19) were defined as “yesses”. All other students were considered “nos.”

Explanatory Variables

To find out why students enrolled in non-Level 1+/1 schools outside their community area, several neighborhood factors were considered. Those factors touched on student demographics such as race and economics, the financial condition of the neighborhood and other neighborhood characteristics that could play a role in driving students to lower performing schools further away from home. These factors are summarized in Table 1 below (also see Appendix A for more detail at the community area level).

The explanatory variables were evaluated independently. For instance, I conducted a frequency distribution analysis (histograms) and measured the mean, median, standard deviation, minimum and maximum values of each variable. With guidance from these initial observations, the logistic regression models were deployed in order to provide statistical evidence of any observed relationship between the response variable and each explanatory variable.

Racial demographics of the elementary school student body in 2019 was first analyzed as a separate and distinct explanatory variable. Race was also analyzed in conjunction with the "Community Stressors" variable and other variables as discussed below. This explanatory variable was used to search for any correlation between the demographic makeup of the student population and school selection.

The number of available health services locations, grocery stores and public parks were also analyzed independently. Although perhaps less meaningful in terms of any direct association to school selection, it is well documented that neighborhoods that tend to have fewer resources available such as health care, healthy food options and access to green space have less access to other opportunities. It is worth evaluating whether this also has an impact on school selection. Each of these was analyzed on a per square mile basis in order to allow for a direct comparison across each community area (descriptive statistics are shown in Appendix A).

Table 1. Means, Medians, Standard Deviations and Minimum and Maximum Values for all Variables

Variable Name	Mean	Median	Standard Deviation	Minimum Value	Maximum Value
EV1 - "Community Stressors" Variable (see below)	--	--	--	--	--
EV1.01 – Percentage of low-income students	74.7	82.0	18.7	16.5	96.7
EV1.02 - Percentage unemployed	6.0	5.2	3.1	1.6	13.2
EV1.03 - Vacant land percentage	5.2	3.1	5.8	0.1	28.5
EV1.04 - Average number of violent criminal incidents per 1,000 residents	40	25	31	6	139
EV1.05 - Percentage of population 25 or older that do not have an Associate's degree or higher	62.8	67.2	20.6	14.7	89.3
EV2 - Percentage of Black or African American students	43.2	24.5	39.3	1.5	98.6
EV3 - Percentage of Hispanic or Latino students	37.4	31.2	33.3	0.9	94.9
EV4 - Percentage of White students	11.8	2.7	17.1	0.0	69.8
EV5 - Health services locations per square mile	10.2	5.6	15.7	0.0	84.1
EV6 - Grocery stores per square mile	2.4	2.0	1.7	0.0	7.1
EV7 - Accessible park acreage per 1,000 residents	2.9	2.0	2.8	0.1	15.6

The "Community Stressors" Explanatory Variable

Additionally, considering there is a strong relationship between some explanatory variables, many of which make logical sense at the surface level, a composite variable was used. A composite variable addresses multicollinearity, a phenomenon in which multiple explanatory variables can be predicted from other explanatory variables with a high degree of precision. A composite variable also increases measurement reliability of the scores. Although in some cases I also analyzed the variables independently to specifically address my research questions and for sake of thoroughness.

As discussed in detail later, there are explanatory variables that are linearly correlated with one another (see Table 1). Therefore, I developed the "Community Stressors" composite variable, which combined the following explanatory variables:

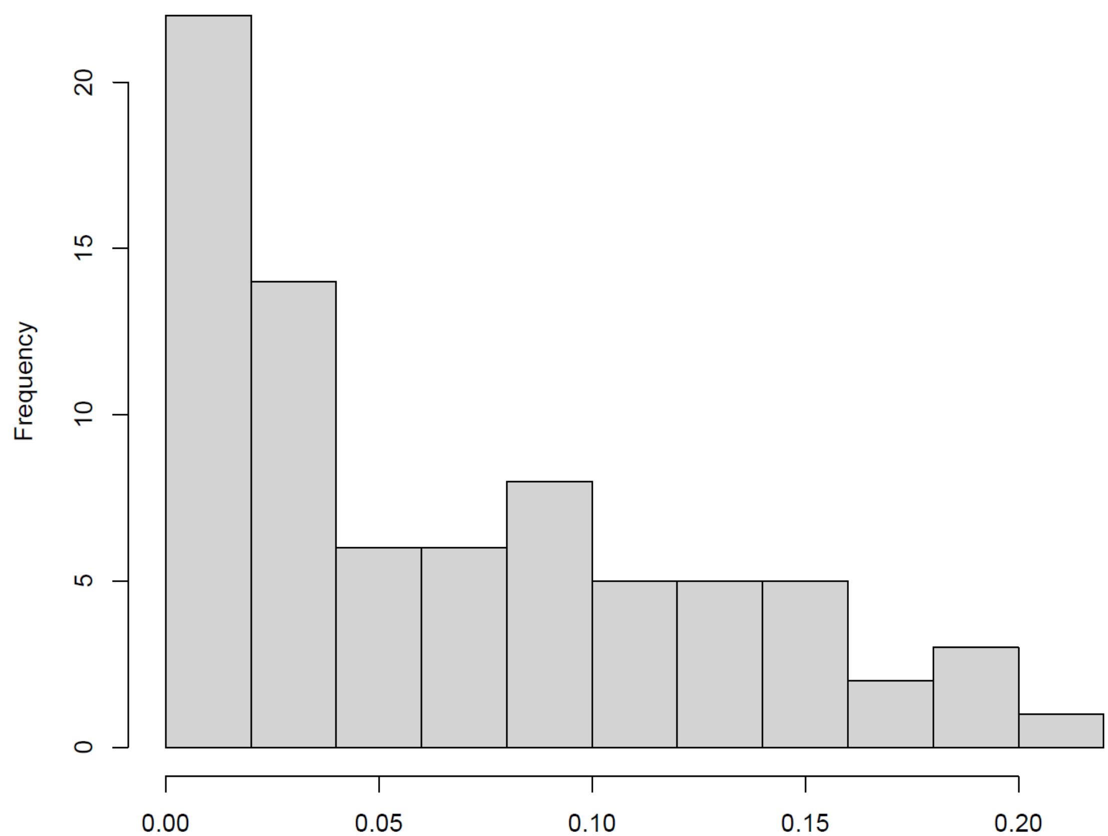
- percent of low-income students
- calculated rate of violent criminal incidents per capita
- percent unemployed
- percent of the population without an associate degree or higher
- percent of vacant land within a given community area

To better understand which community areas are impacted with the highest amount of poverty, the percentage of low-income students by community area was included in the composite variable as well as independently analyzed. The second metric included in the "Community Stressors" composite variable was the number of criminal incidents within each community area. This variable is based upon a historical, multi-year average number of violent criminal incidents, per capita. This inherently accounts for ebbs and flows in violent crime over time. The third variable included in the composite variable was the number of people per capita not in the labor force as of 2019. Measuring employment or lack thereof is another way of testing whether economics plays into school choice. The fourth variable included was the education level of the adult population within each community area. This measured the effect parents' educational attainment, coupled with the metrics included above, may have on school selection. This variable is defined as the population, per capita, aged 25+ that have less than an associate degree, bachelor's degree or other professional degree as of 2019. The final indicator included in the "Community Stressors" composite variable was the percentage of vacant land as of 2019. This may be a clue into the idea that certain neighborhoods are underdeveloped or overlooked by commercial investors. The impact this has on school selection may be less obvious, but given its measured correlation to the variables above, it was worth considering.

Frequency Distributions

Before comparing the explanatory variables to the response variable, each variable was plotted in a frequency distribution (histograms) to visualize the way each was organized and to check for normality. The frequency distribution of the response variable, in this case represented as a proportion, is below in Figure 2. First, it is apparent that this is a non-normal distribution where there are roughly an equal number of communities to the left and right of the mean. The distribution is positive or right skewed, meaning the tail is to the right and the mass of the distribution is to the left. The graph reflects that over 20 community areas had very few, less than 2.5% of K-8 students leaving the community for non-Level 1+/1 schools. In fact, 40 of 77 communities had less than 5% of their K-8 students enroll in non-Level 1+/1 schools outside their community area. The other side of the distribution showed that there were 21 communities that had over 10% of their all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area. Those 21 communities accounted for 27% of all community areas, which is a substantial number of regions and students within those regions.

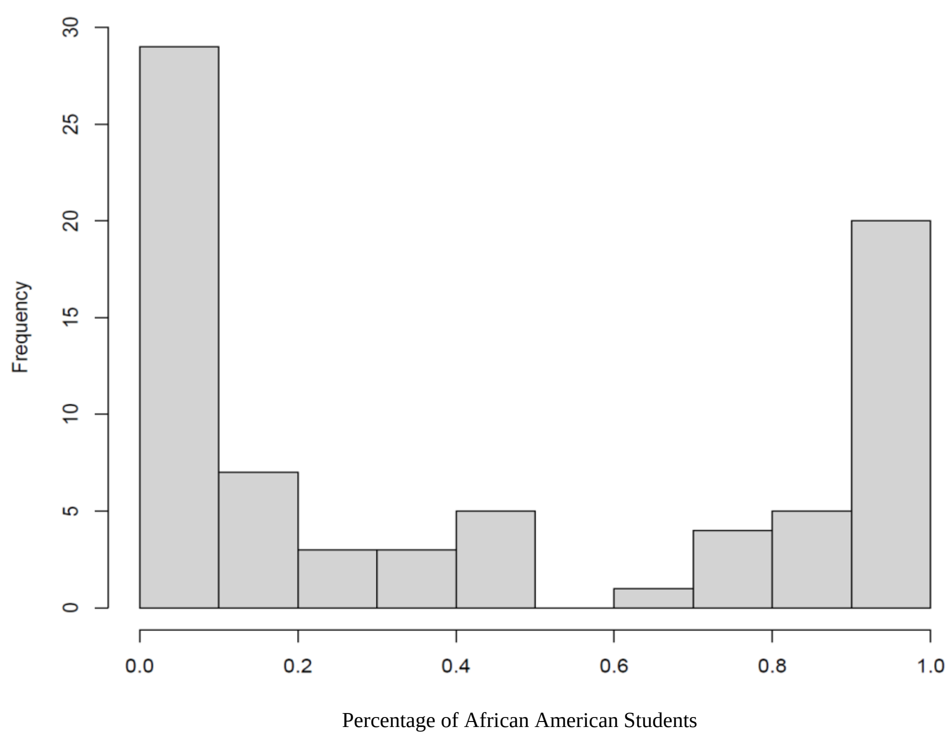
Figure 2. Frequency Distribution of Proportion of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area



Proportion of all K-8 students in each community area that enroll in non-Level 1+/1 schools outside their community area

On the other hand, the frequency distribution of the Percentage of Black or African American students, was bimodal, with very few communities in the middle. This reflects the reality of Chicago's extreme geographic racial segregation (Coes et al., 2020). There were 29 community areas that had less than 10% Black or African American students in their community and another 20 community areas that had greater than 90% Black or African American students in their community. These extremes accounted for 49 of 77 communities (64%). There were only five community areas where the percentage of Black or African American students was between 40% and 60%. (See Appendix E for frequency distributions of all explanatory variables.)

Figure 3. Frequency Distribution of Percentage of African American Students by Community Area



Correlations of Explanatory Variables

Next, I conducted correlation tests among the explanatory variables to make the case for using a composite variable. A correlation coefficient ranges from -1 (perfect negative correlation) to 1 (perfect positive correlation). A zero-correlation coefficient means there is no relationship between the variables. These tests do not prove causality. In other words, they can tell us there is a relationship, but they cannot tell us whether a variable directly causes the measured changes in the other variable. Table 2 represents the correlation coefficient and probability value (*p*-value) of each explanatory variable compared to the other explanatory variables which were incorporated into the "Community Stressors" composite variable.

Table 2. "Community Stressors" Variables Correlation Test Results

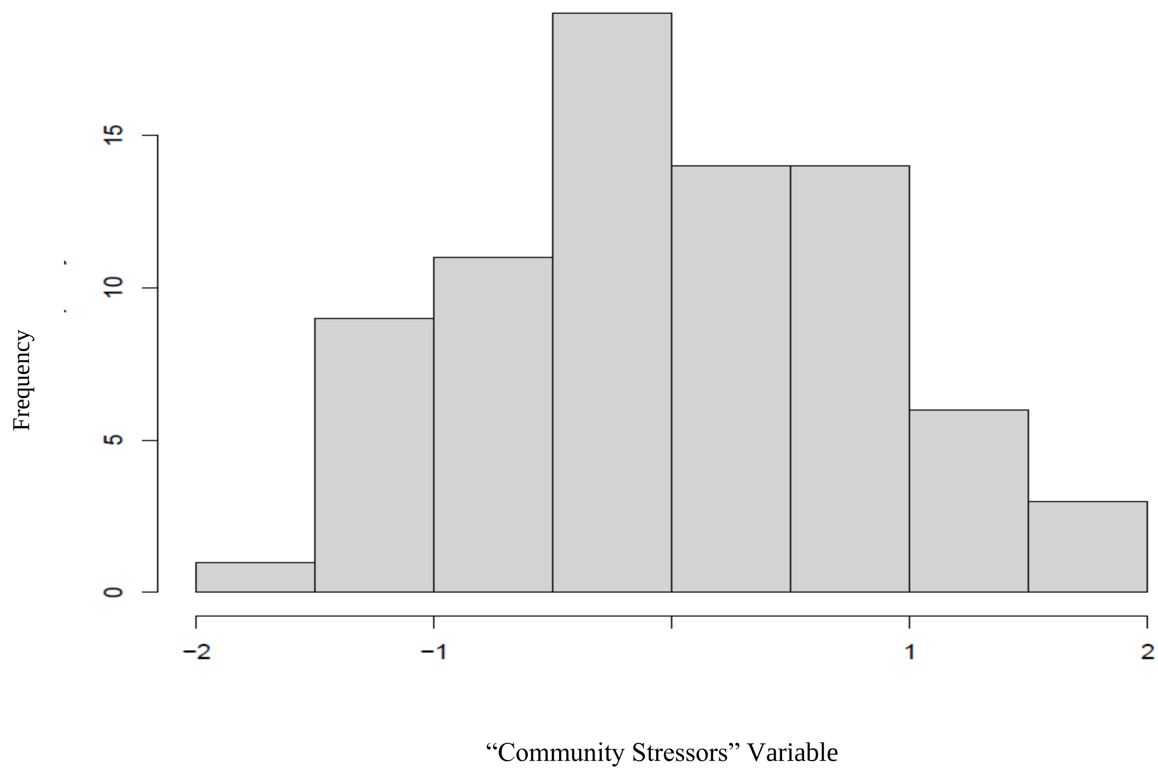
Variable	Correlation Coefficient	Probability Value
Percent Unemployed Compared to Avg Violent Criminal Incidents Per 1,000	.76	$p<.001$
Percent Low-Income Students Compared to Pop. 25+ w/o Associate Degree or Higher	.74	$p<.001$
Percent Vacant Land Compared to Avg Violent Criminal Incidents Per 1,000	.73	$p<.001$
Percent Low-Income Students Compared to Percent Unemployed	.66	$p<.001$
Percent Unemployed Compared to Percent Vacant Land	.64	$p<.001$
Percent Unemployed Compared to Pop. 25+ w/o Associate Degree or Higher	.62	$p<.001$
Percent Low-Income Students Compared to Average Violent Criminal Incidents Per 1,000	.56	$p<.001$
Percent Low-Income Students Compared to Percent Vacant Land	.45	$p<.001$
Avg Violent Criminal Incidents per 1,000 compared to Population 25+ without Associate or Higher	.44	$p<.001$
Percent Vacant Land compared to Pop. 25+ without Associate Degree or Higher	.39	$p<.001$

The "Community Stressors" Variable

As noted above, I chose to create a composite variable because the included variables are highly correlated to one another. For example, the percentage of low-income students in a community is highly correlated to the percentage of unemployment in that same community area with a correlation value of .66 (see Table 2).

Although, before simply combining these variables into one, each was reviewed to determine if standardization was required. In fact, the average number of violent criminal incidents per 1,000 is not a percentage like the rest of the variables comprising the "Community Stressors" variable. Given this variable is on a separate scale, standardizing the variables before combining them was necessary. By standardizing these values, I created a composite variable with a normal distribution. To illustrate this point, see Figure 4 below. In this case, the technique was appropriate for constructing composite variables that were linear combinations of the original variables.

Figure 4. Frequency Distribution of the "Community Stressors" Variable



Logistic Regression

In the following analyses, I used logistic regression to estimate the probability that a student enrolled in a non-Level 1+/1 school outside of their community area when controlling for specified variables. Logistic regression allowed for response variables that had error distributions that are not normally distributed. This was important for purposes of this analysis because many of the variables in my analyses were non-normal as evidenced by their frequency distributions.

The logistic regression was a special case of the binomial model. As noted above in the discussion about sample size, the response variable was converted essentially to two choices:

"yes" or "no," or more precisely, "1" or "0." Logistic regression enabled me to forecast the probability of achieving a "yes" or "1" when comparing to the explanatory variable or variables.

Although multivariable regression models were tested, I did not rely on them due to multicollinearity issues which presented unreliable results. In the case of the "Community Stressors" composite variable, even though the composite was formed from multiple variables, the analysis remained a simple logistic regression model. This allowed me to compare multiple variables at once to the response variable and avoid any issues related to multicollinearity. As noted, in all other models, simple logistic regression models were used comparing each predictor variable individually to the response variable.

Model Output

Each logistic regression model included the output data that analyzed the "goodness of fit," or predictiveness, of the model. Goodness of fit is a measure of the extent to which observed data matches the expected or predicted values. Two snapshots of the number of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area (SY18-19) compared to the "Community Stressors" variable can be found in Figure 6 below. In Table 3, the intercept is the log-odds (i.e., the logarithm of the odds ratio) of a K-8 student enrolling in a non-Level 1+/1 school outside their community area when the predictor is 0. In the case that the intercept is zero, the probability of a student enrolling in a non-Level 1+/1 school outside their community area would be 50%. The estimate coefficients indicate the effects of the predictors and were used to calculate the predicted values (which in logistic regression is used to calculate the probability of the outcome returning a 0 or a 1). Standard error was an indicator of precision. If the standard error was large, then the coefficient point estimate was imprecise.

Generally, the larger the standard error the higher the probability value (*p*-value). The *z*-value measured the ratio between the coefficient and its standard error, which was used to determine the statistical significance of the model. The probability value of the test of whether or not the model was statistically significant (traditionally less than .05 represents statistical significance).

The *N* value reflected the number of observations (sample size). Null deviance showed how well the response variable was predicted by a model that included only the intercept. Fisher scoring iterations were how the model checked to see if the fit would be improved by using different estimates. The model tried different estimates and then fit the model again. The algorithm stopped when it did not perceive that adjusting the estimates would yield additional improvement. This value represented how many iterations were run before the process stopped and outputted the results. Deviance residuals were a distribution of residuals for individual cases used in the model. The model plots summarized in Figure 6 dive deeper into residuals and deviance.

Table 3. Proportion of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area Compared to the Composite Variable

	Estimates	Std. Error	*Z*	*p*-value
Intercept	-2.856	0.010	-293.60	<.001
EV1	0.788	0.012	66.32	<.001
N = 77 Null deviance: 10548.3 on 76 degrees of freedom Residual deviance: 5977.3 on 75 degrees of freedom AIC: 6467.7 Number of Fisher Scoring iterations: 5				

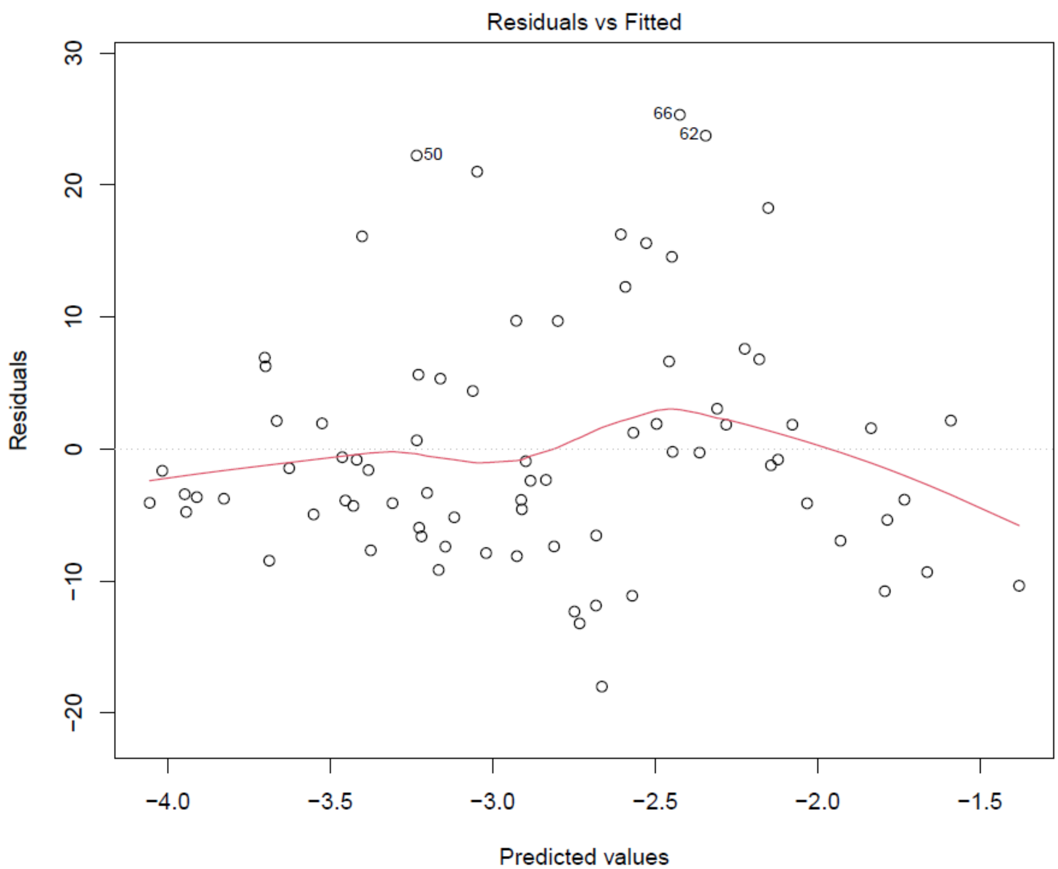
Model Plots

In addition to the data output, there were four key data plots analyzed for each model. Each of the four plots illustrated the "goodness of fit" or how predictive the models were by plotting the residuals, linearity, testing for normalcy, highlighting outliers in the data, etc.

Model Plot #1: Residuals vs. Fitted

Residual vs. Fitted plots are scatter plots that compare the residuals and predicted values. In most cases, this chart should look randomly distributed around the dotted line. The outliers are highlighted while the remaining points are grouped toward the zero residual dotted line. These plots are helpful but not determinative of the goodness of fit of the model by themselves. Figure 5 shows the Residuals vs. Fitted plot for the example of all K-8 Students in each community area that enrolled in non-Level 1+/1 schools outside of their community area compared to the "Community Stressors" variable.

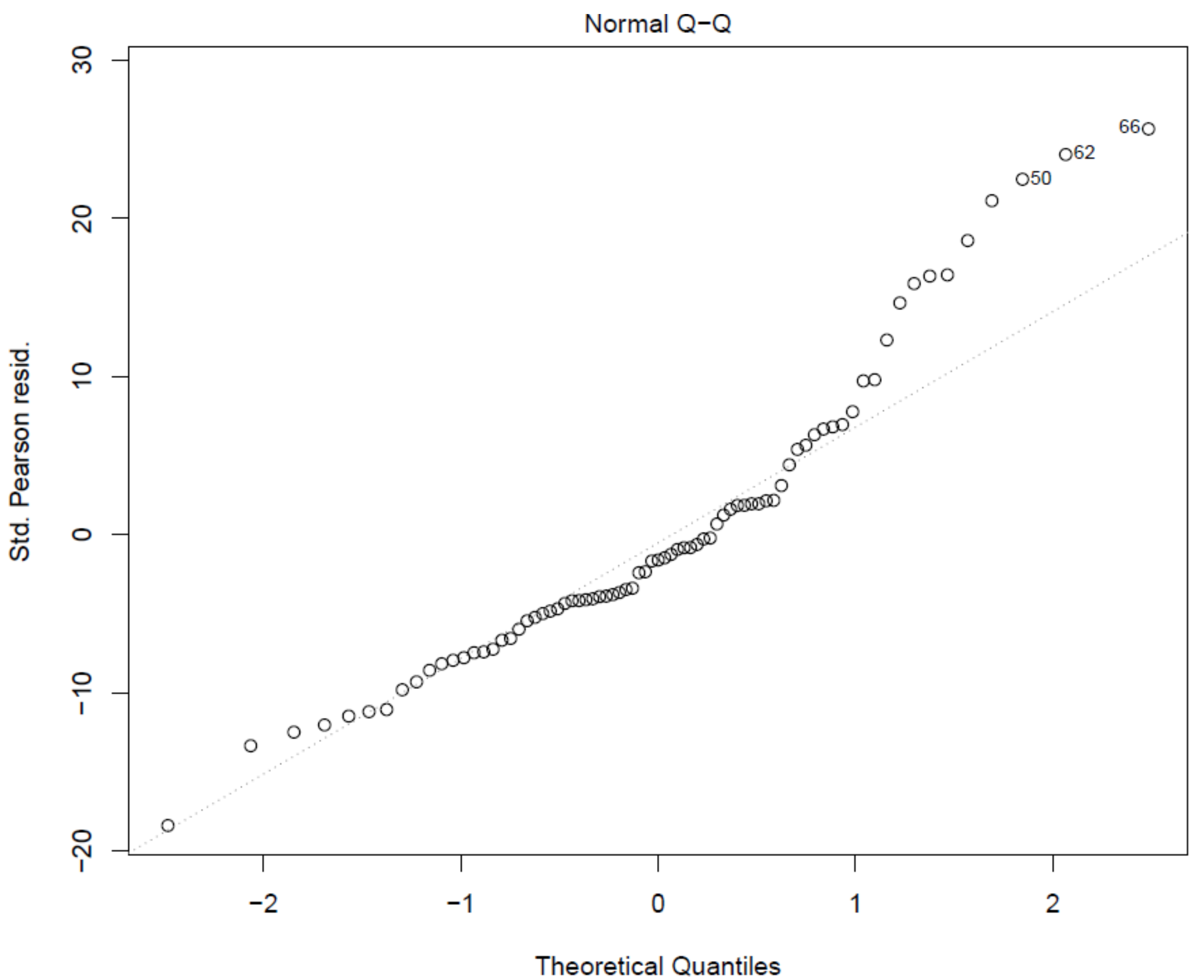
Figure 5. Plot of the Residuals Versus the Predicted Values from the Logistic Regression Model that Compared the Proportion of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area to the “Community Stressors” Variable



Model Plot #2: Normal Q-Q

The Normal Q-Q plot tested for normalcy of the distribution. The Normal Q-Q plots every observed value against a standard normal distribution with the same number of points. The observed and expected normal values should adhere closely to the diagonal line. It is usual to have departures from the diagonal in the extremes other than in the center, even under normality, although these departures are more evident if the data are non-normal. As shown in the histograms, the distributions of the variables were often non-normal. This is expected in most of the models given that the response variable and many of the explanatory variables were non-normal as shown in the frequency distributions (histograms). Below in Figure 6 is the Normal Q-Q plot for the number of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area compared to the "Community Stressors" variable.

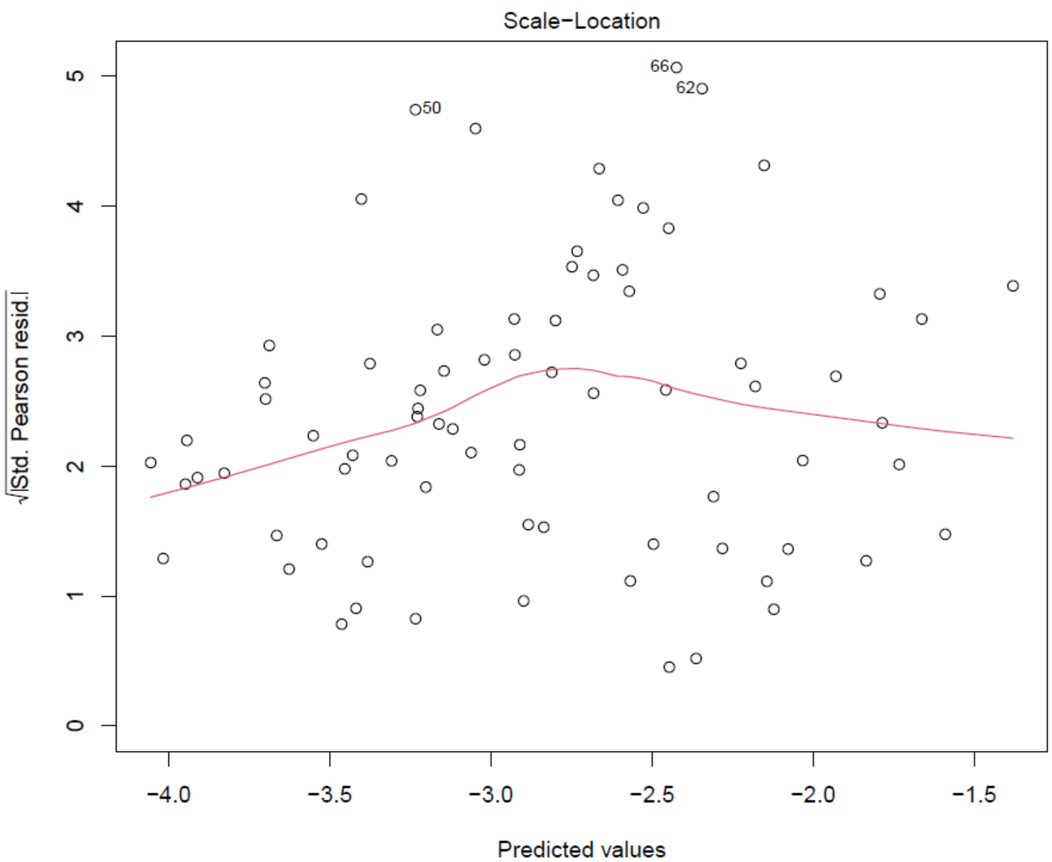
Figure 6. Normal Q-Q Plot from Generalized Linear Model that Compares the Proportion of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area to the "Community Stressors" Variable



Model Plot #3: Scale-Location

The Scale-Location plot, much like the Residual vs. Fitted plot, should generally be randomly distributed. Ideally, the red line will be horizontal. This means the average magnitude of the standardized residuals is not changing much as a function of the fitted values. Second, the spread around the red line ideally will not vary with the fitted values. Then the variability of magnitudes does not vary much as a function of the fitted values. Below in Figure 7 is the Scale-Location plot for all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area compared to the "Community Stressors" variable.

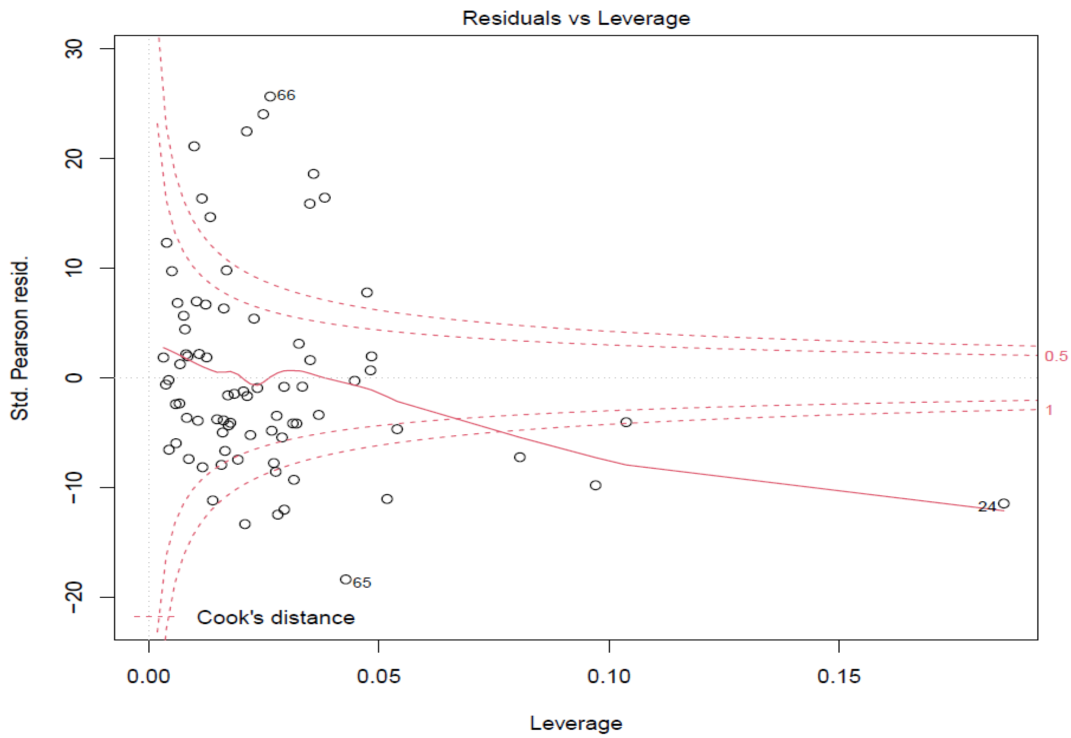
Figure 7. Scale-Location Plot from Generalized Linear Model that Compares the Proportion of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area to the "Community Stressors" Variable



Model Plot #4: Residuals vs. Leverage (Cook's Distance)

The fourth and final model plot illustrated which points had the greatest influence on the regression (leverage points). First, this plot can be used to detect heteroskedasticity and non-linearity. The spread of standardized residuals should not change as a function of leverage. Second, points with high leverage may be influential and therefore removing them could change the model by a large degree. Cook's distance, represented by the dotted red line, measured the effect of deleting a point on the combined parameter. The points outside the dotted line had high influence. Below in Figure 8 is the Scale-Location plot for the number of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area compared to the "Community Stressors" variable.

Figure 8. Residuals Versus Leverage (Cook's Distance) Plot from Generalized Linear Model that Compares the Proportion of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area to the “Community Stressors” Variable



Limitations of the Study Design and Data Collection

Because I worked with community area data and not student-level data, I did not know which students applied to schools with admissions criteria that were rejected. Presumably, some students may have enrolled in their neighborhood school or some other non-selective school outside their community area as their second or third choice. Suppose a pattern existed among students not enrolling at their neighborhood Level 1+/1 school and instead enrolling at selective enrollment schools outside their community area. It makes sense that any measured relationship would be stronger than what is represented in the statistical model. This is because some students would have applied but were not admitted to those selective enrollment schools. Conversely, if no measured relationship existed, the results would be less meaningful because of this unknown factor. Finally, there could also be unknown factors that affected my models' results. Another limitation of the data was that I did not account for students who left their neighborhood to attend a Level 1+/1 school which could be revealing.

Another limitation referenced above was the use of community data, specifically the use of the same geographic community boundary for all variables. This limitation did not allow me to consider variables that changed within each community area. For example, this study did not help me understand if low-income households send their kids to lower rated schools as compared to other households in the same community area. Alternatively, perhaps violent crime was much higher in a particular subsection of a community area, or even a particular block, this data did not allow me to flesh out these differences.

Another key limitation of this study was sample size. There are 77 community areas across the Chicago area, which in statistical modeling terms, is not necessarily a large enough sample size to have meaningful results. Because of the small sample size, each student within every community area was designated as either "enrolled" or "not enrolled" based upon whether they chose to enroll in a non-Level 1+/1 elementary school outside their own community area. Using this approach, the response variable was converted to a categorical binary variable with two distinct outcomes. As a result, the statistical model used was a logistic regression model instead of a linear regression model. The latter works exclusively with continuous outcome variables (e.g., height or weight), while logistic regression requires the response variable to be dichotomous. Logistic regression may also be more appropriate for non-normally distributed data.

Finally, as noted above, although multivariable regression models were tested, I did not rely on them due to multicollinearity issues which presented unreliable results. In the case of the "Community Stressors" composite variable, even though multiple predictor variables were included, it remains a simple logistic regression model.

CHAPTER FOUR

RESULTS

The results were broken out by each of my three research questions:

(1) Are students in low-income regions more likely to enroll in a non-Level 1+/1 school outside of their community area (SY18-19) than students in high-income regions?

(2) What other neighborhood factors contribute to K-8 students enrolling in non-Level 1+1 schools outside their community area?

(3) Does access to a specific type of elementary school (e.g., charter, magnet, neighborhood or selective enrollment) plays a role with respect to whether or not students enroll in a non-Level 1+/1 school outside of their community?

For my first research question, I found that community areas that represent a larger percentage of low-income K-8 students were more likely to leave their community area to enroll in non-Level 1+/1 schools. For my second research question, I found that there are several neighborhood factors that affected the probability of whether or not K-8 students enroll in non-Level 1+/1 schools outside their community area (SY18-19) including variables relating to crime or race. Finally, for my final research question, I found that access to a specific type of elementary school did not change the relationships found when conducting the analysis without consideration of school type.

Low-Income Students

For my first research question, I asked whether students in low-income regions (EV1.01) were more likely to enroll in non-Level 1+/1 schools outside their community area (SY18-19) than students in high-income regions. To test this hypothesis, I assessed whether the percentage of low-income K-8 students increased or decreased the likelihood that the number K-8 students in each community area would enroll in non-Level 1+/1 schools outside their community area (SY18-19).

The histogram of EV1.01 found in the appendix showed that most communities' schools served at least 60% low-income students. As shown in Table 4, there was a positive association between the two variables ($\beta = 3.570$, $p < .001$). This can be interpreted to state that as the percentage of low-income K-8 students in each community area increased, so too did the probability the number of K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area (SY18-19).

Table 4. Summary of the Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to Percentage of Low-Income Students

	Estimates	Std. Error	*Z*	*p*-value
Intercept	-5.592	0.070	-79.83	<.001
EV1.01	3.570	0.0826	43.24	<.001
N = 77 Null deviance: 10548.3 on 76 degrees of freedom Residual deviance: 7937.7 on 75 degrees of freedom AIC: 8428.1 Number of Fisher Scoring iterations: 5				

This phenomenon might be more easily explained if there weren't enough high performing seats in some community areas; however, in most communities with high numbers of low-income students, there were open Level 1+/1 seats during the 2018-2019 school year (Annual Regional Analysis, 2019). For example, in Albany Park, a neighborhood in Chicago's Northwest side, 80.9% of the students were low-income. While 1,357 elementary students left the region to attend school in the 2018-2019 school year, there were over 1,300 available Level 1+/1 open seats in neighborhood schools (Annual Regional Analysis, 2019). In the West Side region, which incorporates 19 neighborhoods including North Lawndale, Austin and West Garfield Park, there were 5,673 unfilled Level 1+/1 elementary seats (Annual Regional Analysis, 2019). Most of these seats had no admissions criteria and were "open" to students in the region. In other words, if a student in the North Lawndale community wanted to enroll in a Level 1+/1 seat in their region, there were several schools (e.g., Sumner) that met this criterion.

There were very few communities that generally had less than 40% low-income students. But the few that did, had the smallest proportion of students leaving the community area for non-Level 1+/1 schools. For example, in a region like the Northwest Side, 85% of K-8 students attended schools in their region with the vast majority (85.5%) attending a Level 1+/1 school in the region (Annual Regional Analysis, 2019). This finding was supported by the research reviewed above. One qualitative study affirmed the idea that families from differing socioeconomic statuses did not consider schools of similar academic quality because they valued different factors based on the individual needs of the family (Bell, 2007). While parents in low-income communities may equally value academics, they also may have "higher decision-making costs" when selecting a school (Duflo et al., 2006). While this research highlighted reasons that low-income parents may not participate in school choice, it did not explain why families of low socio-economic status might deselect their neighborhood school to enroll in a low-performing school outside of their community. Researchers have found, that, in many cases, parents will opt for lower performing schools nearby rather than traveling a farther distance to access a higher performing school. In New Orleans, one study that explored reforms post Hurricane Katrina found that three-quarters of a mile in distance was equal to a letter grade for parents choosing schools. In other words, parents would select a lower performing more proximal school rather than traveling out of their neighborhood for a higher performing school. After the 2013 Chicago school closures, researchers found that proximity to home was the deciding factor the majority of enrollment decisions. While one-third of students did not enroll in a district designated welcoming school, parents felt compelled to choose a school in their neighborhood (De la Torre et al., 2015). The interview with parents revealed that finding a school close to home was about practical circumstances such as having access to a car as well as safety concerns. They also found that academic quality meant something different than a schools' performance policy rating. Specifically, academic quality had more to do "unofficial" indicators like after school programming. These unofficial indicators may be contributing to a parent's choice to deselect their neighborhood school to enroll in non-Level 1+/1 school outside their region.

Neighborhood Factors

For my second research question, whether neighborhood factors related to crime, economics, race and class, grocery store access, or parks access contributed to parents deselecting their school and instead matriculating to a lower level school outside of their own neighborhood, I analyzed the relationships between each individual explanatory variable to the proportion of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area by running a series of simple logistic regression models. Based on the logistic regression models which compared the response variable to each explanatory variable, I found more than one neighborhood factor influenced the likelihood of whether students enrolled in a non-Level 1+/1 school outside their community area.

Model 1: Proportion of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area Compared to the "Community Stressors" Variable

In Model 1, I assessed the likelihood that students would enroll in a non-Level 1+/1 school outside of their community area (e.g., school choice) when in consideration of the "Community Stressors" composite variable. This model revealed that the "Community Stressors" composite variable had a positive relationship when compared to the proportion of students choosing a non-Level 1+/1 school outside of their community area ($\beta = .788$, $p < .001$; see Table 3). This showed that as the community stressors increase, so does the probability that students will choose a non-Level 1+/1 school outside of their community area.

The Model Plot Group 1 - Normal Q-Q plot showed every observed value against a standard normal distribution with the same number of points. The observed and expected normal values adhered closely to the diagonal line. It was usual to have departures from the diagonal in the extremes other than in the center, especially when the variables were non-normal. We know from Figure 2 that the proportion of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area (SY18-19) was non-normal, so even though the composite variable had been standardized, the model was still affected. Specifically, when I plotted the proportion all K-8 students in each community area that enrolled in non-Level

1+/1 schools outside their community area (SY18-19), most community areas had a very low proportion of students leaving the community area for non-Level 1+/1 schools.

The Normal Q-Q model aligned closely to the diagonal throughout the middle of the plot (-1 to +1 quantiles) but then strayed off that line at the left, right, or at both ends of the plot. The outliers in this case were community areas 11 (Jefferson Park), 17 (Dunning), 22 (Logan Square), 26 (West Garfield Park), 38 (Grand Boulevard) and 48 (Calumet Heights). These happened to be the most common outliers in the other models as well and many were racially isolated neighborhoods.

The Residuals vs. Fitted plot was scattered randomly, and closely, around the residual line, which suggested a good fitting predictive model. This suggested this model ws useful for predicting where students would enroll, specifically as defined by the response variable, assuming we have information related to the Community Stressors in the community. The outliers identified were many of the same identified in the Normal Q-Q plot including community areas 11 (Jefferson Park), 17 (Dunning), and 38 (Grand Boulevard).

Taken in consideration with one another, both the Normal Q-Q and Residual vs. Fitted plots helped establish that the model is “good fitting” yet also established there are outlier communities.

Model 2: Proportion of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area Compared to the Percentage of African American or Black Students

Model 2 assessed the relationship between the number of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area (SY18-19) and the percentage of African American or Black students that were enrolled in schools within each community area. As percentage of African American students increased, so did the proportion of all K-8 students enrolled in non-Level 1+/1 schools outside of their community area (β = 1.69, p <.001; see Model 2 output in Appendix C). Interestingly, the plotted values were generally grouped in the 0% to 20% and 80% to 99% ranges which highlighted the fact that Chicago's communities are extremely segregated. Most communities were either mostly African American or had very few African Americans. There were hardly any areas where African Americans were evenly represented with other races. Despite the consolidation of values at the extremes, the model showed statistical significance, suggesting that students in predominately African American or Black communities were more likely to enroll in a non-Level 1+/1 school outside of their community area.

One might think that this was due to the lack of available Level 1+/1 seats; however, during the 2018-2019 school year, there were over 56,000 open Level 1+/1 elementary seats in Chicago. These empty seats were concentrated in regions with a high percentage of African American students. For example, the racial/ethnic composition of the West side student population was predominantly African American (75% in the 2018-2019 school year).

In the 2018-2019 school year, there were 12,609 unfilled Level 1+/1 elementary seats in the region. None of those schools had admissions criteria (Annual Regional Analysis, 2019). In nearly every region with over 50% or more African American students, there were enough Level 1+/1 seats to serve every student who left the region to attend a non-Level 1+/1. Specifically, 30 of the 77 community areas were 50% or more African American students and of those 30 regions, three did not have any available Level 1+/1 seats. The remaining 28 had enough open Level 1+/1 to serve all the students that left the region for a non-Level 1+/1 school. In other words, there were African American students leaving their region to attend a Level 1+/1 school when there were available Level 1+/1 schools in their own community.

Model 3: Proportion of all K-8 students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area Compared to the Percentage of Hispanic or Latino Students

Model 3 examined similar questions as Model 2 but established the relationship between the response variable and the percent of Hispanic or Latino students enrolled at schools within each community area. Unlike Model 2, the probability that students enrolled in non-Level 1+/1 schools outside their community area decreased (β = -1.49, $p < .001$). However, the model's "goodness of fit" test was not as strong and it may not be as predictive as Models 1 or 2. Interestingly, the Annual Regional Analysis showed that in communities like Pilsen, Little Village and Brighton Park, which were mostly Hispanic or Latino, a high proportion of students attended their zoned elementary school (Annual Regional Analysis, 2019). For example, in the Pilsen/Little Village region, only 10% of elementary students left the region to attend school (Annual Regional Analysis, 2019).

The results from Models 2 and 3 indicated that community racial composition remained an important factor in predicting whether students enrolled in a non-Level 1+/1 school outside of their community area. Comparing the two models, African American or Black students were more likely to leave their community to attend a non-Level 1+/1 school than Hispanic or Latino students.

Model 4: Proportion of all K-8 students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area Compared to Percentage of White Students

The number of K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area and the number of White students also had a negative relationship (β = -6.56, $p < .001$). Community areas with at least 20% White students showed a notable decrease in the number K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area. This model demonstrated that White students in the city were more likely to remain in their neighborhood for school. An illustration of this phenomenon was in the Far Northwest Side of the City in which the racial composition of the K-8 population was approximately 24% White compared to 10.9% of the general CPS student population (Annual Regional Analysis, 2019). In one specific neighborhood of that region, Norwood Park, 52.5% of their K-8 students were White. During the 2018-2019 school year, less than 1% of Norwood Park's K-8 students left the region for a non-Level 1+/1 school. While the neighborhood had the same rated schools as other neighborhoods, it appeared that race contributed to students remaining in their region to attend their neighborhood school.

In summary, Models 2 through 4, which related to student racial demographics, indicated that community areas with high Hispanic or White student enrollment had fewer students that enrolled in non-Level 1+/1 schools outside their community area. Alternatively, communities with high enrollment in non-Level 1+/1 schools outside the community area tended to have lower Hispanic or White students in that community. These models showed that if a community area's student body was either predominately Hispanic or Latino or predominately White, then the probability that students enrolled in non-Level 1+/1 schools outside their community area decreased while the opposite was true when the community area was predominately Black or African American.

Model 5: Proportion of all K-8 students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area Compared to Health Services Locations per Square Mile

Model 5 examined the relationship between the number of all K-8 students that enrolled in non-Level 1+/1 schools outside their community area and the number of health services locations per square mile (2019). The relationship between the two variables was slightly negative, and in fact, almost zero ($\beta = -0.008$, $p < .001$). This indicated that having a higher density of health services per square mile did not strongly affect the proportion of K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area.

Given that 56 of the 77 community areas had fewer than ten health services locations, the variation between neighborhoods was likely not large enough to allow for any meaningful effect on the number of all K-8 students enrolling in a non-Level 1+/1 school outside their community area.

Model 6: Proportion of all K-8 students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area Compared to Grocery Stores per Square Mile

Model 6 examined the relationship between the number of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area compared to the number of grocery stores per square mile. This model reflected a slight negative association (β = -0.084, $p < .001$). In other words, grocery store access had little to no direct impact on the number of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area ($p < .001$).

Like Model 5, there was little variability between communities when it came to the number of grocery store locations per square mile. Perhaps with further refinement of this metric, additional analysis could show that access to grocery stores, or lack thereof, had a more noticeable effect with respect to school choice. As it currently stands, Model 6 reflected only a slight negative relationship between the number of all K-8 students in each community area that enrolled in non-Level 1+/1 schools outside their community area (SY18-19) and grocery stores per square mile.

Model 7: Proportion of all K-8 students in Each Community Area that Enroll in non-Level 1+/1 Schools Outside their Community Area Compared to Park Acreage per 1,000 Residents

As of 2019, 66 of 77 communities had five or fewer acres of parks per 1,000 residents. Like health service locations per square mile and grocery stores per square mile above, there were a large grouping of communities with similar characteristics when it came to park accessibility, leaving little measurable variability. Model 7 reflected a slight relationship between park access and school choice ($\beta = 0.041$, $p < .001$). Of course, park accessibility, health care access and food availability were still worth consideration in conjunction with the other variables analyzed in the Community Stressors variable.

Understanding Other Combinations of the Data

In addition to the seven regression models outlined above, I presented three additional models. Model 1.01 was similar to Model 1, but instead of creating a composite variable first, this model combined each of the "Community Stressors" metrics into a multivariable regression model. The purpose was to compare Model 1.01 to Model 1 to determine if there were any major changes in the output between the model variations. The results were similar to Model 01 although there were multicollinearity issues in this multivariable model. As noted in the limitations section, multicollinearity was cause for an unreliable model.

Model 1.02 compared only the percentage of low-income students (SY18-19) to the number of all K-8 students in each community area that enrolled in non-Level 1+/1 outside their community area ($\beta = 3.570$, $p < .001$). The purpose of this model was to specifically analyze the role income level played as outlined in my first research question. This model showed that as the percentage of low-income students in a community area increased the greater the likelihood that the number of K-8 students in each community area that enrolled in non-Level 1+/1 outside their community area increased as well.

Finally, Model 1.03 compared the average number of violent criminal incidents per 1,000 residents (2015-2019) to the number of all K-8 students in each community area that enrolled in non-Level 1+/1 outside their community area. As with Model 1.02, I chose to test this variable by itself because I hypothesized that violent crime had a direct impact with respect to the probability that K-8 students enrolled in a non-Level 1+/1 school outside their community area. Indeed, the results reflected that there was a positive relationship ($\beta = 0.019$, $p < .001$).

Understanding Outliers

Generally, the same outliers, by their very definition, were the culprits of this deviation from the norm. Community areas 32 (Loop), 33 (Near South Side), 51 (South Deering) and 62 (West Elsdon) were the most common outliers. The biggest shared feature between these communities was that each had three or fewer zoned elementary schools (the Loop had none). Community area 32 (Loop) was a business centers mixed with very little residential space or schools. Community area 51 (South Deering) covered a large footprint relative to its population (10.9 square miles) but had just three elementary schools zoned in this area. There was a very small K-8 population across South Deering relative to its geographic footprint. For those K-8 students who chose not to attend their zoned school in South Deering, the vast majority attended one of the other two zoned schools in the community area. For the very small number of students who left the region to attend school, a small proportion attended a non-Level 1+/1 school (Annual Regional Analysis, 2019). Community area 62 (West Elsdon) had just two zoned elementary schools. The only two zoned elementary schools in West Elsdon were Peck and Pasteur elementary schools. Approximately 76% of students residing in that region attended one of those schools and of those who left, none attended a non-Level 1+/1 school (Annual Regional Analysis, 2019).

School Type

For my third research question, whether access to a specific type of elementary school correlated to parents leaving their community to enroll in non-Level 1+/1 schools outside of their community area, I analyzed all schools to find relationships between any of the explanatory variables as described above. After this analysis, I then filtered to include only contract, magnet and selective enrollment elementary schools and ran the analyses again. This allowed me to determine whether the relationships discovered when looking at all schools became more pronounced, less noticeable or remained unchanged. According to the analyses found in Table 5, the results of the analysis controlling for charters, magnet and selective enrollment elementary schools were not different from those found in the models that did not control for school type ($p < .001$ for each model). As noted above, I ran the analysis one final time and filtered for neighborhood schools and other citywide options. According to the analyses found in Table 6, the results of the analysis controlling for neighborhood schools and other citywide options were not different from those found in the models that did not control for school type ($p < .001$ for each model).

Table 5. The Number of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area (SY18-19) (School Type = Charter, Magnet, Selective) Compared Against the "Community Stressors" Composite Variable, Percentage of Black or African American Students, Percentage of Hispanic or Latino Students, Percentage of White Students, Health services Locations per Square Mile, Grocery Stores per Square Mile, Accessible Park Acreage per 1,000 Residents

	Model 1 Alternate	Model 2 Alternate	Model 3 Alternate	Model 4 Alternate	Model 5 Alternate	Model 6 Alternate	Model 7 Alternate
Intercept	-3.60***	-3.54***	-3.41***	-3.79***	-3.42***	-3.38***	-3.39***
EV1 - Composite variable consisting of variables listed below	0.60***						
EV2 - Percentage of Black or African American students		0.69***					
EV3 - Percentage of Hispanic or Latino students			-0.56***				
EV4 - Percentage of White students				-1.03***			
EV5 - Health services locations per square mile					-0.15***		
EV6 - Grocery stores per square mile						-0.19***	
EV7 - Accessible park acreage per 1,000 residents							0.14***
N	77	77	77	77	77	77	77
AIC	3792.33	2434.90	3690.05	3939.89	5669.68	5538.94	5707.36
BIC	3797.02	2439.59	3694.74	3944.58	5674.37	5543.63	5712.04
*** $p < .001$							

Table 6. The Number of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area (SY18-19) (School Type = Neighborhood, Boundary, Citywide, Other) Compared Against the "Community Stressors" Composite Variable, Percentage of Black or African American Students, Percentage of Hispanic or Latino Students, Percentage of White Students, Health Services Locations per Square Mile, Grocery Stores per Square Mile, Accessible Park Acreage per 1,000 Residents

	Model 1 Alternate	Model 2 Alternate	Model 3 Alternate	Model 4 Alternate	Model 5 Alternate	Model 6 Alternate	Model 7 Alternate
Intercept	-3.57***	-3.44***	-3.33***	-3.80***	-3.36***	-3.35***	-3.35***
EV1 - Composite variable consisting of variables listed below	0.64***						
EV2 - Percentage of Black or African American students		0.60***					
EV3 - Percentage of Hispanic or Latino students			-0.41***				
EV4 - Percentage of White students				-1.17***			
EV5 - Health services locations per square mile					-0.10***		
EV6 - Grocery stores per square mile						-0.09***	
EV7 - Accessible park acreage per 1,000 residents							0.09***
N	77	77	77	77	77	77	77
AIC	3929.74	3702.16	5062.69	4097.31	6272.90	6273.88	6303.00
BIC	3934.42	3706.85	5067.38	4102.00	6277.59	6278.57	6307.69
*** $p < 0.001$							

After adjusting the response variable by controlling for school type, the model summaries were largely unaffected. The relationships between the school type-adjusted response variables and the explanatory variables were very similar to that of the original response variable when compared to the same explanatory variables (positive relationships remained positive and negative relationships remained negative). Therefore, I concluded that school type did not have a relationship with how many K-8 students in each community area enrolled in non-Level 1+/1 outside their community area

CHAPTER FIVE

FINDINGS, IMPLICATIONS, AND LIMITATIONS

The data in this study, collected and analyzed from Chicago Public Schools and the City of Chicago, overlaid with the literature reviewed show that combined neighborhood factors such as the number of low-income students in a community, number of unemployed persons in a community, vacant land percentage, average number of violent crime and educational attainment levels are associated with K-8 students enrolling in non-Level 1+/1 schools outside their community area.

For my first research question, I asked whether students in low-income regions were more likely to leave their enroll in a non-Level 1+/1 school outside their community area than students in high-income regions. The percentage of low-income students in a community contributes both as a standalone factor and an impactful factor combined with what I described as the other “Community Stressors” variables above. In other words, communities that have greater numbers of low-income K-8 students have a higher proportion of K-8 students leaving their region for a non-Level 1+/1 school.

For my second research question, I asked whether neighborhood factors related to crime, economics, race and class, contributed to K-8 students in each community area enrolling in non-Level 1+/1 schools outside their community area. The variables with the strongest associations were average number of violent criminal incidents per 1,000 residents (2015-2019) and Percentage of African American students (SY18-19). The models that either directly analyze these variables or include them with other variables suggest a positive association between the number of all K-8 students in each community area that enroll in non-Level 1+/1 schools outside their community area and the average number of violent criminal incidents per 1,000 residents (2015-2019) and the Percentage of African American students (SY18-19), respectively, notwithstanding the fact that there were clear outliers which may influence the predictiveness and accuracy of even the best fitting models.

Finally, for my third research question, I asked whether access to a specific type of elementary school (e.g., charter, magnet, neighborhood or selective enrollment elementary) had a measurably stronger or weaker association to students enrolling in non-Level 1+/1 schools outside their community area than any of the measured relationships found while analyzing the second research question. To answer this question, I ran the analysis with three different response variables. The first analysis included a response variable that consisted of all school types, the second response variable was restricted to charter, selective enrollment, and magnet schools. The third response variable included only neighborhood schools along with a handful of "other" school types. This allowed me to determine whether the relationships discovered in the original models were impacted by school type. The analysis revealed that school type does not change the relationships found in any meaningful way. There is a common perception in major urban cities that charters are responsible for siphoning off students from neighborhood schools. This study suggests that school type is not a contributing factor to K-8 students leaving their community area to attend a non-Level 1+/1 school.

Implications

The information from this research may support school districts aiming to better understand and address school choice. The main implications that are explored in depth below concern (1) the connection of neighborhood factors to school choice, (2) access to a specific type of elementary school (e.g., charter, magnet, neighborhood or selective enrollment) to school choice, (3) the role of parents as choice makers and what type of information districts should consider disseminating, and (4) the implications for neighborhood schools themselves.

The assumption of many of the recommendations below is that districts want families to select high performing schools in regions. School districts like Chicago, Denver and New York City actively highlight school performance at both the district level through reporting, dashboards and through school websites. For example, when you search for any elementary school in Chicago Public Schools, the School Quality Rating is prominently featured. Years ago, when Chicago Public Schools released the Annual Regional Analysis, it stated that the purpose was to "support CPS goal of providing every student with a high-quality education in every neighborhood by giving stakeholders consistent information regarding school quality" (Annual Regional Analysis, 2019). While CPS isn't publicly stating that students should attend Level 1+/1, it's implicit in a lot of the information disseminated by the district.

Neighborhood Factors

Often school improvement is attempted in isolation of other neighborhood factors. The data indicated that cities and school districts may want to consider other neighborhood factors when examining school choice policies. First, as noted in the literature and results section, race played a role in school choice. Specifically, in this study, the percentage of African American and Hispanic or Latino students had a relationship to the number of K-8 students in community areas enrolling in non-Level 1+/1 schools outside their community area.

Cities and school districts may also want to consider both perceived and actual safety when examining choice policies. Based on the data, the probability that students enrolled in non-Level 1+/1 schools outside of their own community area increased as the number of violent criminal incidents per 1,000 residents increased. For example, according to the data, Roseland had one of the highest rates of violent criminal incidents per 1,000 residents. In that community, nearly 20% of K-8 students left the region to attend a non-Level 1+/1 elementary school. It's possible that parents in this scenario were making assumptions about safety based on other neighborhood factors including demographic breakdown. In order to support families in choosing neighborhood schools, districts may want to consider partnering with cities on violence reduction strategies. For example, Chicago Public Schools could potentially partner with other city agencies to expand innovative youth violence prevention programs for students as increasing a community's safety impacts the number of K-8 students leaving the region for another school.

In addition to the factors explored above, it might be worthwhile for districts and cities to look at other neighborhood characteristics when focusing on school improvement. As part of the "Community Stressors" variable, it is clear that some neighborhood factors taken into consideration with others influence the likelihood of students enrolling in a non-Level 1+/1 school outside their community area. Percent unemployed and percent of the population without as associate degree or higher are two areas where schools districts may consider partnering with community institutions and stakeholders to address. For example, a district might work with higher education institutions to create a multi-generational scholarship aimed at addressing communities with the lowest percentage of residents without an associate's degree or higher. To address unemployment, districts might consider partnering with workforce development organizations to offer job training for parents with the goal of improving economic mobility. .

School Type

Since access to a specific type of elementary school (e.g., charter, magnet, neighborhood or selective enrollment) did not show a greater probability of K-8 students enrolling in non-Level 1+/1 schools outside their community area, it may be beneficial for school districts to work to improve neighborhood factors over expanding access to a specific type of elementary school in a choice system. For example, in Chicago Public Schools, if district officials want a higher number of students to enroll in neighborhood Level 1+/1 schools, they may want to consider partnering with the city on violence reduction measures and then sharing that information with parents instead of expanding access to a specific type of program. As an example, Chicago Public Schools put a classical program at a school in the Southwest Side of the city. Because enrollment has been too low, the school has yet been able to offer the program (Kunichoff, 2019). The data suggests that if a district decides to start a new program in a neighborhood school, they should consider disseminating information to parents about other neighborhood factors, including safety.

Role of Parents as Choice Makers

As highlighted in the research, the role of parents as choice makers had been studied exhaustively. There is a widespread assumption that if parents know more about the school itself, they will make certain choices. This assumption is rooted in Rational Choice Theory, which would lead us to anticipate that educational decisions (for example, whether a student attends his or her zoned neighborhood school or a different school) would be made pursuant to a cost-benefit analysis (Gabay-Egozi et al., 2009). With this in mind, situating schools in a market-based environment positions parents as consumers who operate as highly rational actors able to effectively navigate options available and as such, will ultimately choose a high-performing option. However, this study shows that parents may be considering other factors, such as safety, when selecting a school. It may be worthwhile for districts and cities to disseminate information focused on the school's neighborhood factors rather than information about just the academic performance of the school. When disseminating information about schools, districts may consider highlighting safety programs like Safe Passage, a program in Chicago that places paid community members on routes to support children traveling to and from school during arrival and dismissal bell times. Highlighting the school's climate and culture and other information that helps parents feel like the neighborhood school is a safe option could support parents in choice making.

Implications for Neighborhood Schools

This study highlights that despite increased academic performance, neighborhood schools may be losing enrollment due to factors outside their control. As noted in my literature review section, researchers have found that the lifting of desegregation decrees over the last two decades has led to a renewed focus on neighborhood schools (Goldring et al., 2006). This focus has generally been met with public enthusiasm grounded in the belief that neighborhood schools increase community attachment and support (Bingler et al., 2003). However, this study highlights the fact that despite academic improvement of neighborhood schools, parents may leave their neighborhood schools in communities with more African American and Latino students, more low-income students, neighborhoods with safety concerns as well as a combination of other neighborhood factors. If districts want to increase attachment to neighborhood schools, it may be worthwhile for them to do so in combination with other factors that matter to families.

Limitations

One limitation of this study was the inability to identify whether an individual student left their zoned Level 1+/1 school to attend a non-Level 1+/1 school outside of their region. While we do know the number of students leaving their regions to attend a non-Level 1+/1 school, we do not know if they deselected a higher performing school. For example, 493 students in the Auburn Gresham neighborhood (10.3% of their K-8 student population) left the region to attend a non-Level 1+/1 school during the 2018-2019 school year. In the Auburn Gresham region, there are several neighborhood Level 1+/1 schools with available seats. For the 2018-2019 school year, Stagg, an elementary school in the community had 400 available seats. While we do know that there were several elementary schools in that neighborhood with capacity, we don’t know whether the 493 students were zoned to those higher performing schools.

Another limitation of this study was the use of SQRP as the metric. Because SQRP levels can vary from year to year, I am not able to determine whether students attended a non-Level 1+/1 school outside of their region because high performing schools in their region hadn’t been consistently high performing over the years. For example, a school in their region could have recently moved up in the rating system to a Level 1. Parents may have deselected that school because the school was lower performing when they made a school selection for their child or because they’d like to see stability in performance prior to selecting the school.

An additional limitation of this study was that I didn’t look at program type within school type. For example, if a school had a fine and performing arts program, it was unclear whether that was a factor for parents deselecting their zoned neighborhood school to attend a non-Level 1+/1 school.

Another limitation of this study was the inability to understand which region a student left their Level 1+/1 school to attend. While the research examined in my literature review noted that conditions of neighborhoods as well as perception of those conditions impacts school choice, this was difficult to quantify in this study. For example, a student may be leaving one region with higher rates of certain neighborhood factors (e.g., violent crime) for a neighborhood with comparable rates. Understanding the neighborhoods students ultimately end up in would help better explain if it was neighborhood factors or something else driving families to make these decisions.

An additional limitation in this study was sample size. There are 77 community areas across the Chicago area, which in statistical modeling terms, was not necessarily a large enough sample size to have meaningful results. Finally, as noted above, although multivariable regression models were tested, I did not rely on them due to multicollinearity issues which presented unreliable results. In the case of the "Community Stressors" composite variable, even though multiple predictor variables were included, it remained a simple logistic regression model.

Conclusion

School choice to parents in Chicago is not a set of factors based on the school itself. Rather, school choice is a decision based on a myriad of neighborhood factors, often outside of the actual control of the school. Policymakers should consider working to improve these other neighborhood factors to support parents in considering their neighborhood school as an option.

APPENDIX A

RAW DATA

Percentage and Number of Students Leaving their Region for Non-Level 1+/1 School

Community Area	Comm Area #	% Students Left Region for Non-Level 1+/1 School	Number of Students Left Region for Level 1+/1 School
ALBANY PARK	14	1.50%	75
ARCHER HEIGHTS	57	1.69%	31
ARMOUR SQUARE	34	3.74%	44
ASHBURN	70	4.93%	232
AUBURN GRESHAM	71	10.30%	497
AUSTIN	25	8.13%	786
AVALON PARK	45	17.78%	149
AVONDALE	21	5.81%	212
BELMONT CRAGIN	19	4.19%	447
BEVERLY	72	5.53%	64
BRIDGEPORT	60	1.54%	44
BRIGHTON PARK	58	2.27%	138
BURNSIDE	47	14.65%	40
CALUMET HEIGHTS	48	12.64%	135
CHATHAM	44	15.81%	398
CHICAGO LAWN	66	8.52%	626
CLEARING	64	1.31%	33
DOUGLAS	35	7.97%	115
DUNNING	17	1.04%	38
EAST GARFIELD PARK	27	8.94%	219
EAST SIDE	52	1.86%	55
EDGEWATER	77	1.56%	35
EDISON PARK	9	0.23%	2
ENGLEWOOD	68	12.66%	392
FOREST GLEN	12	0.45%	8
FULLER PARK	37	21.75%	62
GAGE PARK	63	2.80%	181
GARFIELD RIDGE	56	1.50%	47
GRAND BOULEVARD	38	9.67%	201
GREATER GRAND CROSSING	69	19.60%	724
HEGEWISCH	55	1.25%	12
HERMOSA	20	8.80%	290
HUMBOLDT PARK	23	12.21%	880

HYDE PARK	41	3.60%	33
IRVING PARK	16	2.39%	106
JEFFERSON PARK	11	0.93%	18
KENWOOD	39	7.01%	80
LAKE VIEW	6	1.02%	29
LINCOLN PARK	7	1.30%	28
LINCOLN SQUARE	4	2.10%	45
LOGAN SQUARE	22	7.23%	365
LOOP	32	2.55%	12
LOWER WEST SIDE	31	3.65%	117
MCKINLEY PARK	59	4.11%	57
MONTCLARE	18	6.93%	95
MORGAN PARK	75	15.02%	261
MOUNT GREENWOOD	74	0.76%	12
NEAR NORTH SIDE	8	4.67%	85
NEAR SOUTH SIDE	33	3.87%	40
NEAR WEST SIDE	28	11.31%	361
NEW CITY	61	12.72%	740
NORTH CENTER	5	0.66%	18
NORTH LAWNDALE	29	9.33%	442
NORTH PARK	13	1.25%	17
NORWOOD PARK	10	0.10%	3
OAKLAND	36	7.78%	63
OHARE	76	0.00%	0
PORTAGE PARK	15	3.06%	174
PULLMAN	50	18.00%	124
RIVERDALE	54	8.92%	106
ROGERS PARK	1	2.52%	92
ROSELAND	49	19.43%	767
SOUTH CHICAGO	46	9.70%	289
SOUTH DEERING	51	10.55%	185
SOUTH LAWNDALE	30	1.94%	182
SOUTH SHORE	43	18.13%	870
UPTOWN	3	2.70%	62
WASHINGTON HEIGHTS	73	15.11%	378
WASHINGTON PARK	40	15.12%	246
WEST ELSDON	62	1.36%	31
WEST ENGLEWOOD	67	12.79%	480

WEST GARFIELD PARK	26	6.19%	134
WEST LAWN	65	1.43%	65
WEST PULLMAN	53	10.27%	328
WEST RIDGE	2	3.94%	285
WEST TOWN	24	2.94%	113
WOODLAWN	42	11.58%	273

Table A1. Details of the Data at the Community Level

Community Area	EV1.01: Percent Low-Income Students	EV1.02: Percent Unemployed	EV1.03: Percent Vacant Land	EV1.04: Avg Violent Criminal Incidents Per 1,000 (2015 - 2019)	EV1.05: Pop. 25+ Without Associate Degree or Higher	EV2: Percent Black or African American Students	EV3: Percent Hispanic or Latino Students	EV4: Percent White Students	EV5: Health Services Locations Per Square Mi.	EV6: Grocery Stores per Square Mi.	EV7: Accessible Park Acreage per 1,000
ALBANY PARK	80.9%	4.0%	0.4%	17.49	60.9%	4.6%	69.7%	11.4%	44.8	6.3	1.7
ARCHER HEIGHTS	88.4%	4.6%	2.6%	22.77	84.0%	7.1%	89.4%	1.6%	9.0	2.0	1.5
ARMOUR SQUARE	78.6%	5.7%	2.3%	30.34	73.4%	19.0%	11.2%	3.0%	0.0	4.0	2.2
ASHBURN	84.3%	6.6%	1.3%	20.06	69.6%	44.6%	52.2%	1.8%	1.2	0.6	2.0
AUBURN GRESHAM	88.1%	9.5%	5.1%	69.39	77.6%	97.1%	1.6%	0.2%	4.5	2.9	1.7
AUSTIN	87.1%	6.6%	3.9%	67.92	78.4%	86.2%	10.8%	0.8%	6.3	2.0	0.7
AVALON PARK	89.3%	7.6%	3.1%	52.84	69.9%	96.4%	2.4%	0.3%	11.2	2.4	2.9
AVONDALE	82.4%	3.1%	1.2%	19.99	61.4%	2.6%	89.8%	4.4%	24.2	3.0	0.9
BELMONT CRAGIN	85.7%	4.7%	0.3%	21.94	81.8%	6.1%	89.1%	2.7%	23.0	5.6	0.9
BEVERLY	46.1%	3.2%	0.5%	12.01	37.2%	75.4%	4.7%	17.3%	19.5	0.3	2.0
BRIDGEPORT	73.9%	4.9%	5.7%	15.76	64.1%	10.6%	31.2%	10.2%	19.1	1.0	2.0
BRIGHTON PARK	89.4%	5.1%	3.2%	22.25	85.9%	2.0%	92.5%	1.4%	11.8	3.7	0.9
BURNSIDE	96.0%	11.0%	8.1%	68.77	78.4%	98.6%	1.1%	0.0%	26.2	0.0	1.0
CALUMET HEIGHTS	75.7%	6.0%	6.3%	40.26	64.9%	95.8%	1.6%	0.1%	8.0	1.1	1.5
CHATHAM	79.1%	9.3%	3.9%	80.03	67.2%	94.8%	1.4%	1.2%	6.8	2.0	1.7
CHICAGO LAWN	89.9%	10.7%	2.3%	45.37	85.9%	35.5%	62.1%	1.1%	5.9	3.4	1.5
CLEARING	57.0%	5.2%	1.0%	11.93	73.8%	3.5%	74.4%	19.6%	0.0	0.4	1.9
DOUGLAS	86.7%	7.0%	11.6%	49.69	51.4%	92.0%	5.2%	0.7%	18.8	1.2	8.5
DUNNING	56.9%	2.7%	1.5%	12.74	67.3%	3.8%	54.1%	34.0%	0.0	2.4	1.0
EAST GARFIELD PARK	90.0%	6.8%	13.7%	100.97	78.4%	95.4%	2.9%	0.2%	7.3	1.6	4.2
EAST SIDE	82.5%	8.4%	6.8%	20.76	82.7%	3.8%	90.9%	3.8%	3.7	1.0	7.5
EDGEWATER	70.4%	3.8%	0.7%	14.39	39.9%	19.6%	41.4%	17.3%	0.0	6.3	1.7
EDISON PARK	26.2%	1.6%	0.1%	7.84	46.3%	1.5%	20.1%	65.0%	0.0	0.9	2.1
ENGLEWOOD	90.4%	12.9%	21.5%	111.93	87.1%	94.2%	3.3%	0.3%	3.9	2.6	2.3
FOREST GLEN	16.5%	1.9%	0.3%	6.48	36.0%	2.1%	18.8%	59.8%	0.0	0.6	2.7
FULLER PARK	96.7%	11.4%	11.5%	138.66	80.0%	91.8%	6.0%	1.6%	5.6	1.4	3.2
GAGE PARK	90.7%	6.6%	1.5%	21.78	89.3%	5.2%	93.3%	0.8%	6.8	2.3	0.9
GARFIELD RIDGE	66.4%	4.9%	1.5%	15.49	71.0%	4.8%	76.4%	16.8%	0.0	0.9	1.8
GRAND BOULEVARD	82.0%	8.7%	20.2%	59.98	63.8%	93.7%	1.8%	1.0%	7.5	2.3	4.0

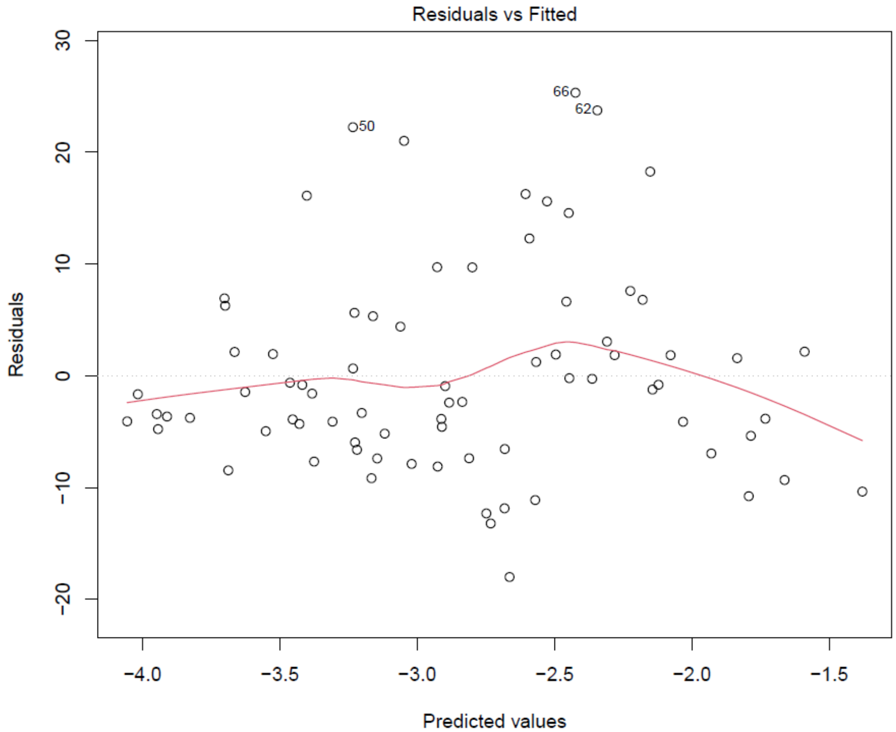
Community Area	EV1.01: Percent Low-Income Students	EV1.02: Percent Unemployed	EV1.03: Percent Vacant Land	EV1.04: Avg Violent Criminal Incidents Per 1,000 (2015 - 2019)	EV1.05: Pop. 25+ Without Associate Degree or Higher	EV2: Percent Black or African American Students	EV3: Percent Hispanic or Latino Students	EV4: Percent White Students	EV5: Health Services Locations Per Square Mi.	EV6: Grocery Stores per Square Mi.	EV7: Accessible Park Acreage per 1,000
GREATER GRAND CROSSING	90.2%	9.6%	6.2%	92.99	75.2%	97.0%	1.8%	0.1%	8.5	2.0	1.3
HEGEWISCH	80.5%	4.1%	12.7%	23.70	76.0%	10.7%	76.7%	9.5%	1.3	0.6	3.0
HERMOSA	89.3%	3.9%	0.3%	23.68	79.7%	3.7%	93.3%	1.6%	17.9	6.0	0.7
HUMBOLDT PARK	88.9%	5.5%	6.7%	53.39	79.8%	42.9%	53.8%	1.0%	7.8	4.4	1.9
HYDE PARK	57.8%	3.7%	0.4%	18.73	21.9%	76.4%	6.1%	7.8%	72.7	1.9	15.6
IRVING PARK	72.8%	3.3%	0.6%	18.02	54.7%	6.4%	72.6%	14.2%	22.7	2.2	1.2
JEFFERSON PARK	46.7%	3.2%	0.5%	12.24	56.2%	1.8%	37.9%	37.6%	0.0	1.3	0.9
KENWOOD	67.6%	5.7%	3.1%	31.24	37.2%	88.9%	3.6%	3.0%	7.7	3.8	6.8
LAKE VIEW	38.1%	2.3%	0.5%	15.69	17.0%	8.3%	40.4%	40.1%	0.0	2.9	2.7
LINCOLN PARK	32.1%	2.1%	1.4%	13.12	14.7%	18.9%	22.7%	43.3%	0.0	3.5	4.4
LINCOLN SQUARE	59.5%	2.7%	0.9%	14.09	32.9%	6.7%	50.9%	28.4%	0.0	1.6	1.9
LOGAN SQUARE	72.2%	2.7%	1.6%	20.09	42.3%	5.3%	77.5%	12.0%	40.9	4.2	1.0
LOOP	55.5%	3.1%	4.5%	55.08	16.4%	21.9%	39.0%	23.4%	0.0	2.4	6.0
LOWER WEST SIDE	89.7%	3.8%	3.9%	29.32	65.8%	4.0%	92.3%	1.7%	12.6	3.8	1.2
MCKINLEY PARK	82.0%	6.1%	4.6%	20.33	72.3%	3.0%	88.2%	4.7%	6.4	2.8	2.6
MONTCLARE	81.6%	3.6%	0.7%	16.15	76.2%	2.4%	83.3%	11.0%	21.2	1.0	1.3
MORGAN PARK	75.8%	5.4%	2.7%	31.55	55.3%	83.6%	6.3%	8.5%	7.9	2.1	3.6
MOUNT GREENWOOD	25.6%	1.6%	0.2%	8.97	57.2%	19.4%	15.6%	59.0%	0.0	1.1	2.6
NEAR NORTH SIDE	46.7%	2.7%	3.4%	30.62	17.5%	33.3%	22.4%	25.7%	0.0	6.2	2.3
NEAR SOUTH SIDE	56.3%	2.1%	7.3%	25.14	23.4%	61.3%	11.7%	14.2%	0.0	1.1	15.3
NEAR WEST SIDE	62.2%	5.1%	5.6%	42.35	29.9%	42.2%	33.1%	11.2%	52.4	1.6	1.5
NEW CITY	92.0%	8.3%	9.9%	48.46	88.7%	24.5%	71.2%	2.4%	4.3	3.5	1.7
NORTH CENTER	34.7%	2.2%	0.6%	8.94	26.1%	6.8%	33.9%	43.9%	0.0	2.9	1.4
NORTH LAWNDALE	93.6%	7.7%	14.5%	96.12	82.2%	93.4%	4.6%	0.3%	8.7	1.2	2.1
NORTH PARK	63.3%	3.4%	0.5%	14.10	48.0%	8.0%	44.8%	24.2%	0.0	0.8	5.8
NORWOOD PARK	38.7%	2.5%	0.5%	10.05	53.6%	1.9%	34.7%	52.5%	0.0	0.9	1.3

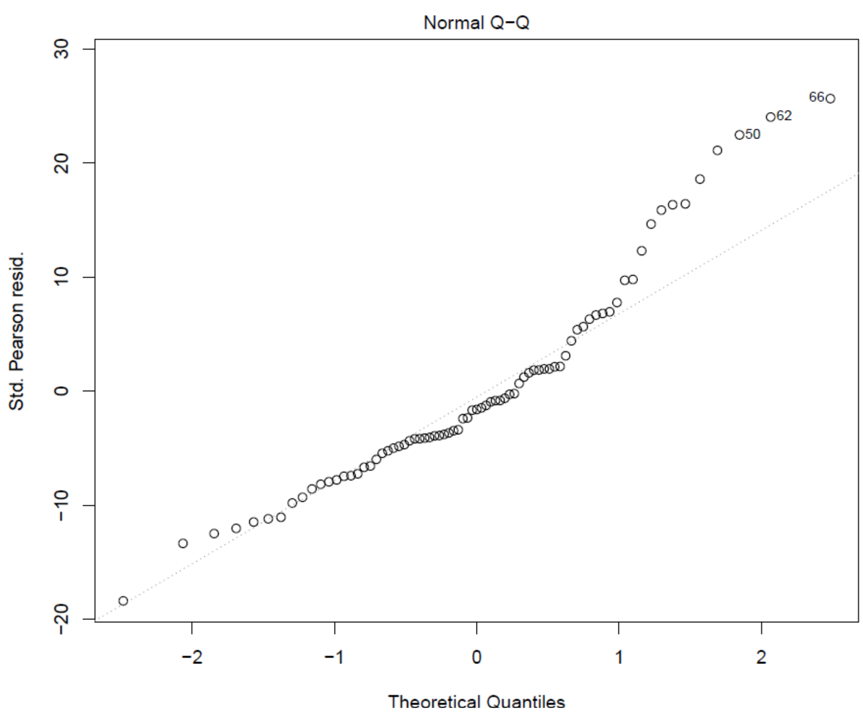
Community Area	EV1.01: Percent Low-Income Students	EV1.02: Percent Unemployed	EV1.03: Percent Vacant Land	EV1.04: Avg Violent Criminal Incidents Per 1,000 (2015 - 2019)	EV1.05: Pop. 25+ Without Associate Degree or Higher	EV2: Percent Black or African American Students	EV3: Percent Hispanic or Latino Students	EV4: Percent White Students	EV5: Health Services Locations Per Square Mi.	EV6: Grocery Stores per Square Mi.	EV7: Accessible Park Acreage per 1,000
OAKLAND	74.2%	11.0%	10.7%	38.40	65.0%	97.2%	1.2%	0.0%	5.2	0.0	8.0
OHARE	64.4%	4.3%	1.6%	32.17	55.0%	2.0%	10.9%	69.8%	0.0	0.1	0.1
PORTAGE PARK	74.3%	4.0%	0.4%	17.46	63.5%	5.8%	68.2%	20.3%	41.3	2.5	1.1
PULLMAN	86.0%	9.3%	15.5%	63.48	64.7%	92.9%	5.2%	0.5%	1.9	0.9	2.4
RIVERDALE	92.2%	13.2%	10.0%	85.64	88.2%	76.2%	20.7%	0.6%	0.3	0.6	4.0
ROGERS PARK	86.1%	4.5%	0.4%	25.07	53.0%	33.8%	44.1%	8.5%	0.0	7.1	1.4
ROSELAND	84.7%	10.8%	4.8%	65.17	71.4%	92.2%	5.8%	0.3%	3.1	1.5	2.1
SOUTH CHICAGO	89.8%	9.3%	28.5%	70.36	77.8%	78.1%	19.6%	0.9%	9.9	1.5	2.5
SOUTH DEERING	87.3%	9.7%	9.2%	48.61	79.8%	45.8%	50.6%	0.9%	0.8	0.4	2.2
SOUTH LAWNDALE	92.3%	3.3%	7.6%	25.15	88.6%	4.4%	94.0%	0.7%	16.3	4.8	1.4
SOUTH SHORE	89.7%	8.4%	4.4%	73.93	67.2%	94.7%	2.9%	0.2%	7.2	2.4	4.0
UPTOWN	70.2%	4.2%	0.6%	22.20	39.2%	44.3%	24.6%	11.4%	84.1	6.5	5.9
WASHINGTON HEIGHTS	86.1%	8.9%	2.8%	42.79	70.2%	98.1%	0.9%	0.1%	2.4	0.7	1.8
WASHINGTON PARK	83.3%	9.6%	17.3%	104.97	76.9%	95.0%	1.5%	0.2%	0.7	2.0	8.8
WEST ELSDON	75.4%	5.9%	1.5%	16.66	82.5%	1.7%	93.9%	2.4%	16.2	2.6	1.3
WEST ENGLEWOOD	82.3%	12.9%	13.6%	99.01	86.1%	82.6%	14.3%	1.5%	1.3	3.5	2.2
WEST GARFIELD PARK	94.5%	6.6%	14.4%	121.76	89.3%	96.6%	2.4%	0.1%	7.0	5.5	3.2
WEST LAWN	91.0%	6.5%	2.1%	18.50	83.5%	2.3%	94.9%	1.5%	16.3	1.4	1.5
WEST PULLMAN	89.5%	11.7%	9.5%	58.51	77.2%	89.2%	9.4%	0.2%	0.0	1.4	2.9
WEST RIDGE	77.6%	4.3%	0.5%	15.09	54.8%	16.7%	34.8%	18.5%	0.0	5.1	3.0
WEST TOWN	71.5%	3.3%	2.3%	24.95	30.6%	21.3%	61.5%	11.9%	0.0	3.1	1.6
WOODLAWN	87.9%	7.2%	9.2%	65.60	61.6%	97.1%	1.6%	0.2%	2.4	2.4	7.8
Mean	**74.7%**	**6.0%**	**5.2%**	**40**	**62.8%**	**43.2%**	**37.4%**	**11.8%**	**10.2**	**2.4**	**2.9**
Median	**82.0%**	**5.2%**	**3.1%**	**25**	**67.2%**	**24.5%**	**31.2%**	**2.7%**	**5.6**	**2.0**	**2.0**
Min	**16.5%**	**1.6%**	**0.1%**	**6**	**14.7%**	**1.5%**	**0.9%**	**0.0%**	**0.0**	**0.0**	**0.1**
Max	**96.7%**	**13.2%**	**28.5%**	**139**	**89.3%**	**98.6%**	**94.9%**	**69.8%**	**84.1**	**7.1**	**15.6**
SD	**18.7%**	**3.1%**	**5.8%**	**31**	**20.6%**	**39.3%**	**33.3%**	**17.1%**	**15.7**	**1.7**	**2.8**

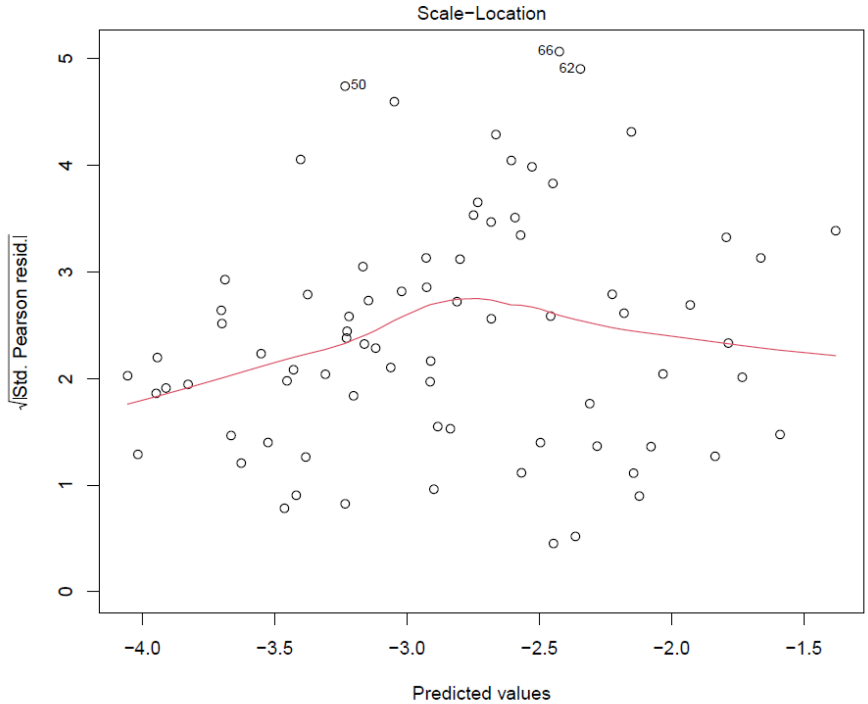
APPENDIX B

MODEL PLOTS

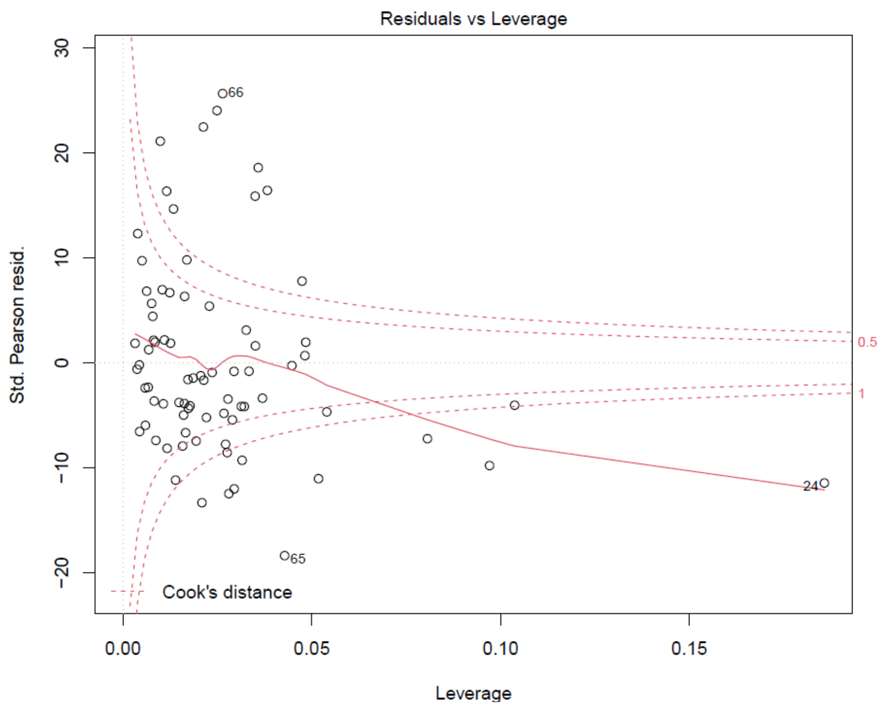
Figure A1. “Community Stressors” Model Residuals vs. Fitted, Normal Q-Q, Scale-Location and Residuals vs. Leverage plots





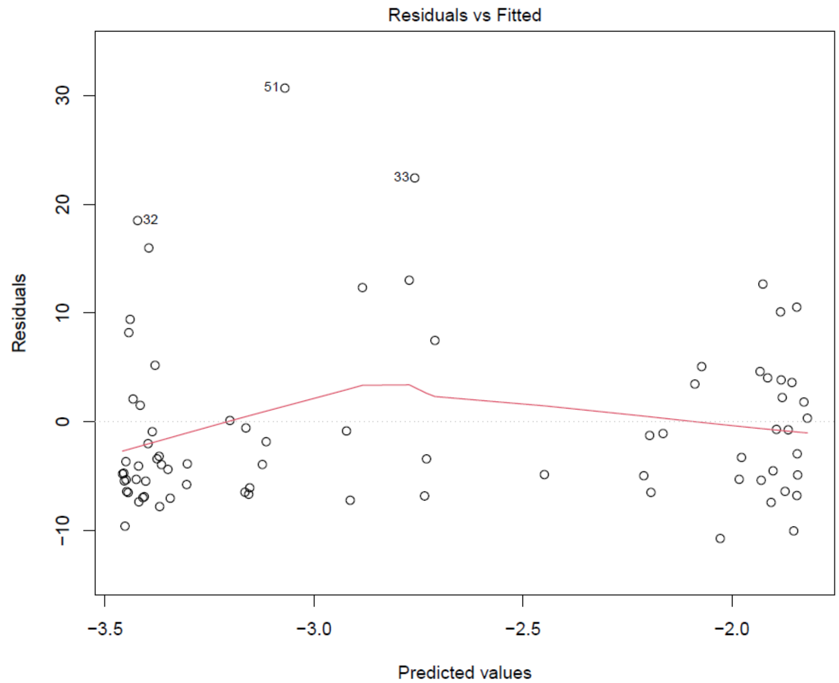


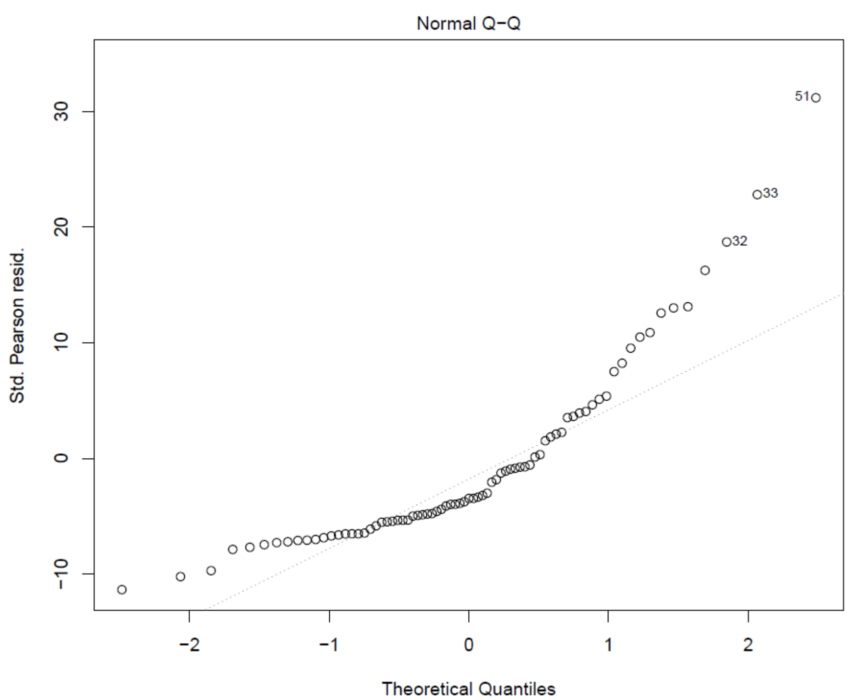
Scale−Location
√|Std. Pearson resid.|
Predicted values
66
62
50
0
1
2
3
4
5
−4.0
−3.5
−3.0
−2.5
−2.0
−1.5

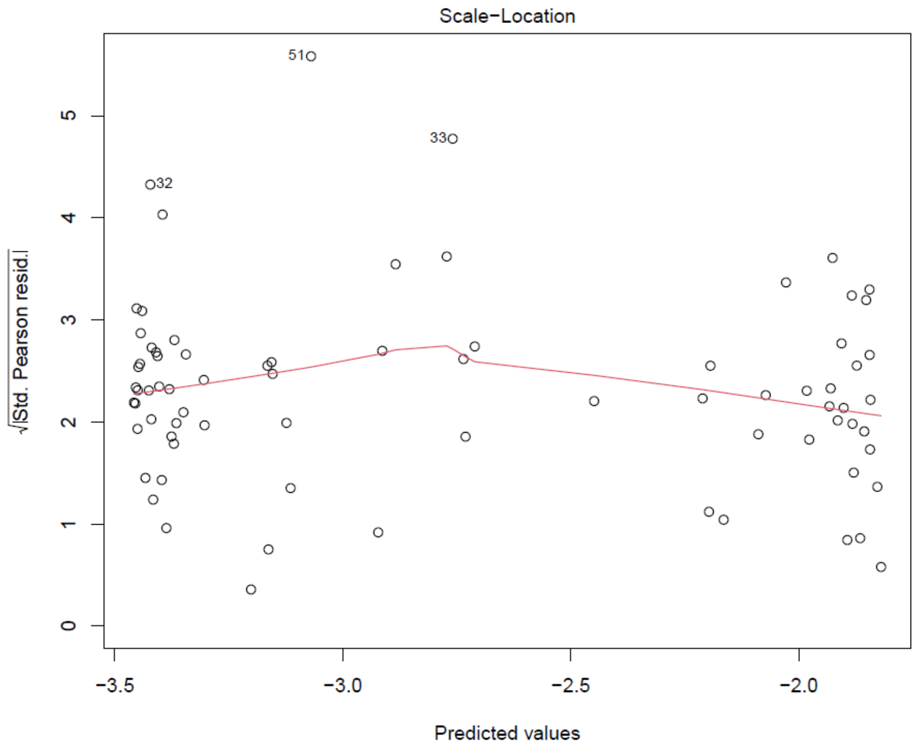


Residuals vs Leverage
Std. Pearson resid.
Leverage
66
65
24
Cook's distance
0.5
1
−20
−10
0
10
20
30
0.00
0.05
0.10
0.15

Figure A2. Model 02 Residuals vs. Fitted, Normal Q-Q, Scale-Location and Residuals vs. Leverage plots






Scale−Location
√|Std. Pearson resid.|
Predicted values
51
33
32
0
1
2
3
4
5
−3.5
−3.0
−2.5
−2.0

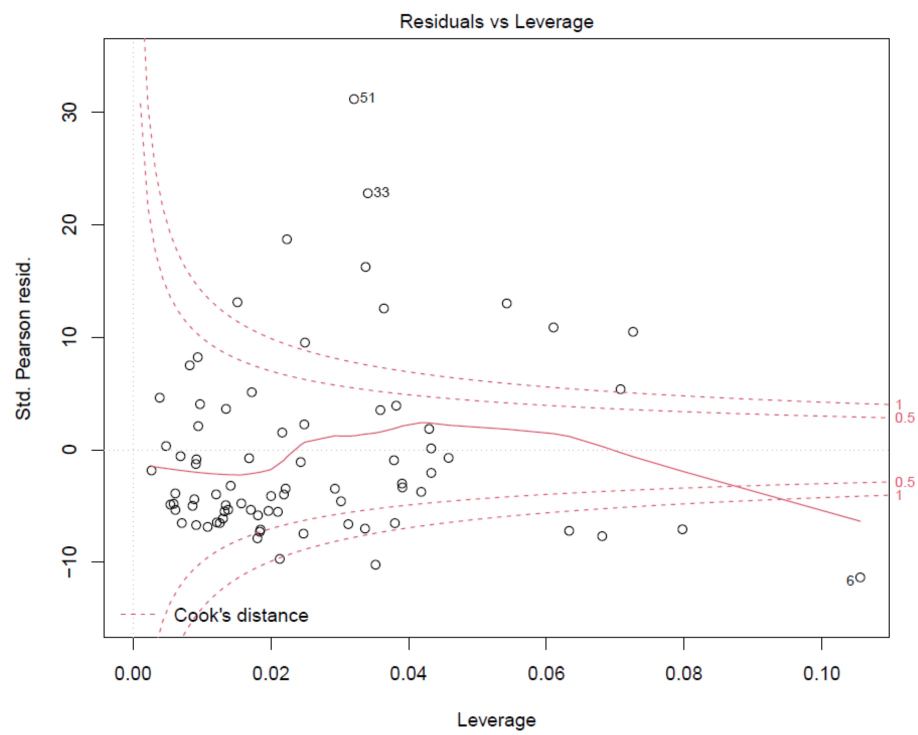
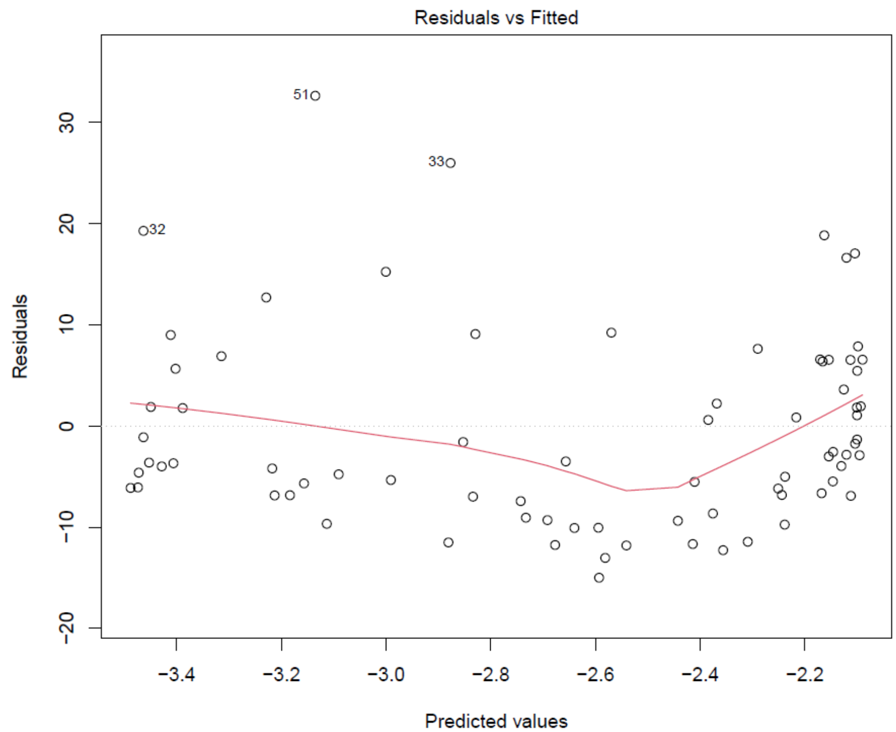
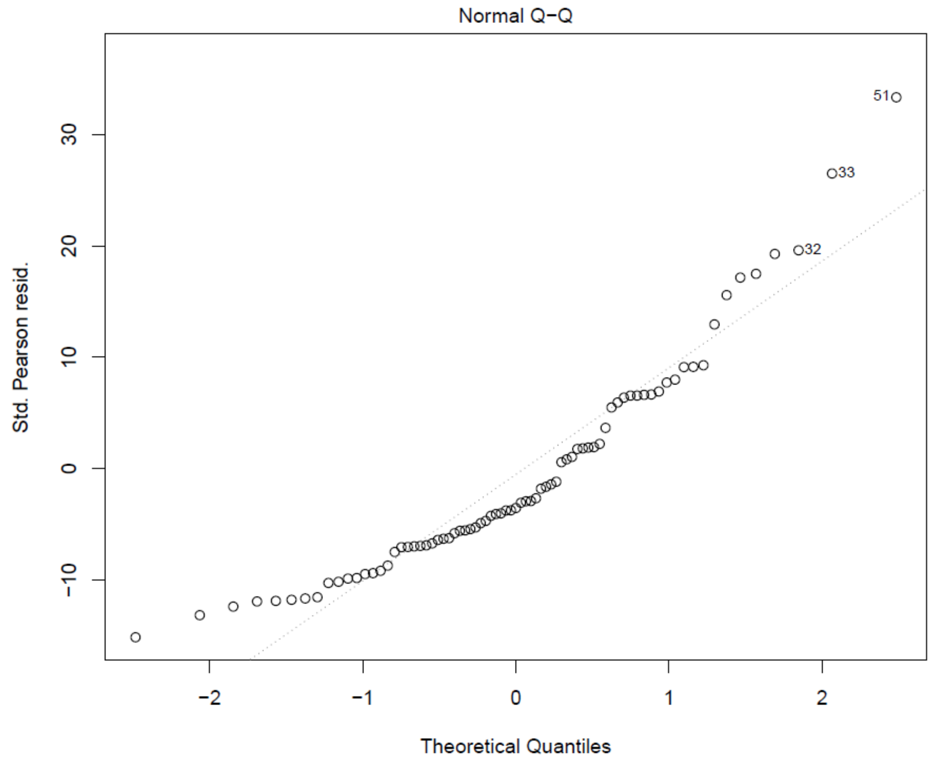
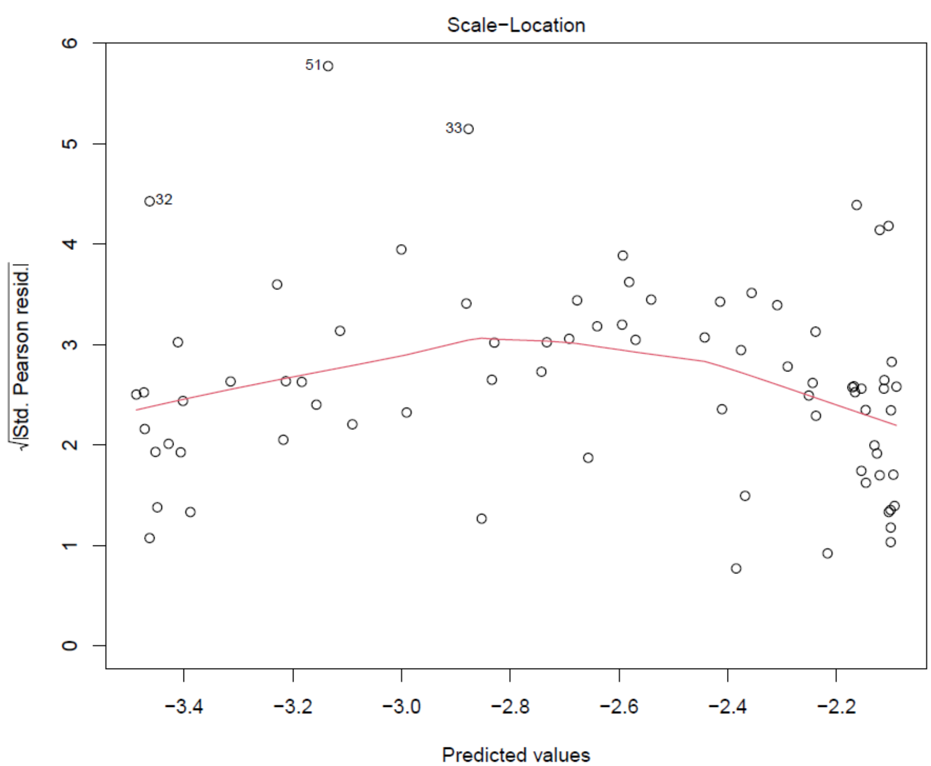

Residuals vs Leverage
Std. Pearson resid.
Leverage
51
33
6
Cook's distance
1
0.5
0.5
1
−10
0
10
20
30
0.00
0.02
0.04
0.06
0.08
0.10

Figure A3. Model 03 Residuals vs. Fitted, Normal Q-Q, Scale-Location and Residuals vs. Leverage plots




Normal Q−Q
Std. Pearson resid.
Theoretical Quantiles
51
33
32
30
20
10
0
−10
−2
−1
0
1
2


Scale−Location
√|Std. Pearson resid.|
Predicted values
51
33
32
0
1
2
3
4
5
6
−3.4
−3.2
−3.0
−2.8
−2.6
−2.4
−2.2

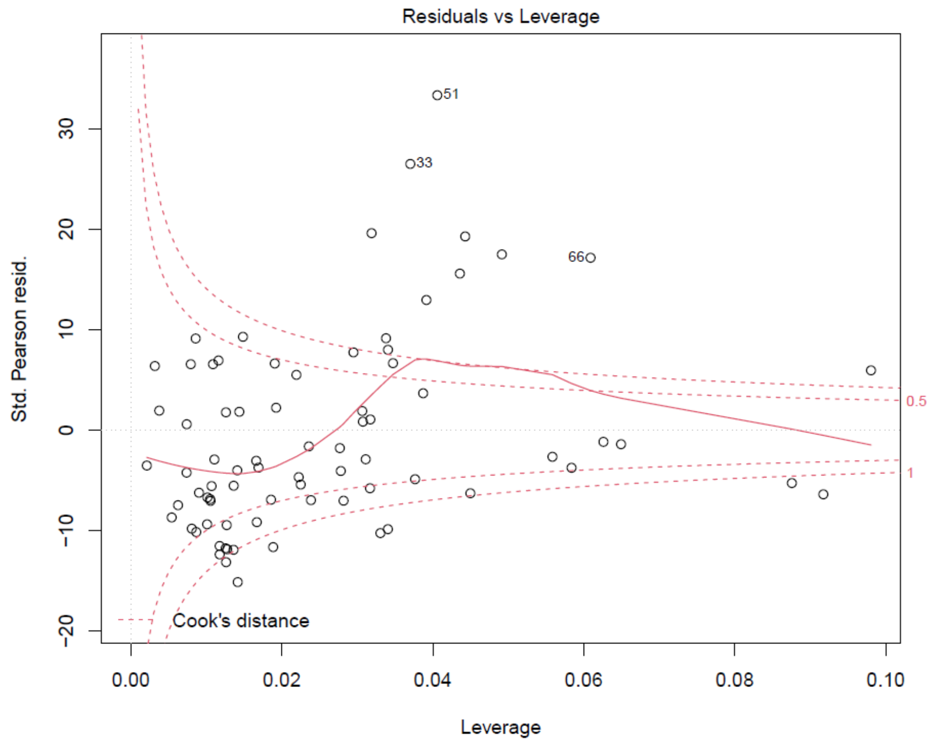
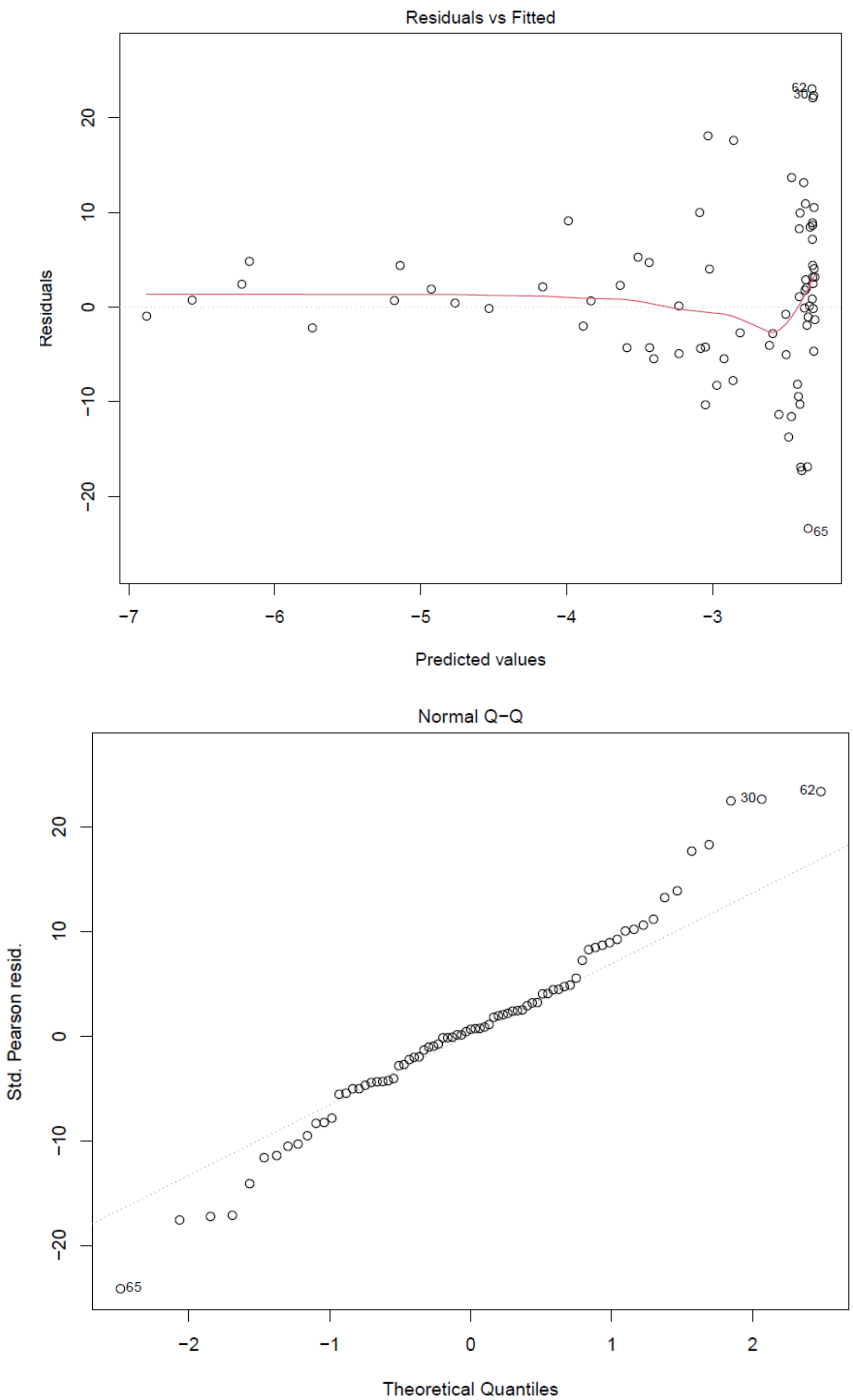
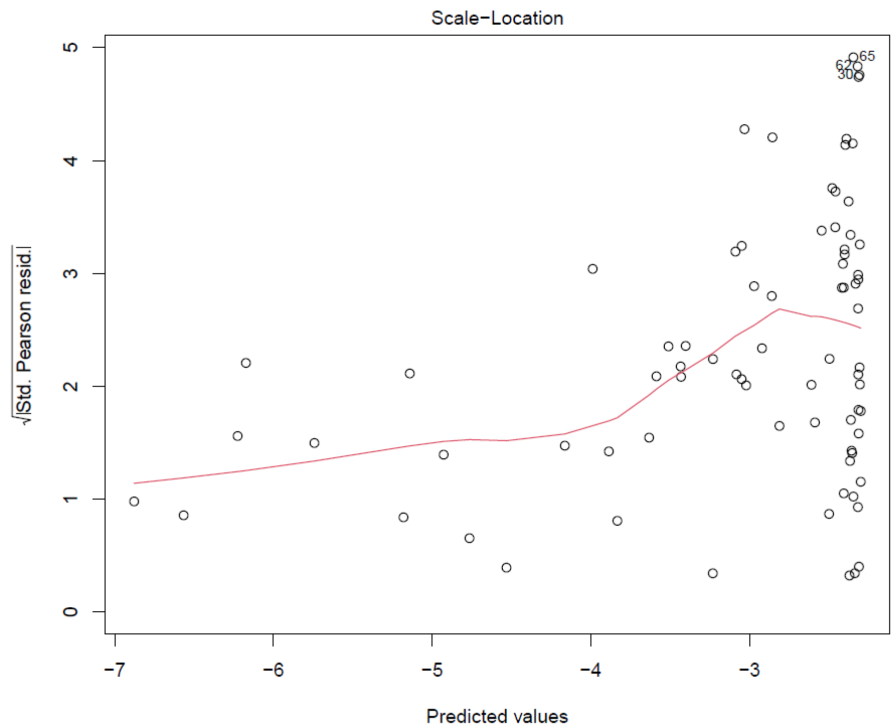

Residuals vs Leverage
Std. Pearson resid.
Leverage
Cook's distance
0.5
1
51
33
66
30
20
10
0
−10
−20
0.00
0.02
0.04
0.06
0.08
0.10

Figure A4. Model 04 Residuals vs. Fitted, Normal Q-Q, Scale-Location and Residuals vs. Leverage plots




Scale−Location
√|Std. Pearson resid.|
Predicted values
65
62
30
0
1
2
3
4
5
−7
−6
−5
−4
−3

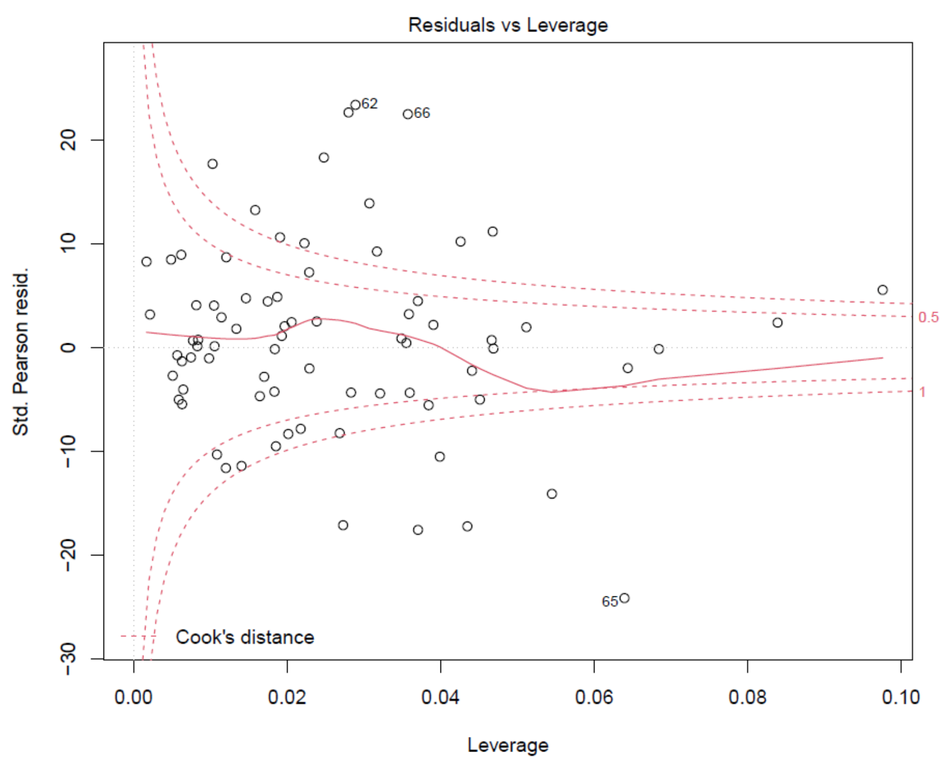
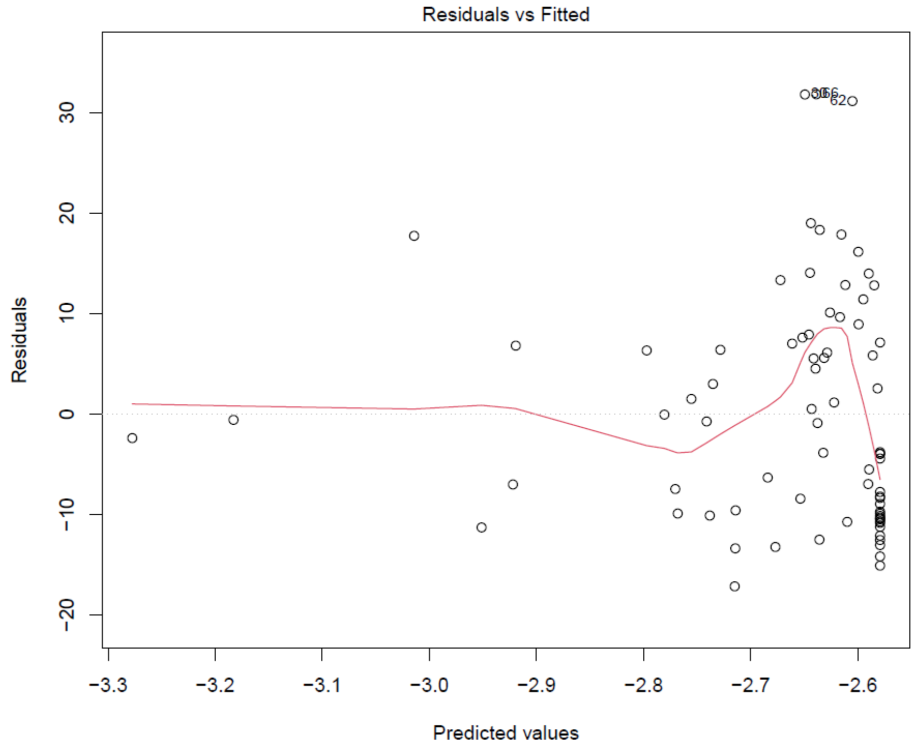
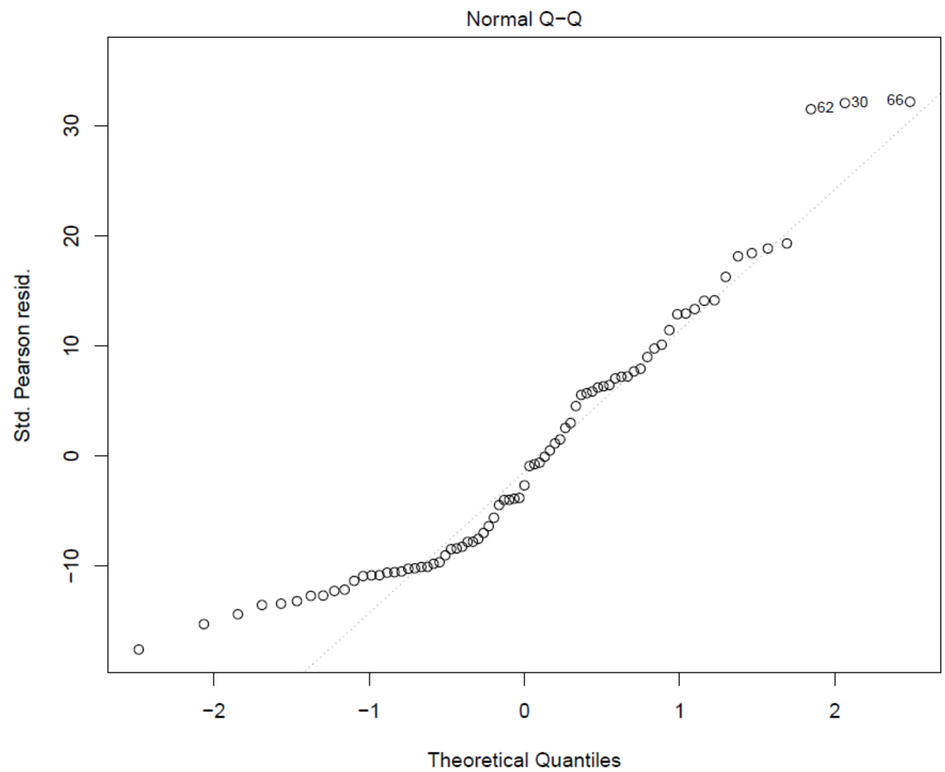
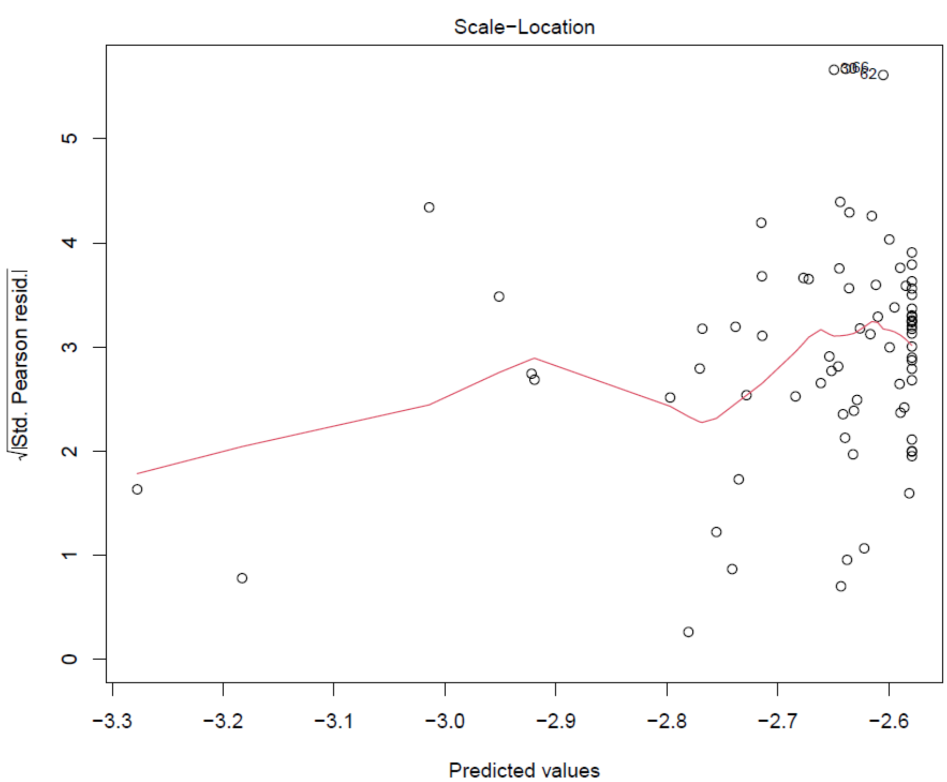

Residuals vs Leverage
Std. Pearson resid.
Leverage
62
66
65
Cook's distance
0.5
1
−30
−20
−10
0
10
20
0.00
0.02
0.04
0.06
0.08
0.10

Figure A5. Model 05 Residuals vs. Fitted, Normal Q-Q, Scale-Location and Residuals vs. Leverage plots




Normal Q−Q
Std. Pearson resid.
Theoretical Quantiles
62
30
66
−10
0
10
20
30
−2
−1
0
1
2


Scale−Location
√|Std. Pearson resid.|
Predicted values
0
1
2
3
4
5
−3.3
−3.2
−3.1
−3.0
−2.9
−2.8
−2.7
−2.6

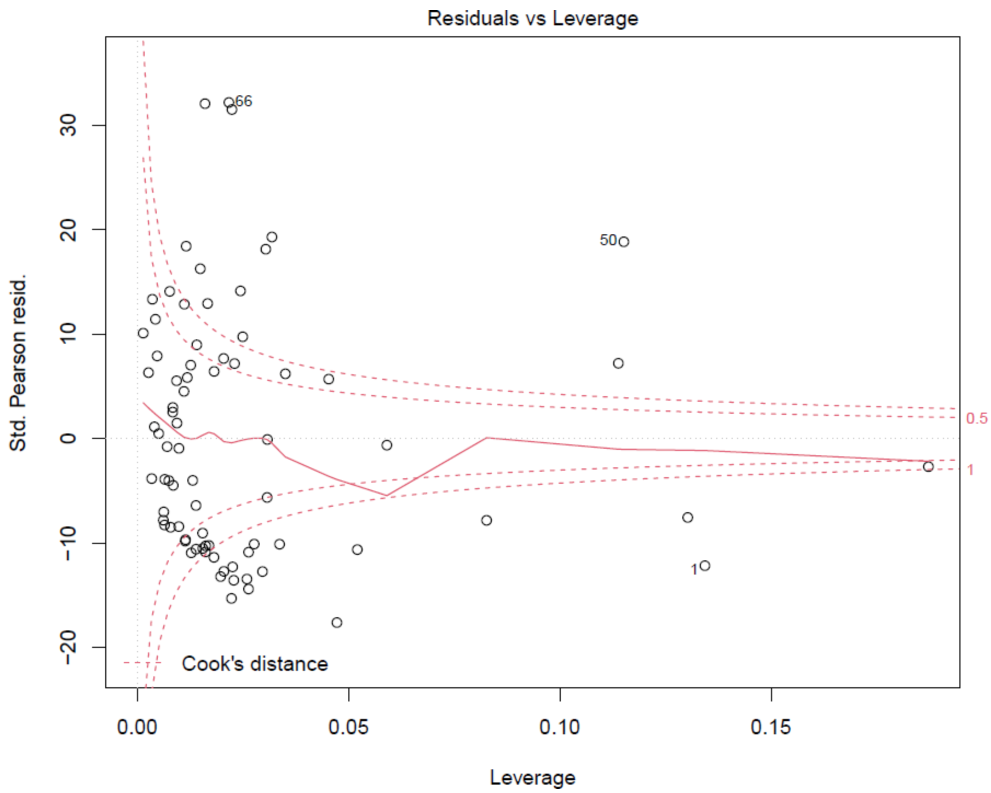
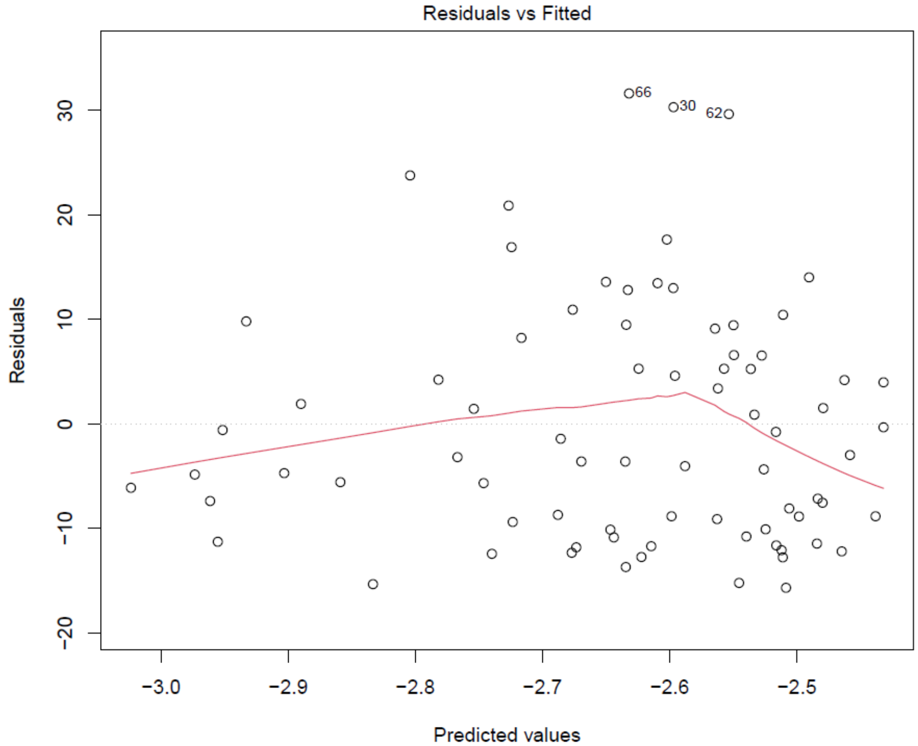
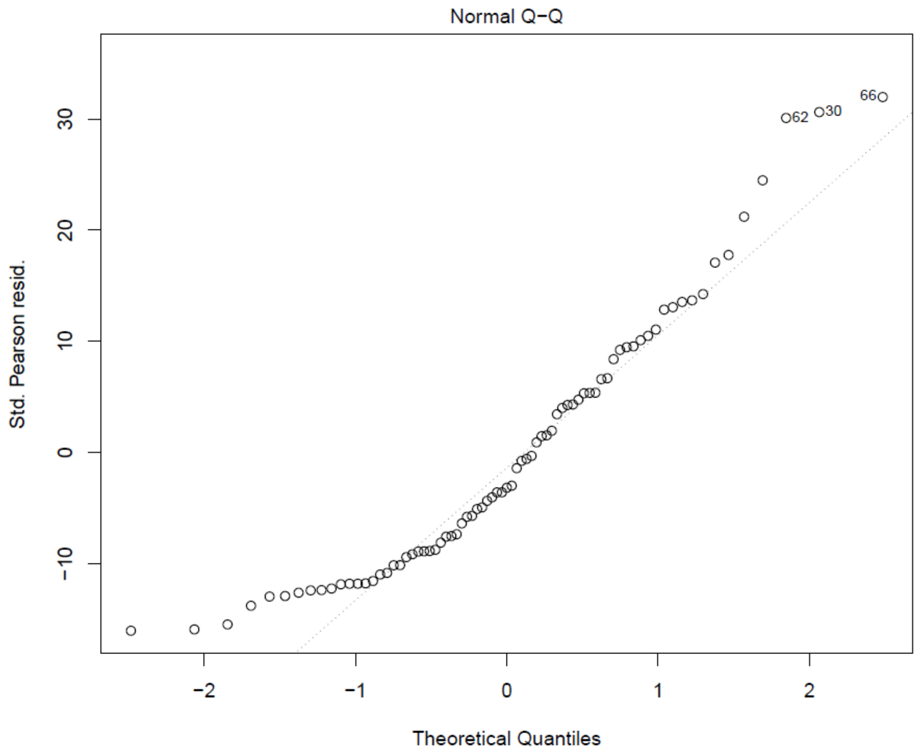
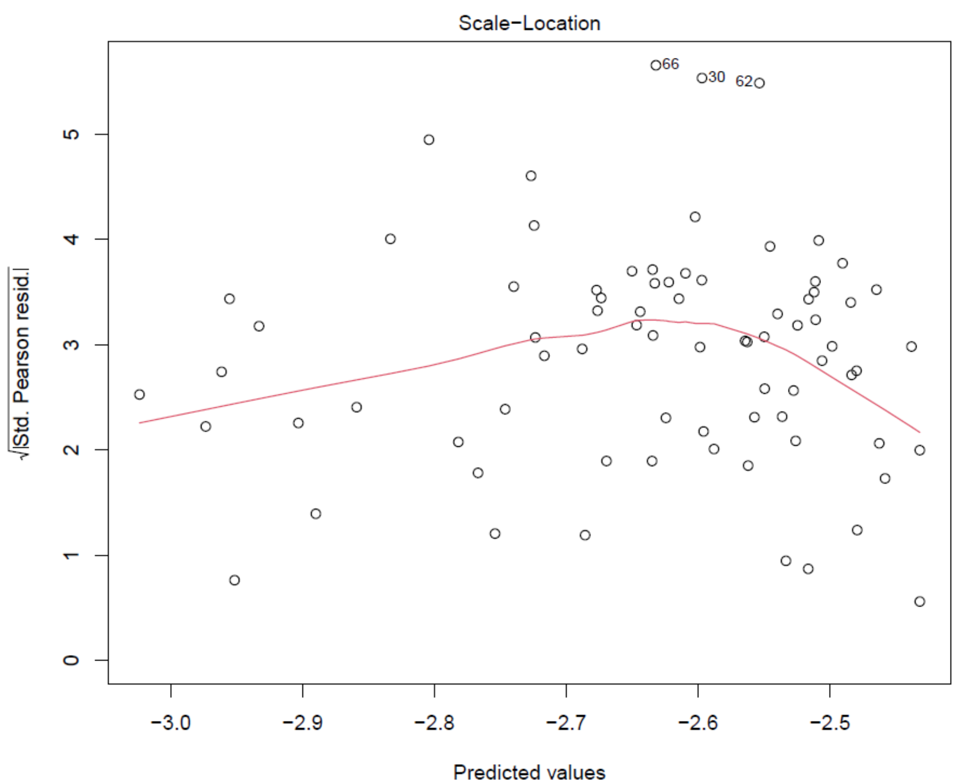

Residuals vs Leverage
Std. Pearson resid.
Leverage
Cook's distance
0.5
1
66
50
1
30
20
10
0
−10
−20
0.00
0.05
0.10
0.15

Figure A6. Model 06 Residuals vs. Fitted, Normal Q-Q, Scale-Location and Residuals vs. Leverage plots




Normal Q−Q
Std. Pearson resid.
30
20
10
0
−10
66
62
30
−2
−1
0
1
2
Theoretical Quantiles


Scale−Location
√|Std. Pearson resid.|
5
4
3
2
1
0
66
30
62
−3.0
−2.9
−2.8
−2.7
−2.6
−2.5
Predicted values

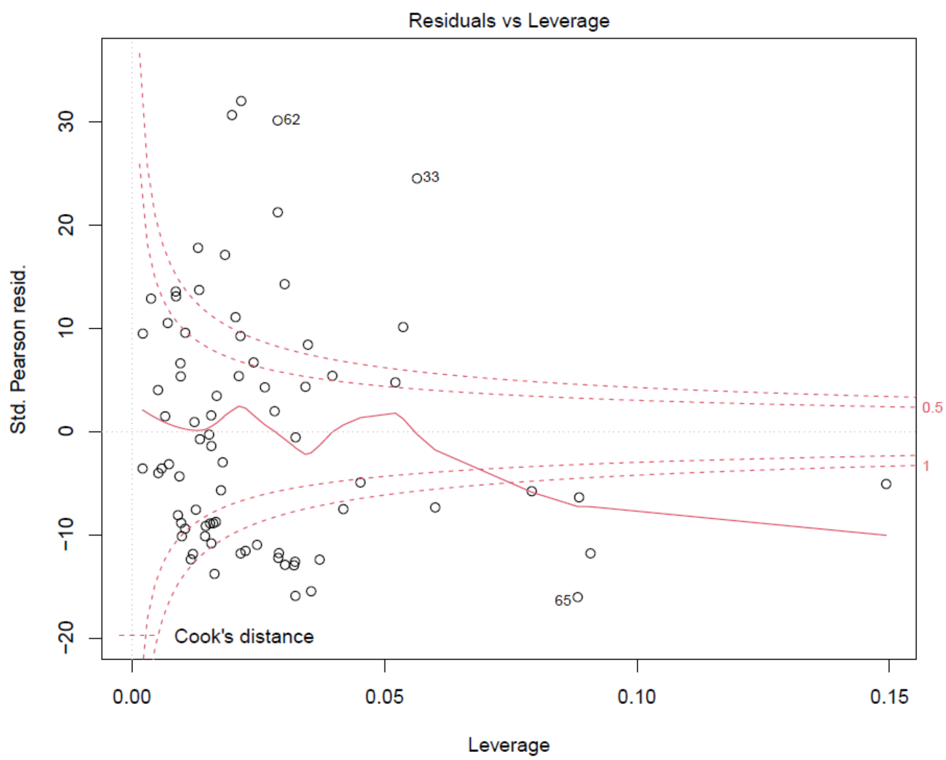
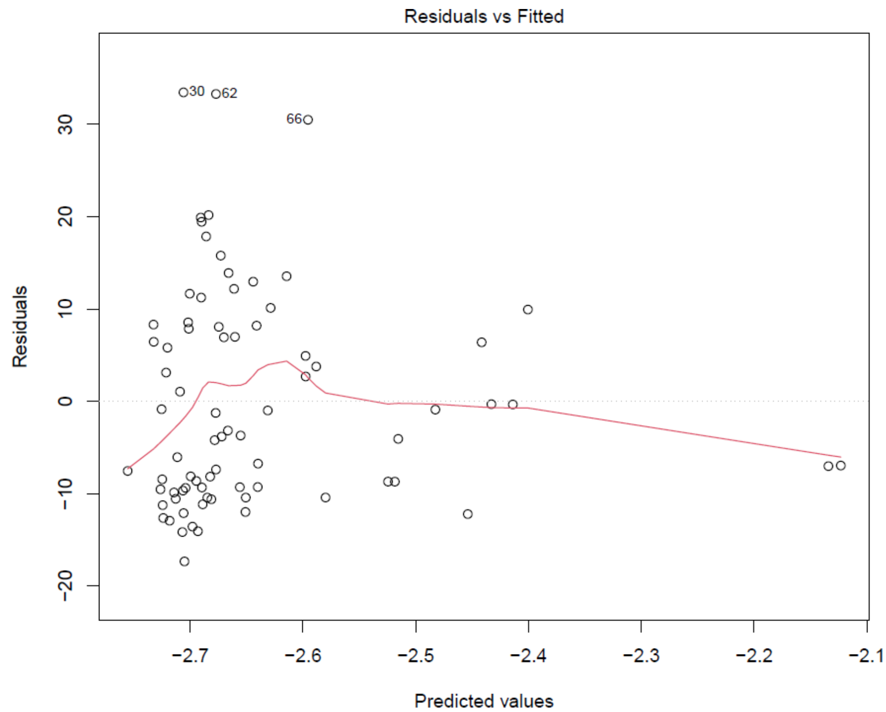
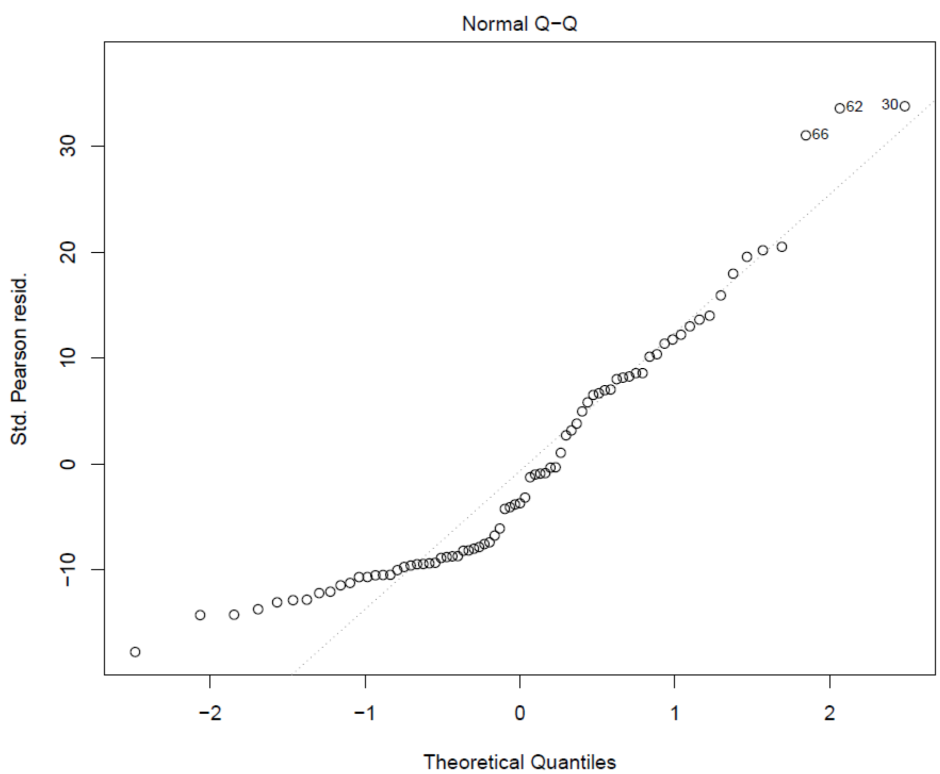
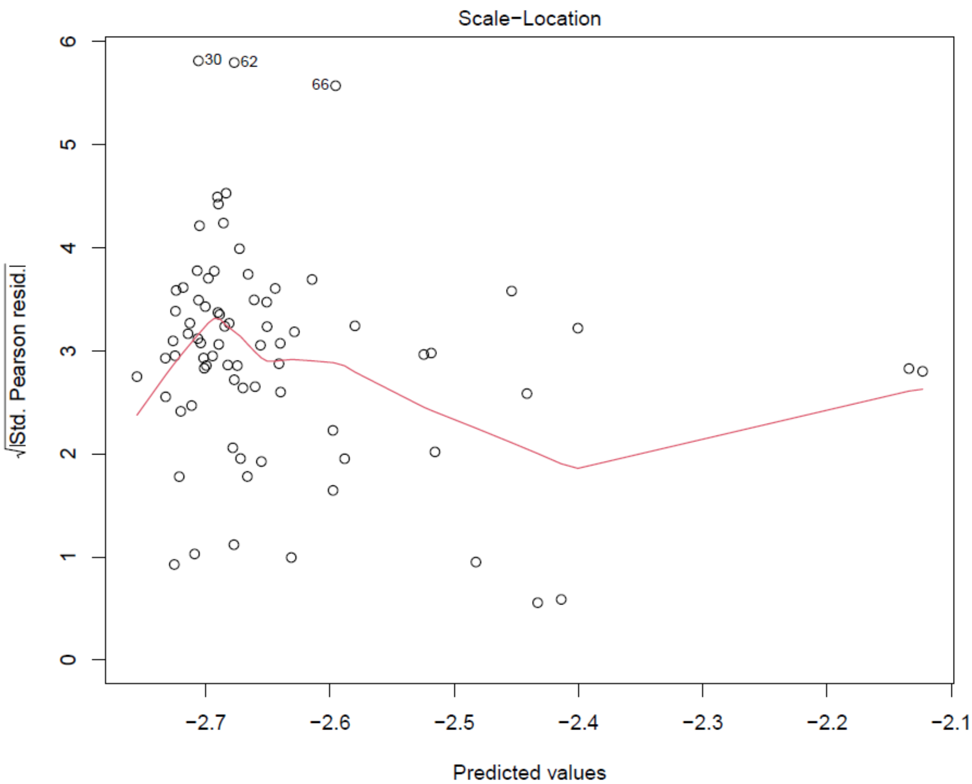

Residuals vs Leverage
Std. Pearson resid.
Leverage
30
20
10
0
−10
−20
0.00
0.05
0.10
0.15
62
33
65
0.5
1
Cook's distance

Figure A7. Model 07 Residuals vs. Fitted, Normal Q-Q, Scale-Location and Residuals vs. Leverage plots






Scale−Location
√|Std. Pearson resid.|
Predicted values
30
62
66
0
1
2
3
4
5
6
−2.7
−2.6
−2.5
−2.4
−2.3
−2.2
−2.1

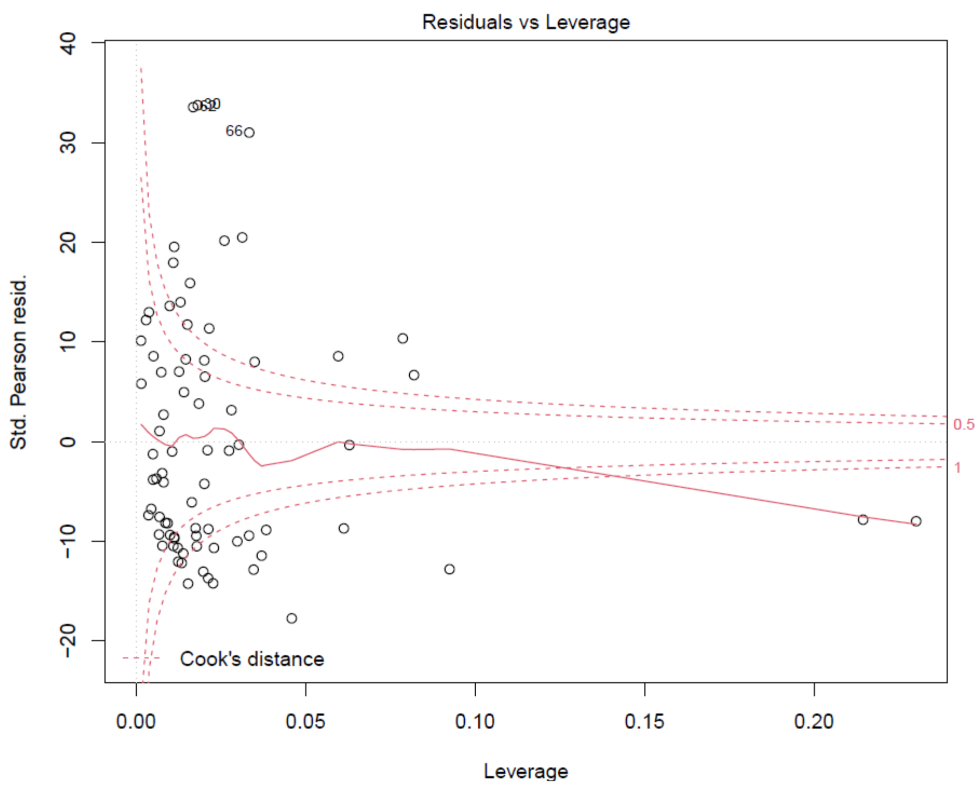
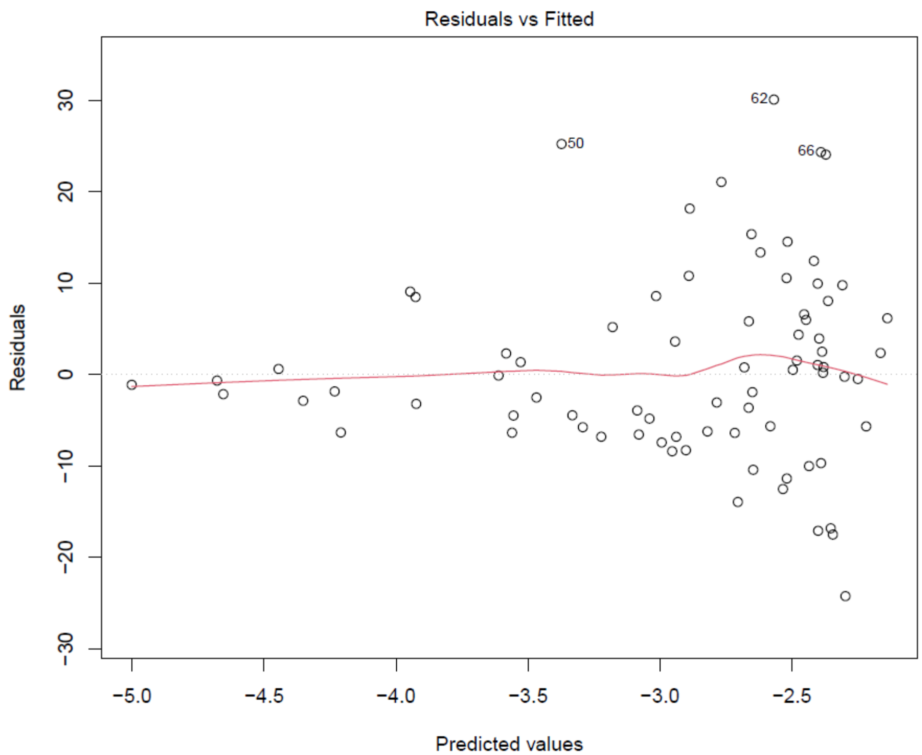
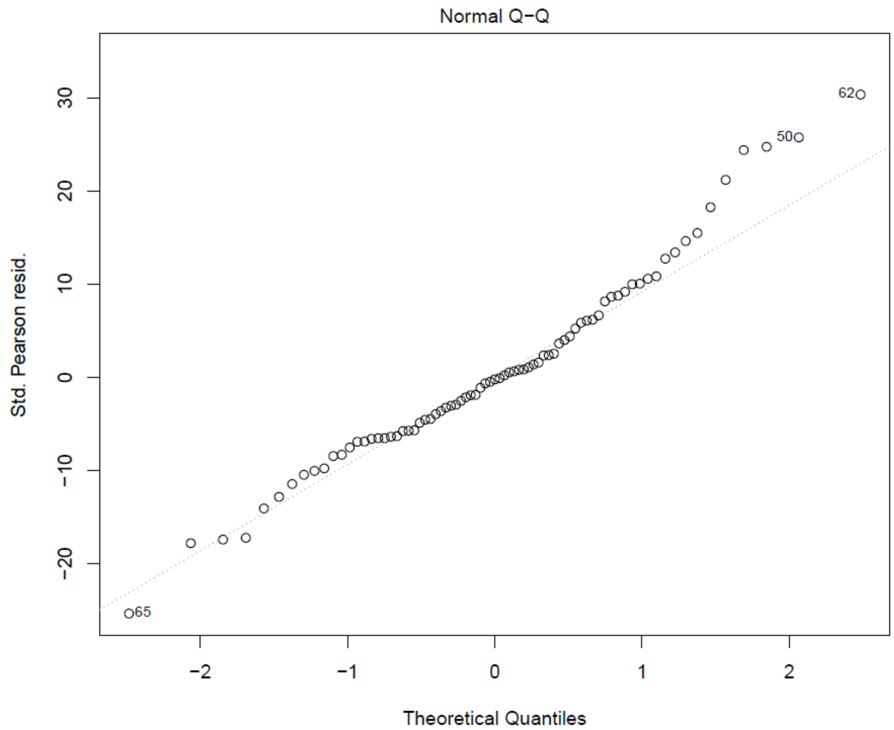
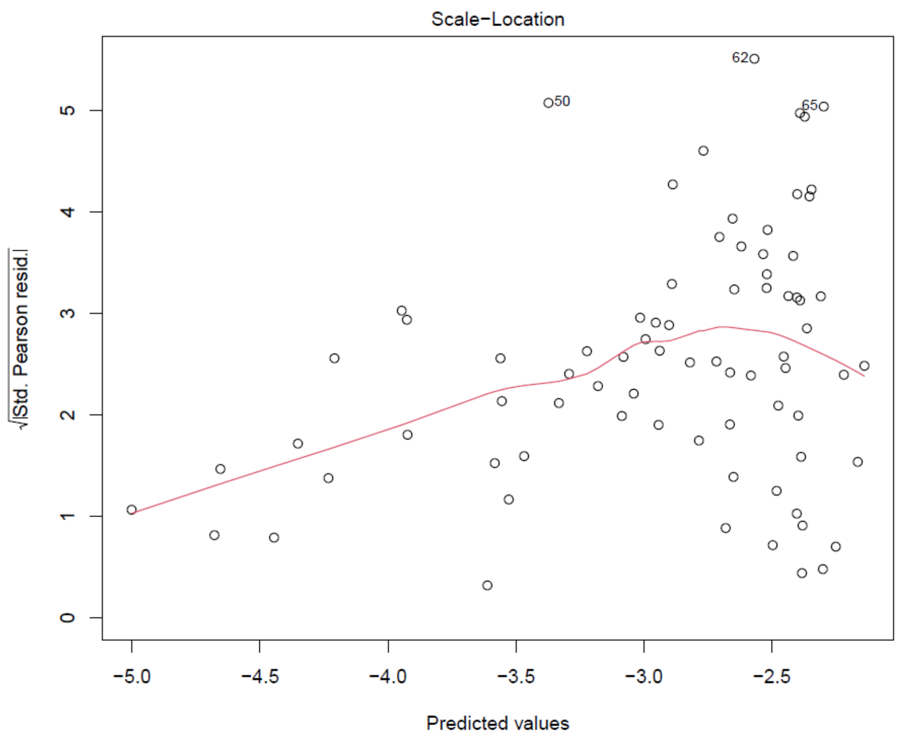

Residuals vs Leverage
Std. Pearson resid.
Leverage
Cook's distance
66
0.5
1
−20
−10
0
10
20
30
40
0.00
0.05
0.10
0.15
0.20

Figure A8. Model 1.01 Residuals vs. Fitted, Normal Q-Q, Scale-Location and Residuals vs. Leverage plots





Normal Q−Q
Std. Pearson resid.
Theoretical Quantiles
62
50
65



Scale−Location
√|Std. Pearson resid.|
Predicted values
62
50
65

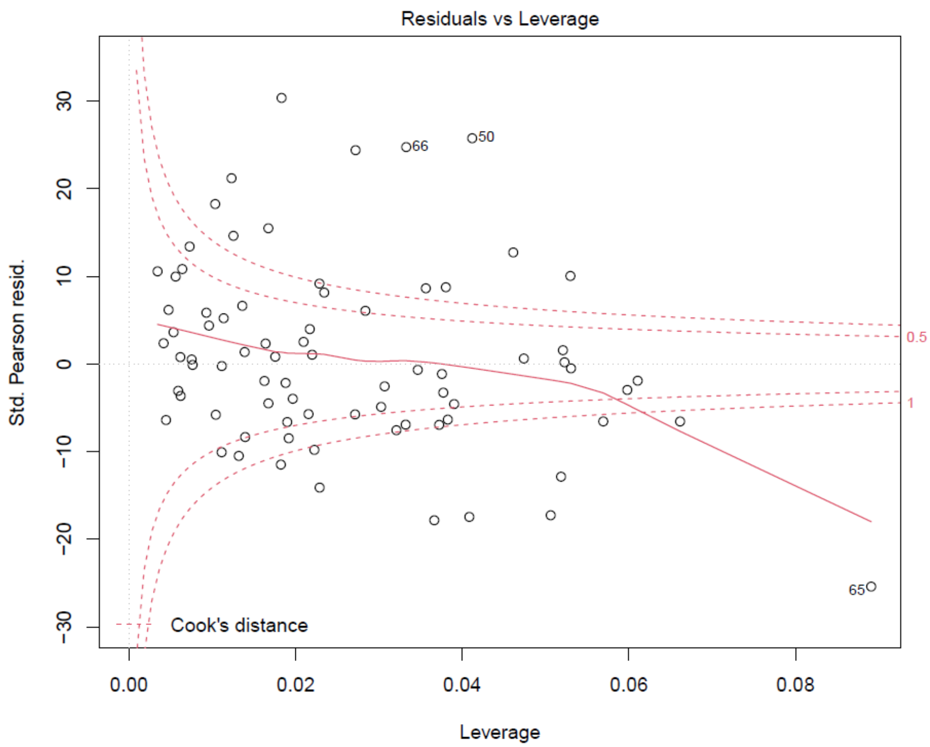
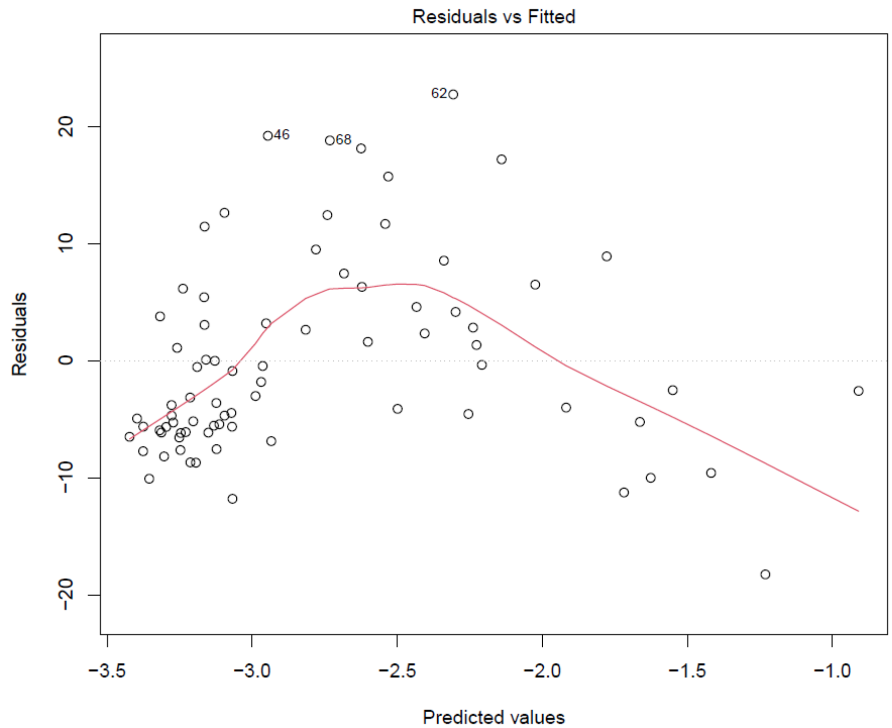
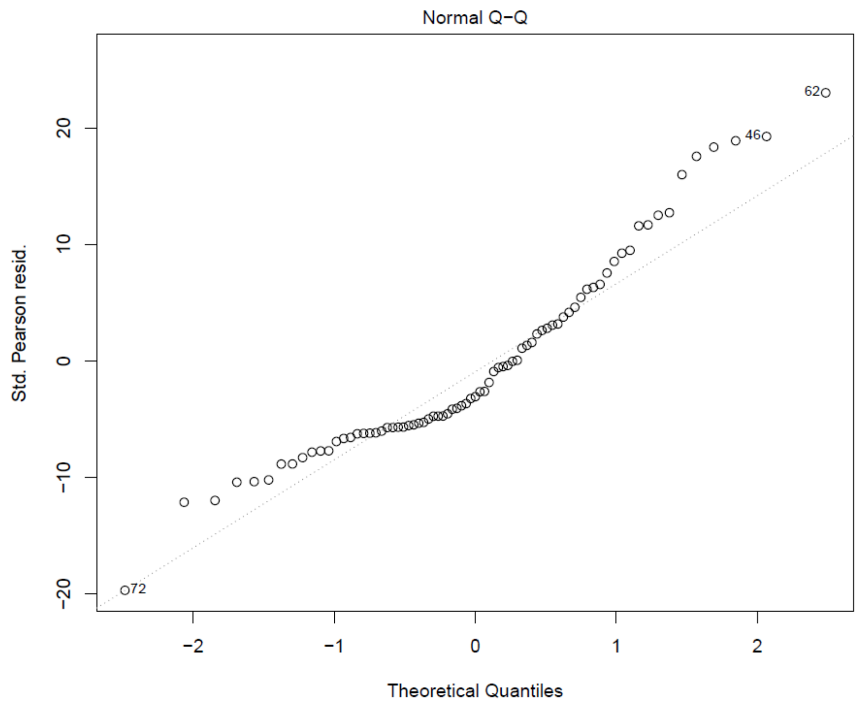
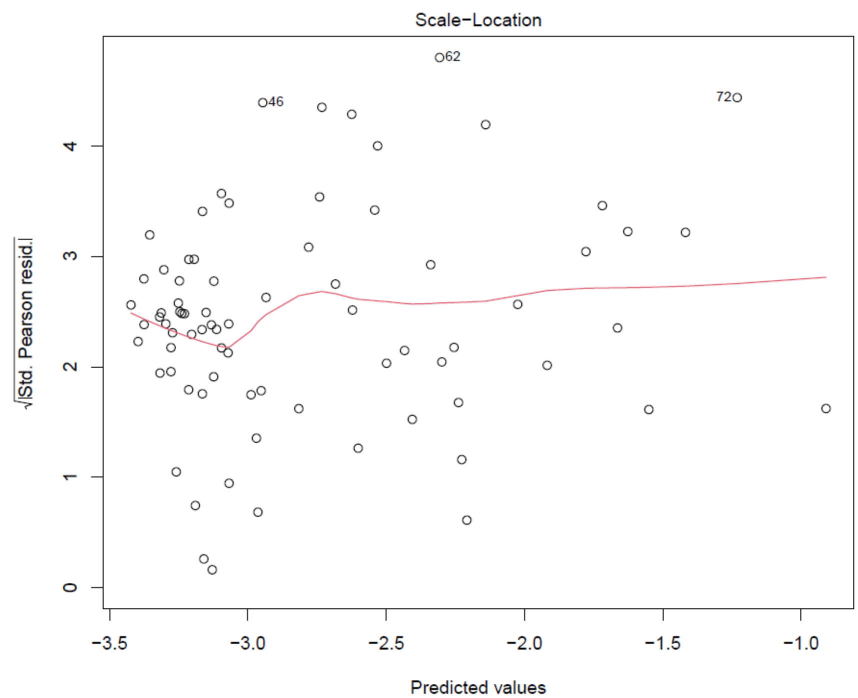
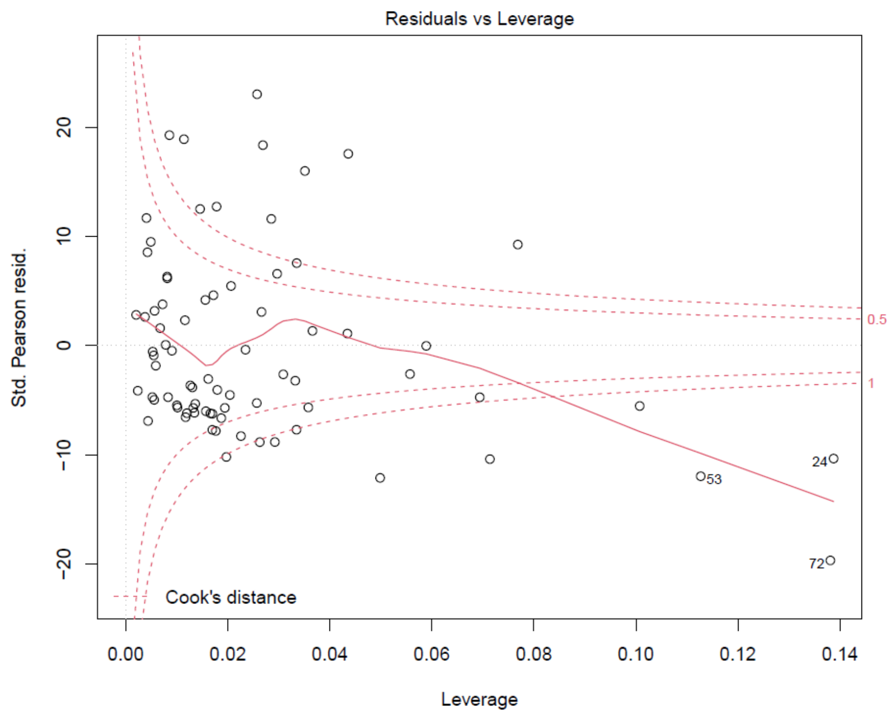

Residuals vs Leverage
Std. Pearson resid.
Leverage
30
20
10
0
−10
−20
−30
0.00
0.02
0.04
0.06
0.08
66
50
65
0.5
1
Cook's distance

Figure A9. Model 1.04 Residuals vs. Fitted, Normal Q-Q, Scale-Location and Residuals vs. Leverage plots




Normal Q−Q
Std. Pearson resid.
Theoretical Quantiles
62
46
72
20
10
0
−10
−20
−2
−1
0
1
2


Scale−Location
√|Std. Pearson resid.|
Predicted values
62
46
72
4
3
2
1
0
−3.5
−3.0
−2.5
−2.0
−1.5
−1.0



Residuals vs Leverage
Std. Pearson resid.
20
10
0
−10
−20
Leverage
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.5
1
24
53
72
Cook's distance

APPENDIX C

MODEL OUTPUTS

Table A2. Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to the Percentage of Black or African American Students

Deviance Residuals				
Min	1Q	Median	3Q	Max
-12.887	-6.739	-3.572	2.192	25.250
Coefficients				
	Estimates	Std. Error	Z	P-value
Intercept	-3.48405	0.01555	-224.03	<.001
EV2	1.68901	0.02201	76.75	<.001

*Signif. codes: 0 '***'*
(Dispersion parameter for binomial family taken to be 1)

N = 77
Null deviance: 10548.3 on 76 degrees of freedom
Residual deviance: 4365.5 on 75 degrees of freedom
AIC: 4855.9
Number of Fisher Scoring iterations: 5

Table A3. Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to the Percentage of Hispanic or Latino Students

Deviance Residuals				
Min	1Q	Median	3Q	Max
-20.353	-7.814	-3.797	5.410	26.493
Coefficients				
	Estimates	Std. Error	Z	P-value
Intercept	-2.07712	0.01206	-172.19	<.001
EV3	-1.48637	0.02652	-56.04	<.001

*Signif. codes: 0 '***'*
(Dispersion parameter for binomial family taken to be 1)

N = 77
Null deviance: 10548.3 on 76 degrees of freedom
Residual deviance: 7129.2 on 75 degrees of freedom
AIC: 7619.6
Number of Fisher Scoring iterations: 5

Table A4. Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to the Percentage of White Students

Deviance Residuals				
Min	1Q	Median	3Q	Max
-27.8943	-4.7371	0.6326	4.2243	20.2591
Coefficients				
	Estimates	Std. Error	Z	P-value
Intercept	-2.298654	0.009672	-237.67	<.001
EV4	-6.561701	0.135554	-48.41	<.001

*Signif. codes: 0 '***'*
(Dispersion parameter for binomial family taken to be 1)

N = 77
Null deviance: 10548.3 on 76 degrees of freedom
Residual deviance: 6362.3 on 75 degrees of freedom
AIC: 6852.7
Number of Fisher Scoring iterations: 5

Table A5. Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to the Number of Health Services Locations Per Square Mile

Deviance Residuals				
Min	1Q	Median	3Q	Max
-20.498	-11.528	-2.521	6.688	26.664
Coefficients				
	Estimates	Std. Error	Z	P-value
Intercept	-2.5792165	0.0104820	-246.06	<.001
EV5	-0.0083067	0.0006406	-12.97	<.001

*Signif. codes: 0 '***'*
(Dispersion parameter for binomial family taken to be 1)

N = 77
Null deviance: 10548 on 76 degrees of freedom
Residual deviance: 10366 on 75 degrees of freedom
AIC: 10856
Number of Fisher Scoring iterations: 5

Table A6. Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to the Number of Grocery Stores Per Square Mile

Deviance Residuals				
Min	1Q	Median	3Q	Max
-21.251	-12.057	-3.389	6.229	26.524
Coefficients				
	Estimates	Std. Error	Z	P-value
Intercept	-2.431829	0.015934	-152.6	<.001
EV6	-0.083775	0.005017	-16.7	<.001

*Signif. codes: 0 '***'*
(Dispersion parameter for binomial family taken to be 1)

Null deviance: 10548 on 76 degrees of freedom
Residual deviance: 10261 on 75 degrees of freedom
AIC: 10752
Number of Fisher Scoring iterations: 5

Table A7. Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to the Accessible Park Acreage per 1,000 Residents

Deviance Residuals				
Min	1Q	Median	3Q	Max
-20.133	-11.075	-3.952	7.588	27.283
Coefficients				
	Estimates	Std. Error	Z	P-value
Intercept	-2.761139	0.012086	-228.46	<.001
EV7	0.040926	0.003691	11.09	<.001

*Signif. codes: 0 '***'*
(Dispersion parameter for binomial family taken to be 1)

N = 77Null deviance: 10548 on 76 degrees of freedom
Residual deviance: 10435 on 75 degrees of freedom
AIC: 10925
Number of Fisher Scoring iterations: 5

Table A8. Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to Average Number of Violent Criminal Incidents per 1,000 Residents

Deviance Residuals				
Min	1Q	Median	3Q	Max
-20.840	-6.811	-3.158	3.996	20.021
Coefficients				
	Estimates	Std. Error	Z	P-value
Intercept	-3.545653	0.016076	-220.56	<.001
EV1.04	0.019008	0.000253	75.13	<.001

*Signif. codes: 0 '***'*
(Dispersion parameter for binomial family taken to be 1)

N = 77
Null deviance: 10548.3 on 76 degrees of freedom
Residual deviance: 5244.5 on 75 degrees of freedom
AIC: 5734.9
Number of Fisher Scoring iterations: 5

Table A9. Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to EV1.01 + EV1.02 + EV1.03 + EV1.04 = EV1.05

Deviance Residuals				
Min	1Q	Median	3Q	Max
-13.270	-4.700	-1.443	3.168	19.932

Coefficients				
	Estimates	Std. Error	Z	P-value
Intercept	-5.3296951	0.0791021	-67.38	<.001
EV1.01	3.8737022	0.1409323	27.49	<.001
EV1.02	12.9751465	0.4389087	29.56	<.001
EV1.03	-2.4586019	0.1986872	-12.37	<.001
EV1.04	0.0131680	0.0004676	28. 16	<.001
EV1.05	-2.6688066	0.0903784	-29.53	<.001

*Signif. codes: 0 '***'*
(Dispersion parameter for binomial family taken to be 1)

N = 77
Null deviance: 10548.3 on 76 degrees of freedom
Residual deviance: 3317.1 on 71 degrees of freedom
AIC: 3815.5
Number of Fisher Scoring iterations: 4

Table A10. Number of K-8 Students Leaving Region for Non 1+/1 Schools Compared to all Variables (EV1 through EV7)

Deviance Residuals				
Min	1Q	Median	3Q	Max
-14.135	-3.846	-1.407	3.173	21.174

Coefficients				
	Estimates	Std. Error	Z	P-value
Intercept	-3.7905704	0.1574847	-24.069	<.001
EV1	0.0242206	0.0212510	1.140	<.001
EV2	2.0338325	0.1576790	12.899	<.001
EV3	0.5966193	0.1535086	3.887	<.001
EV4	-2.2518330	0.2628279	-8.568	<.001
EV5	0.0034710	0.0007562	4.590	<.001
EV6	0.0274754	0.0062315	4.409	<.001
EV7	-0.0413376	0.0046174	-8.953	<.001

*Signif. codes: 0 '***'*
(Dispersion parameter for binomial family taken to be 1)

N = 77
Null deviance: 10548.3 on 76 degrees of freedom
Residual deviance: 3294.1 on 69 degrees of freedom
AIC: 3796.5
Number of Fisher Scoring iterations: 5

Table A11. Model Summary of Composite Variable

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	-2.86***	-2.75***	-2.63***	-3.07***	-2.66***	-2.63***	-2.64***
EV1 - Composite variable consisting of variables listed below	.65***						
EV2 - Percentage of Black or African American students		0.67***					
EV3 - Percentage of Hispanic or Latino students			-0.50***				
EV4 - Percentage of White students				-1.13***			
EV5 - Health services locations per square mile					-0.13***		
EV6 - Grocery stores per square mile						-0.15***	
EV7 - Accessible park acreage per 1,000 residents							0.12***
N	77	77	77	77	77	77	77
AIC	6467.66	4855.95	7619.63	6852.70	10856.18	10751.86	10925.30
BIC	6472.35	4860.63	7624.31	6857.38	10860.87	10756.55	10929.99
Pseudo R2	1.00	1.00	1.00	1.00	0.91	0.98	0.77
*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$							

APPENDIX D

FREQUENCY DISTRIBUTIONS

Figure A10. Frequency Distribution of the Number of all K-8 Students in Each Community Area that Enroll in Non-Level 1+/1 Schools Outside their Community Area (SY18-19)

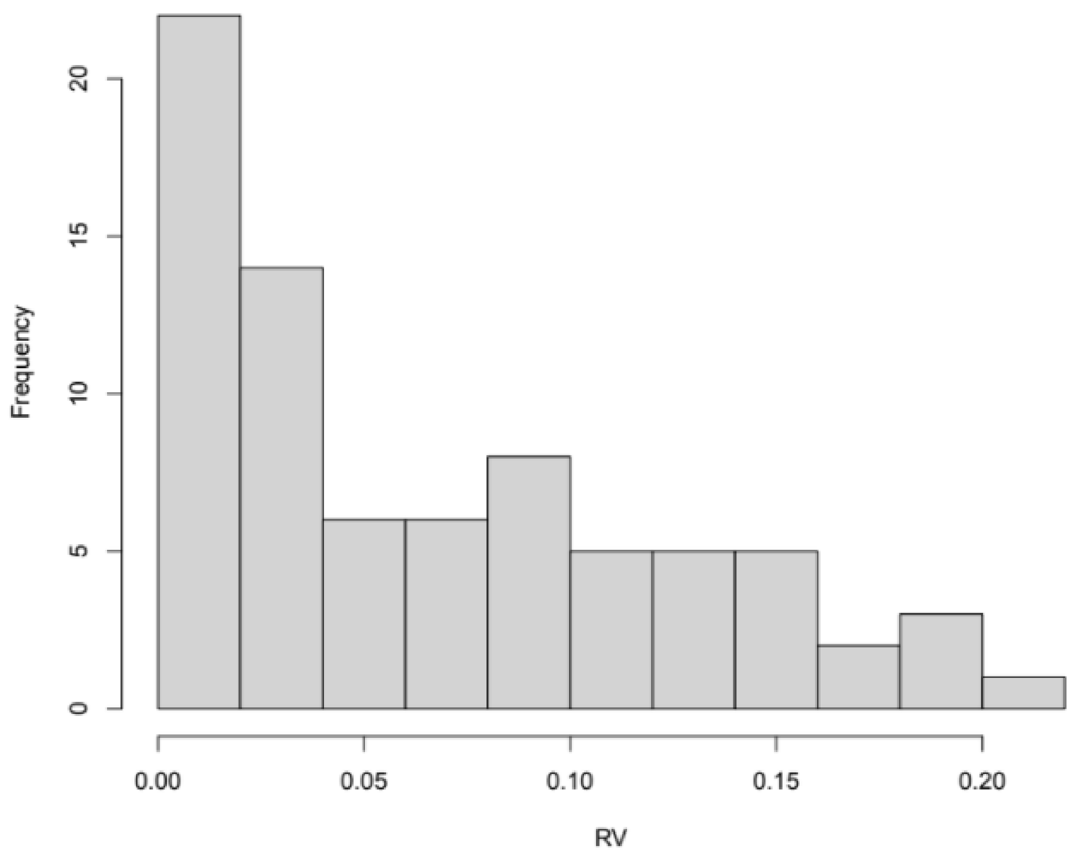


Figure A11. Frequency Distribution of Percentage of Hispanic or Latino Students (SY18-19)

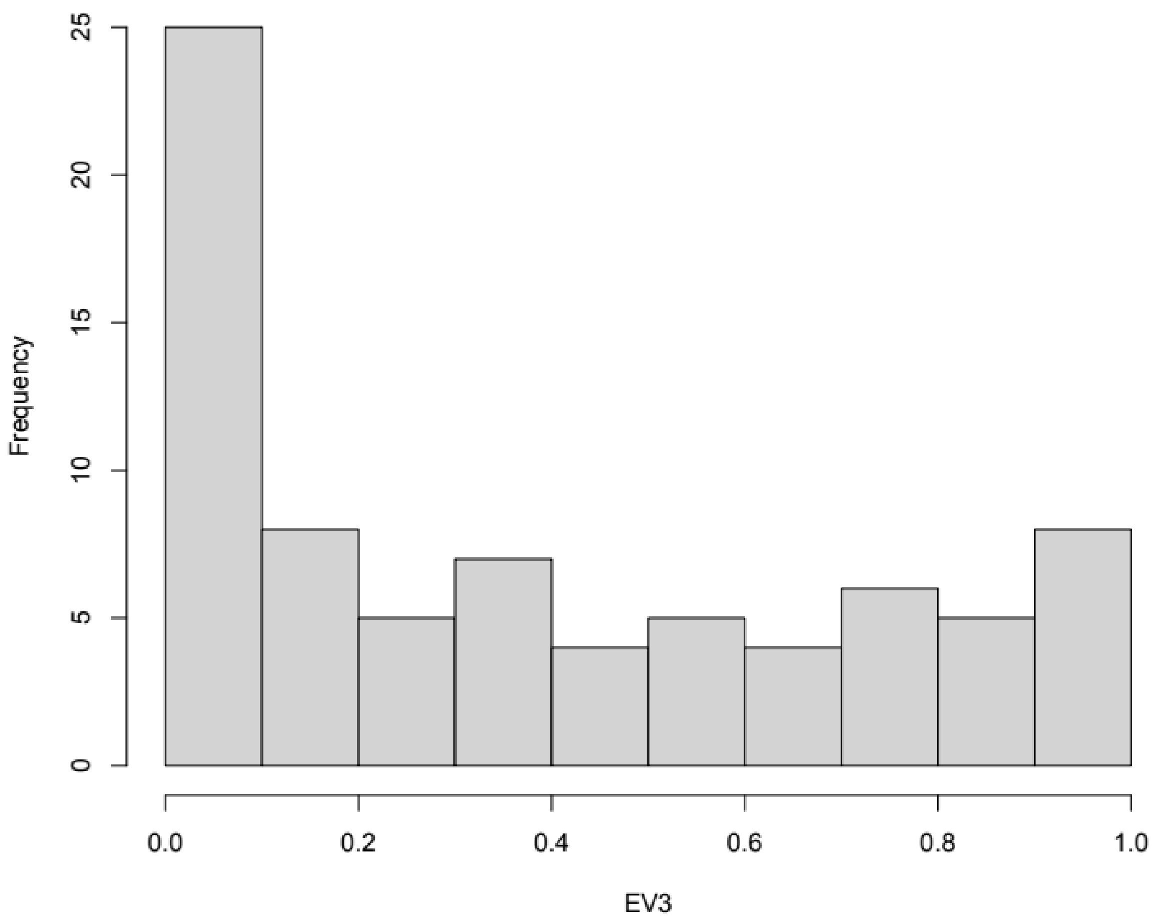


Figure A12. Frequency Distribution of Percentage of White Students (SY18-19)

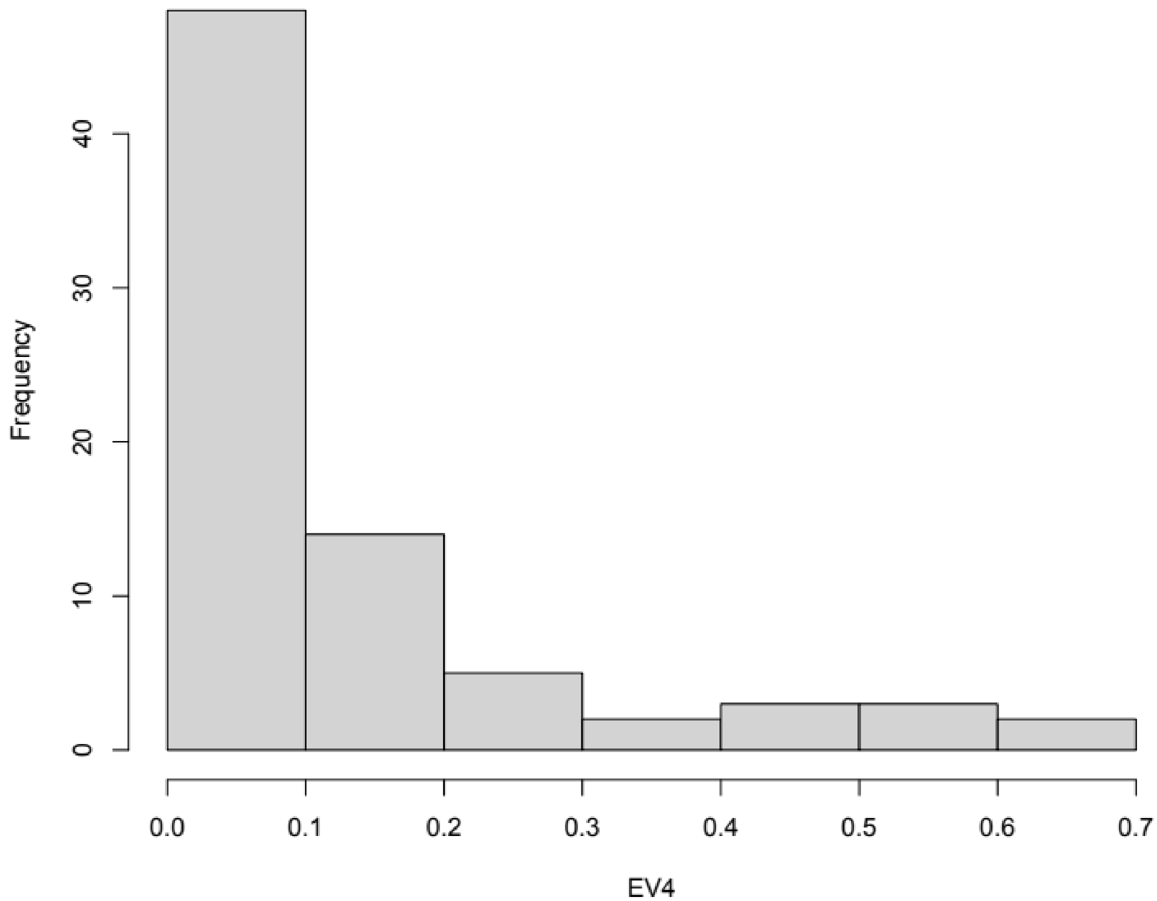


Figure A13. Frequency Distribution of Health Service Locations per Square Mile (2019)

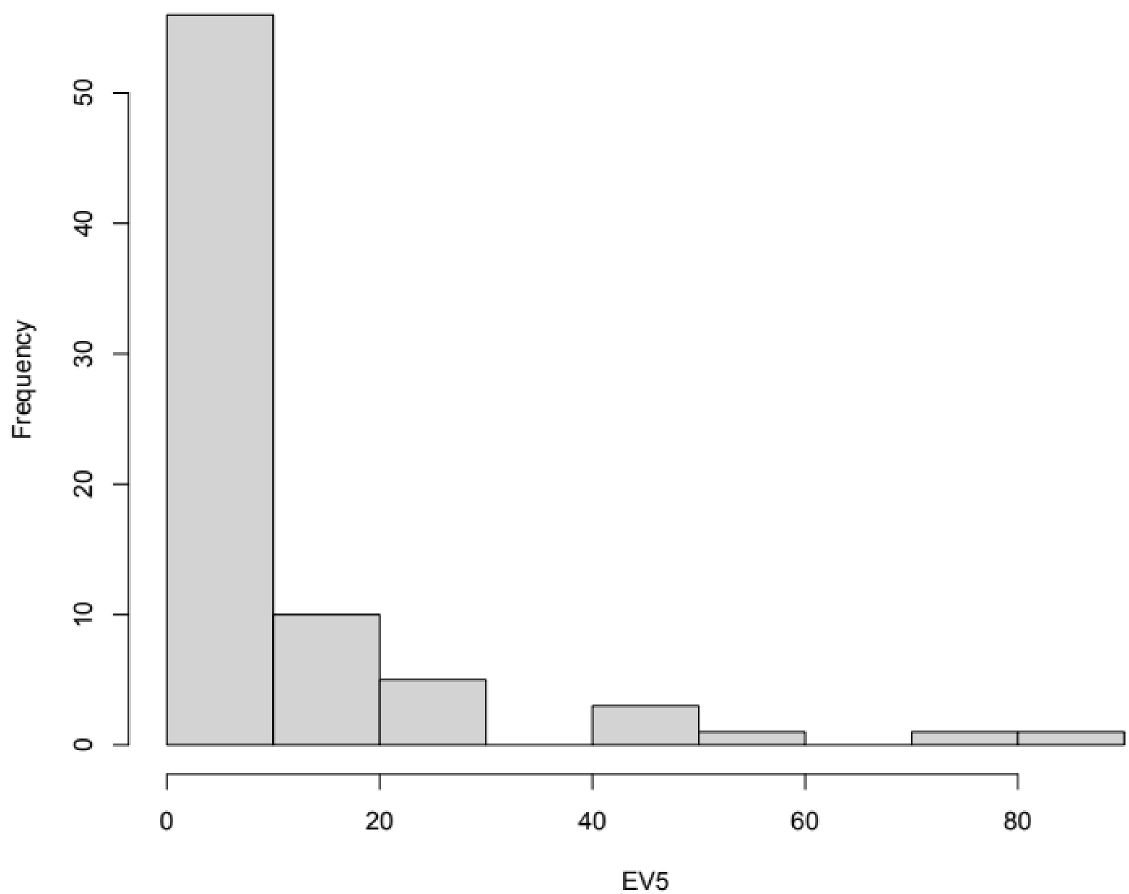


Figure A14. Frequency Distribution of Grocery Stores per Square Mile (2019)

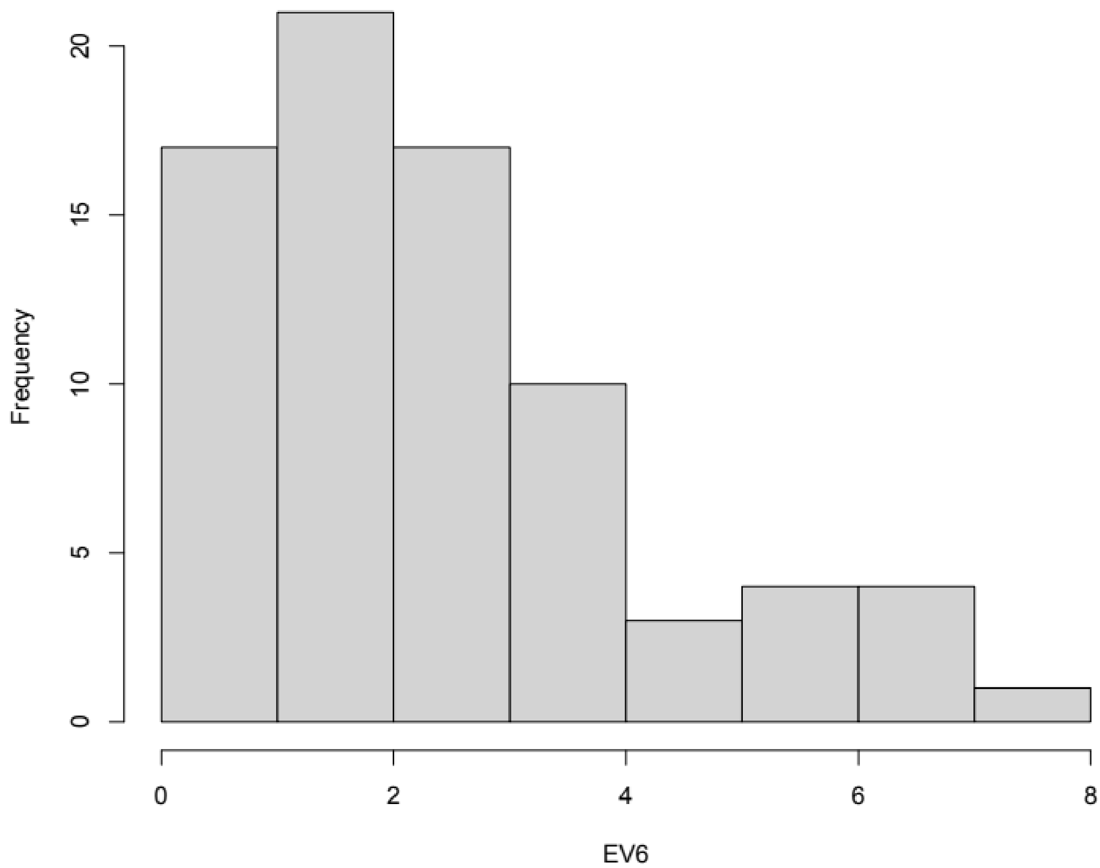


Figure A15. Frequency Distribution of Accessible Park Acreage per 1,000 Residents (2019)

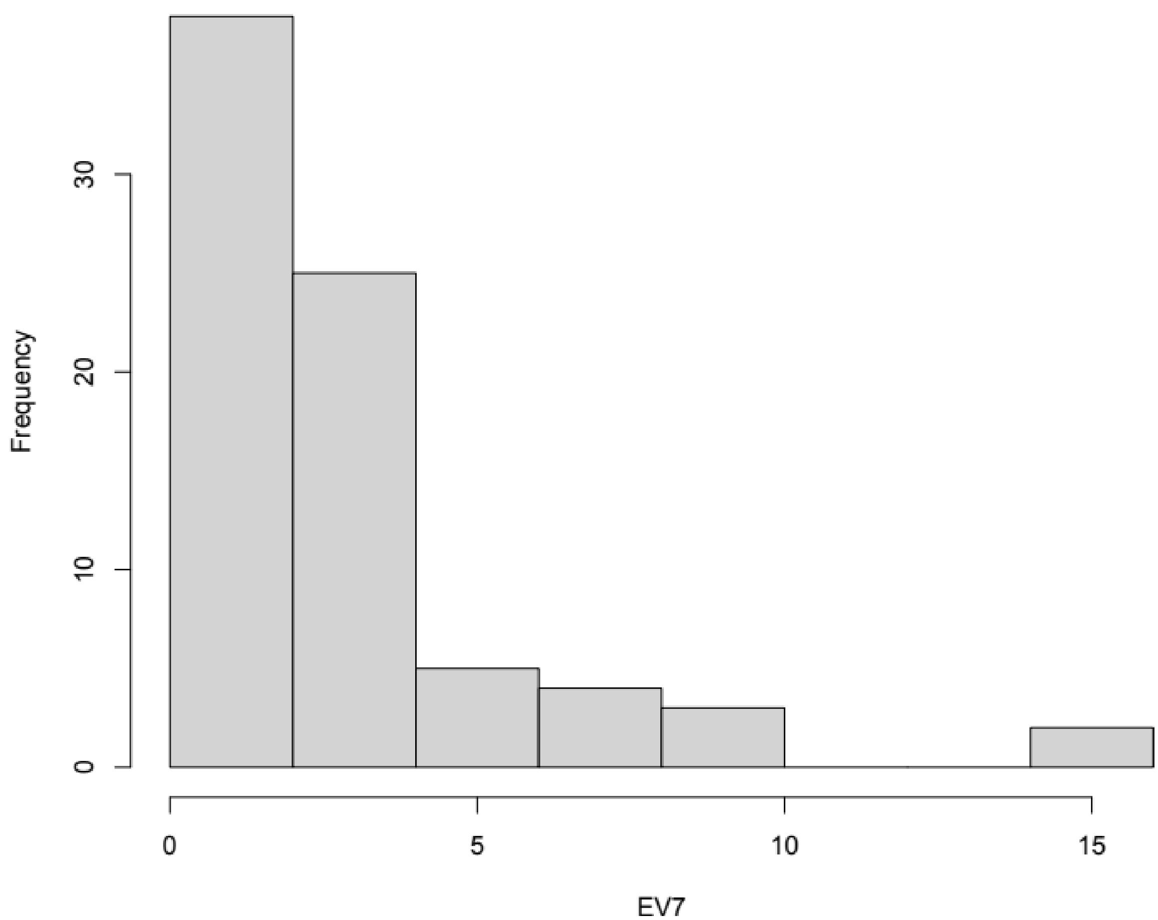


Figure A16. Frequency Distribution of Percentage of Low-income Students (SY18-19)

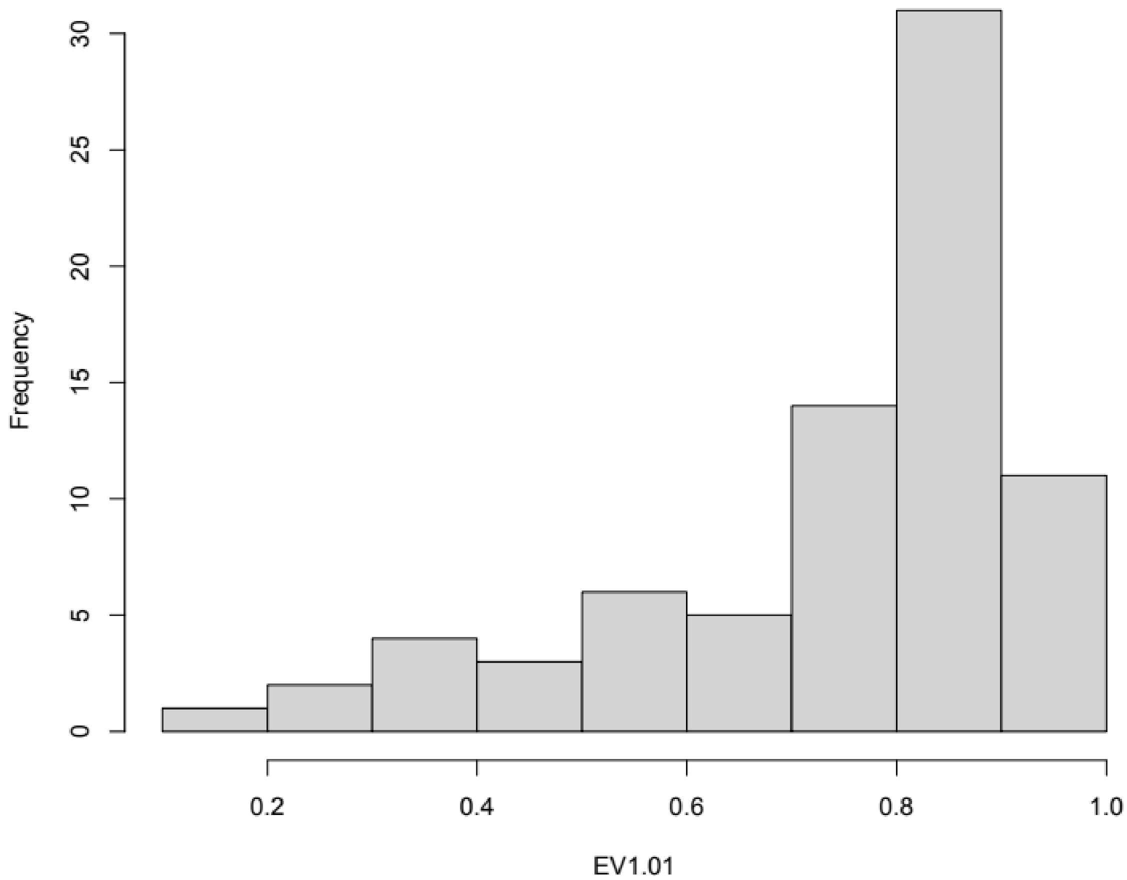


Figure A17. Frequency Distribution of Percentage Unemployed (2019)

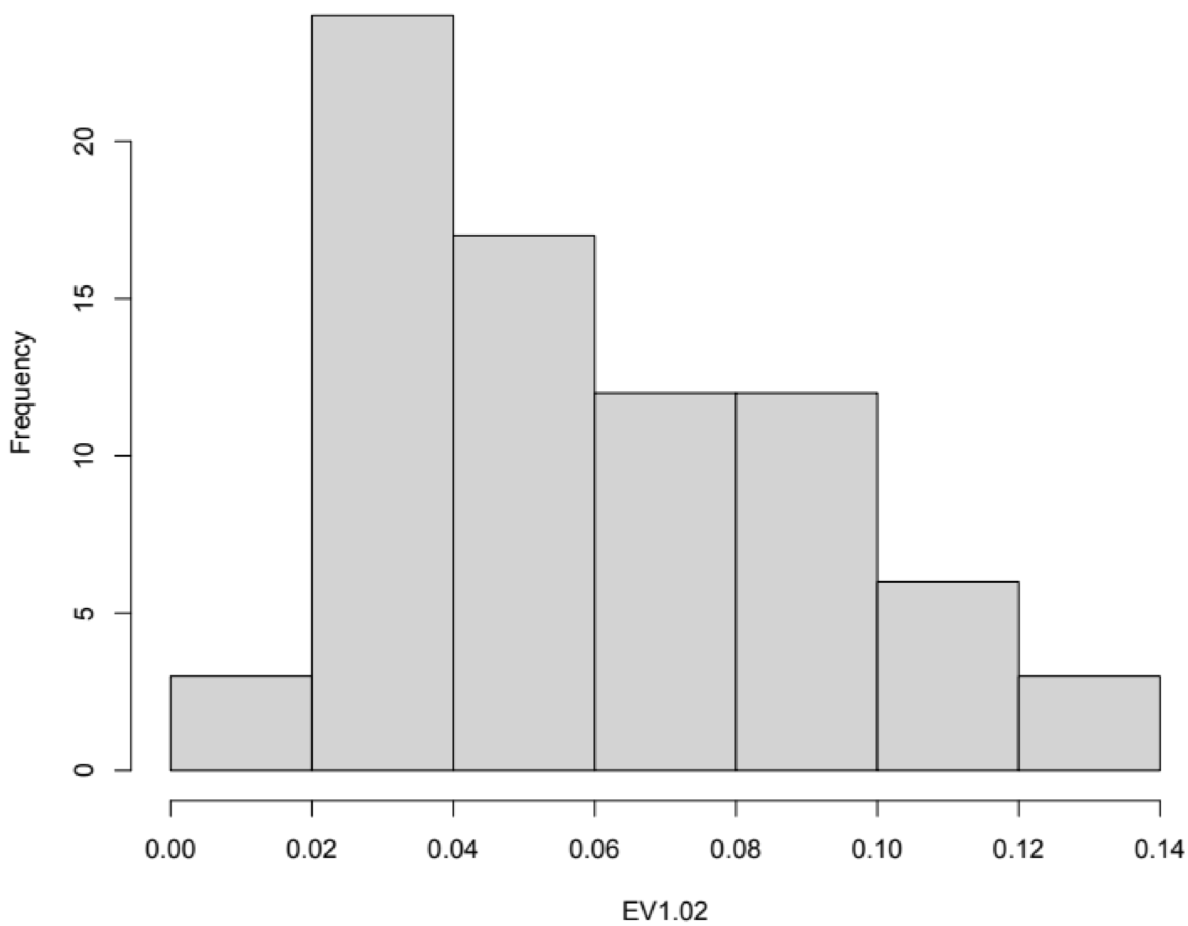


Figure A18. Frequency Distribution of Vacant Land Percentage (2019)

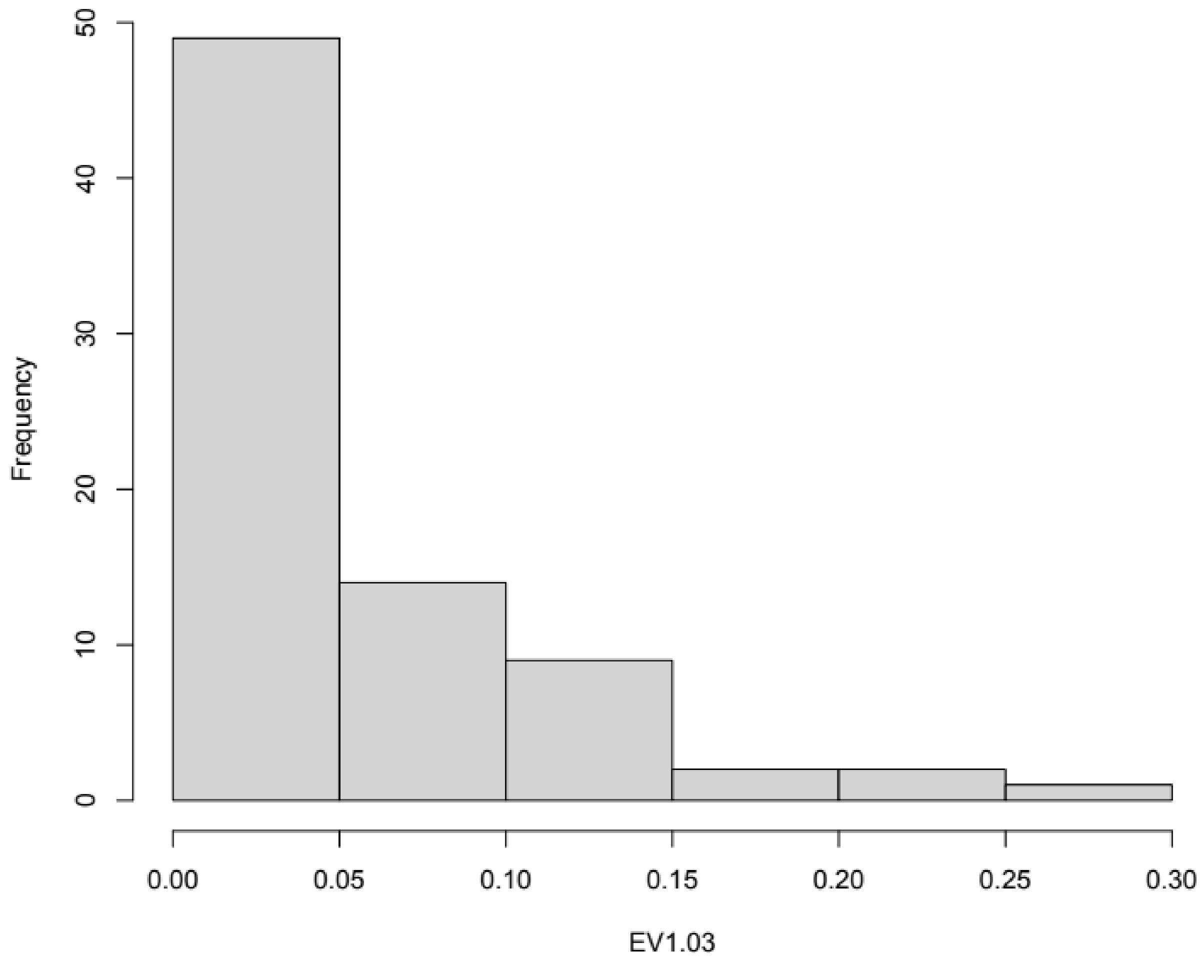


Figure A19. Frequency Distribution of Average Number of Violent Criminal Incidents per 1,000 Residents (2015-2019)

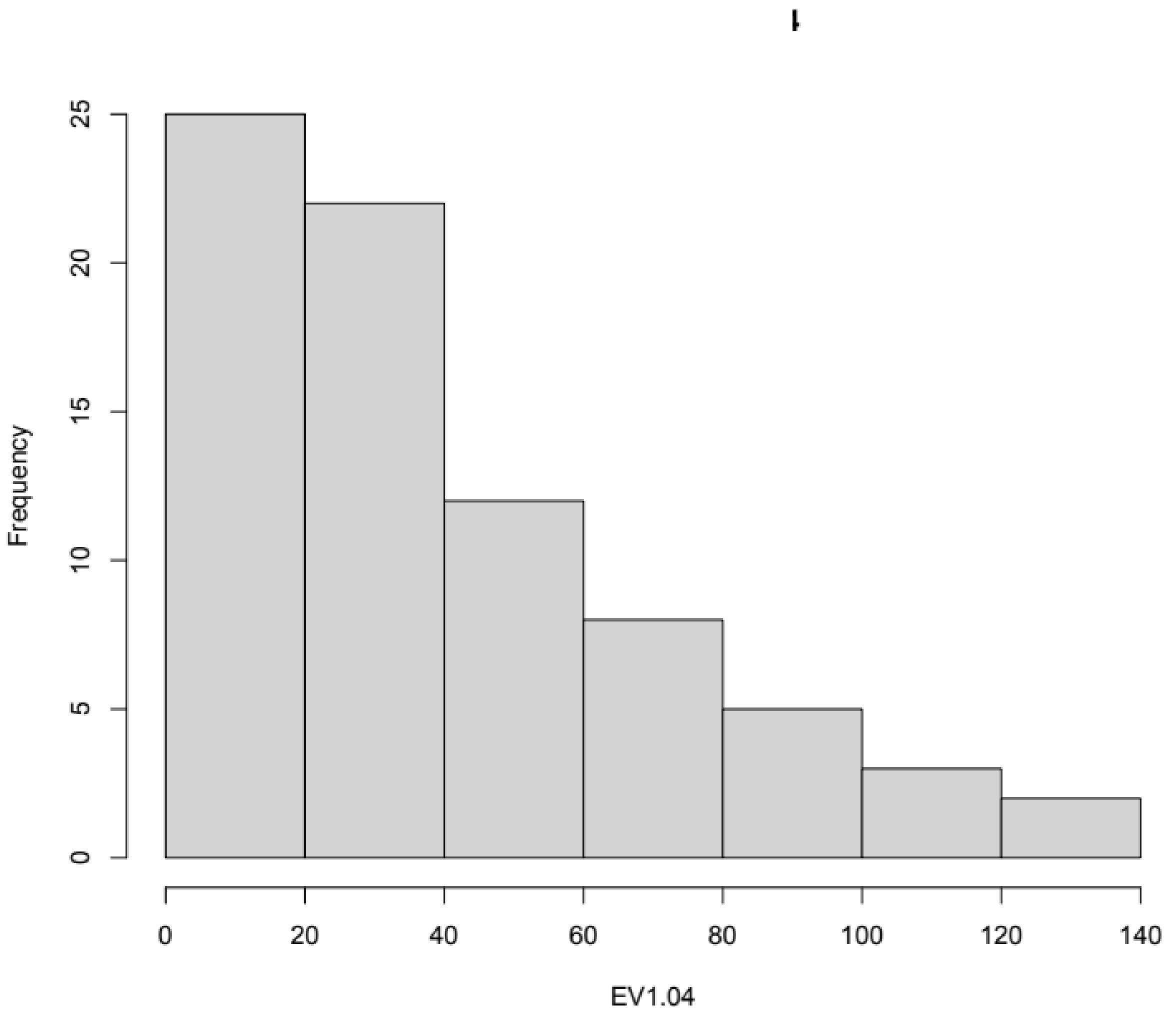
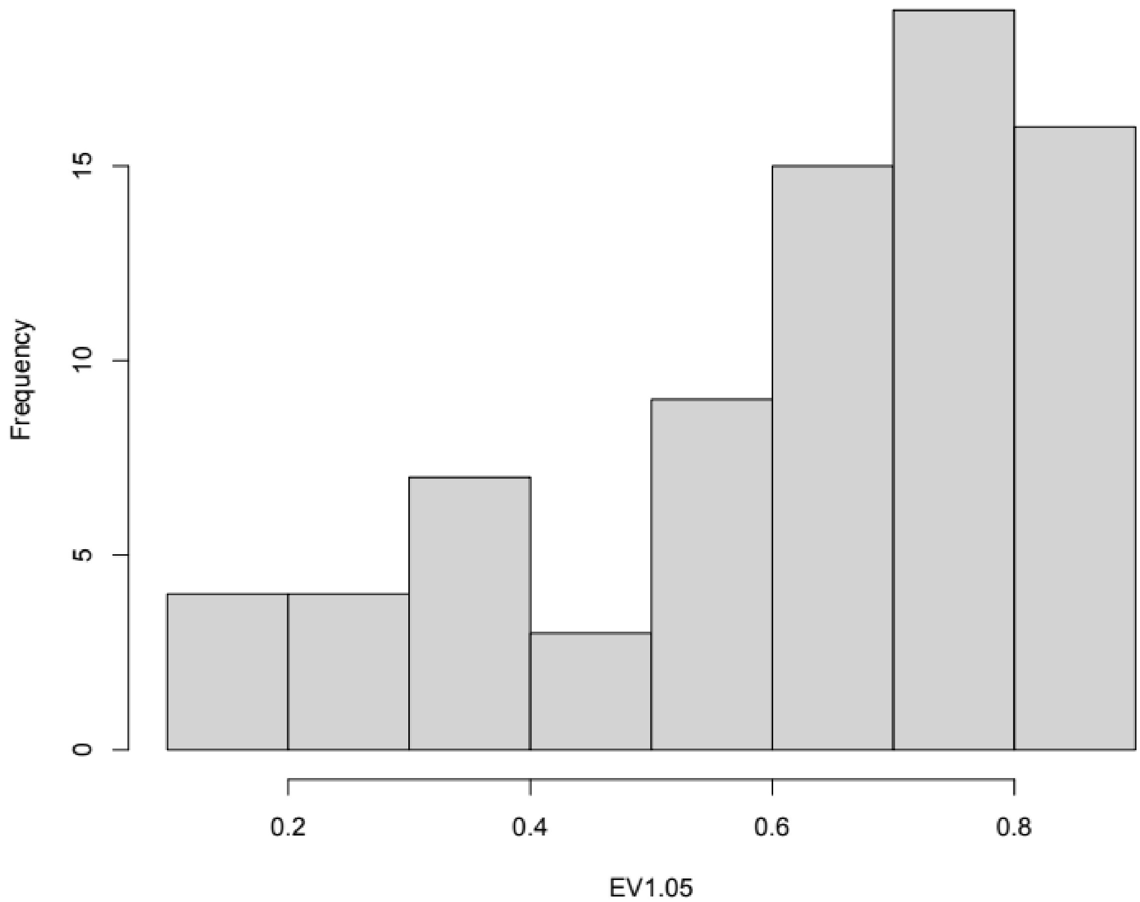


Figure A20. Frequency Distribution of Percentage of Population 25 or Older that do not have an Associate's Degree or Higher (2019)



APPENDIX E

UNFILLED LEVEL 1+/1 SEATS IN PREDOMINATELY AFRICAN AMERICAN STUDENTS

Community Area	Comm Area #	% Students Left Region for Non 1+/1 School	No. of Students Left Region for Non 1+/1 School	% of Students that are Black or African American	Available ES Level 1+/1 Seats in Region
NEAR SOUTH SIDE	33	4%	40	61%	275
BEVERLY	72	6%	64	75%	113
RIVERDALE	54	9%	106	76%	0
HYDE PARK	41	4%	33	76%	158
SOUTH CHICAGO	46	10%	289	78%	770
WEST ENGLEWOOD	67	13%	480	83%	779
MORGAN PARK	75	15%	261	84%	730
AUSTIN	25	8%	786	86%	3135
KENWOOD	39	7%	80	89%	528
WEST PULLMAN	53	10%	328	89%	387
FULLER PARK	37	22%	62	92%	0
DOUGLAS	35	8%	115	92%	255
ROSELAND	49	19%	767	92%	856
PULLMAN	50	18%	124	93%	359
NORTH LAWNDALE	29	9%	442	93%	3594
GRAND BOULEVARD	38	10%	201	94%	455
ENGLEWOOD	68	13%	392	94%	880
SOUTH SHORE	43	18%	870	95%	606
CHATHAM	44	16%	398	95%	912
WASHINGTON PARK	40	15%	246	95%	459
EAST GARFIELD PARK	27	9%	219	95%	1668

CALUMET HEIGHTS	48	13%	135	96%	432
AVALON PARK	45	18%	149	96%	457
WEST GARFIELD PARK	26	6%	134	97%	2008
GREATER GRAND CROSSING	69	20%	724	97%	818
AUBURN GRESHAM	71	10%	497	97%	2024
WOODLAWN	42	12%	273	97%	1215
OAKLAND	36	8%	63	97%	292
WASHINGTON HEIGHTS	73	15%	378	98%	488
BURNSIDE	47	15%	40	99%	0

APPENDIX F

RELEVANT DATA SETS

I. Annual Regional Analysis (ARA) education data, that includes the following fields:

- Community Area & ID
- Number of K-8 students per community area as a whole in SY1819 who reside in the community area (note this will not include individual grade level or average).
- Number of K-8 students in SY1819 whose zoned school is in their residing community area.
- Number of K-8 students in SY1819 whose zoned school is in their residing community area and whose zoned school has a 4-year SQRP score average of 4.0 or above (Level 1+).
- Number of K-8 students in SY1819 whose zoned school is in their residing community area and whose zoned school has a 4-year SQRP score average of 3.5 or above, up to 4.0 (Level 1).
- Number of neighborhood (boundary) schools in the community area.
- Number of neighborhood (boundary) schools in the community area that have a 4-year SQRP score average of 4.0 or above (Level 1+).
- Number of neighborhood (boundary) schools in the community area that have a 4-year SQRP score average of 3.5 or above, up to 4.0 (Level 1).
- Number of K-8 students in SY1819 whose zoned school is in their residing community area and whose zoned school has a 4-year SQRP score average of 3.5 or above (Level 1+/1) but do not attend school in their community area.
- Number of K-8 students in SY1819 whose zoned school is in their residing community area and whose zoned school has a 4-year SQRP score average of 3.5

or above (Level 1+/1) but attend a charter or contract school outside the community area.

- Number of K-8 students in SY1819 whose zoned school is in their residing community area and whose zoned school has a 4-year SQRP score average of 3.5 or above (Level 1+/1) but attend a neighborhood school (boundary school) outside the community area.
- Number of K-8 students in SY1819 whose zoned school is in their residing community area and whose zoned school has a 4-year SQRP score average of 3.5 or above (Level 1+/1) but attend a magnet school outside the community area.
- Number of K-8 students in SY1819 whose zoned school is in their residing community area and whose zoned school has a 4-year SQRP score average of 3.5 or above (Level 1+/1) but attend a selective enrollment school outside the community area.
- The number and percentage of K-8 students by community area who attend a Level 2+, Level 2, or Level 3 school outside of their region.

II. Publicly available data from the City of Chicago, including:

a. Criminal incidents from 2001 to present including reported incidents of crime that occurred within each community area. Data is extracted from the Chicago Police Department's CLEAR (Citizen Law Enforcement Analysis and Reporting) system. Incidents are broken down by Uniform Crime Reporting (UCR) code. The City of Chicago also includes Chicago Police Department (CPD) Illinois Uniform Crime Reporting (IUCR) Codes. Illinois Uniform Crime Reporting

(IUCR) codes are four-digit codes that law enforcement agencies use to classify criminal incidents when taking individual reports. These codes are also used to aggregate types of cases for statistical purposes. In Illinois, the Illinois State Police establish IUCR codes, but the agencies can add codes to suit their individual needs. The Chicago Police Department currently uses more than 350 IUCR codes to classify criminal offenses, divided into “Index” and “Non-Index” offenses. Index offenses are the offenses that are collected nation-wide by the Federal Bureaus of Investigation’s Uniform Crime Reports program to document crime trends over time (data released semi-annually), and include murder, criminal sexual assault, robbery, aggravated assault & battery, burglary, theft, motor vehicle theft, and arson. Non-index offenses are all other types of criminal incidents, including vandalism, weapons violations, public peace violations, etc.

b. The City of Chicago’s Public Health Services Chicago Primary Care Community Health Centers data. This data includes locations and contact information for Chicago primary care community health clinics (including all federally qualified health centers and similar community health centers that provide primary care and are open to the general community).

c. Grocery stores by community area (2013) which was used by the city to calculate the estimates of Chicagoans living in food deserts in 2011. Data in this file was cross-referenced with the city's business license data (http://bit.ly/sMFZdN).

d. Chicago Owned Land Inventory data that tabulates the amount of vacant property owned and managed by the City of Chicago Department of Planning and

Development. Based on the City-Owned Land Inventory; Updated August 23, 2019.

II. 2016 - 2019 MAPSCorps data including the number of establishments by community area in the following categories:

a. Arts and Entertainment
b. Childcare and Schools
c. Dining
d. Financial, Insurance, Real Estate, Legal, and Professional
e. Fitness
f. Health Services
g. Industrial
h. Other
i. Personal Service
j. Public Services
k. Religious (except school or residence)
l. Retail
m. Service or Programmed Residential Space
n. Social Services & Political Advocacy
o. Trade Service
p. Wholesale, Storage and Transportation

III. CMAP Illinois 2019 community data including, but not limited to, the categories outlined below:

- Age Cohorts
- Educational Attainment
- Employment in the Community
- Employment of Community Residents
- Employment Status
- General Land Use
- General Merchandise Retail Sales
- General Population Characteristics
- Household Income
- Housing & Transportation (H+T) Costs, Percent of Income per Household
- Housing and Tenure
- Park Access
- Race and Ethnicity
- Vehicles Available
- Walk Score

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